Inside this issue . . .

For non-UK readers who access EUMETCast via C-Band, Kobus Botha describes how to optimise your signal strength

Newcomers and seasoned readers alike will be fascinated by Mike Stevens' look back through the history of gaining data for weather forecasting, from the days of balloons to the satellites we now take so much for granted
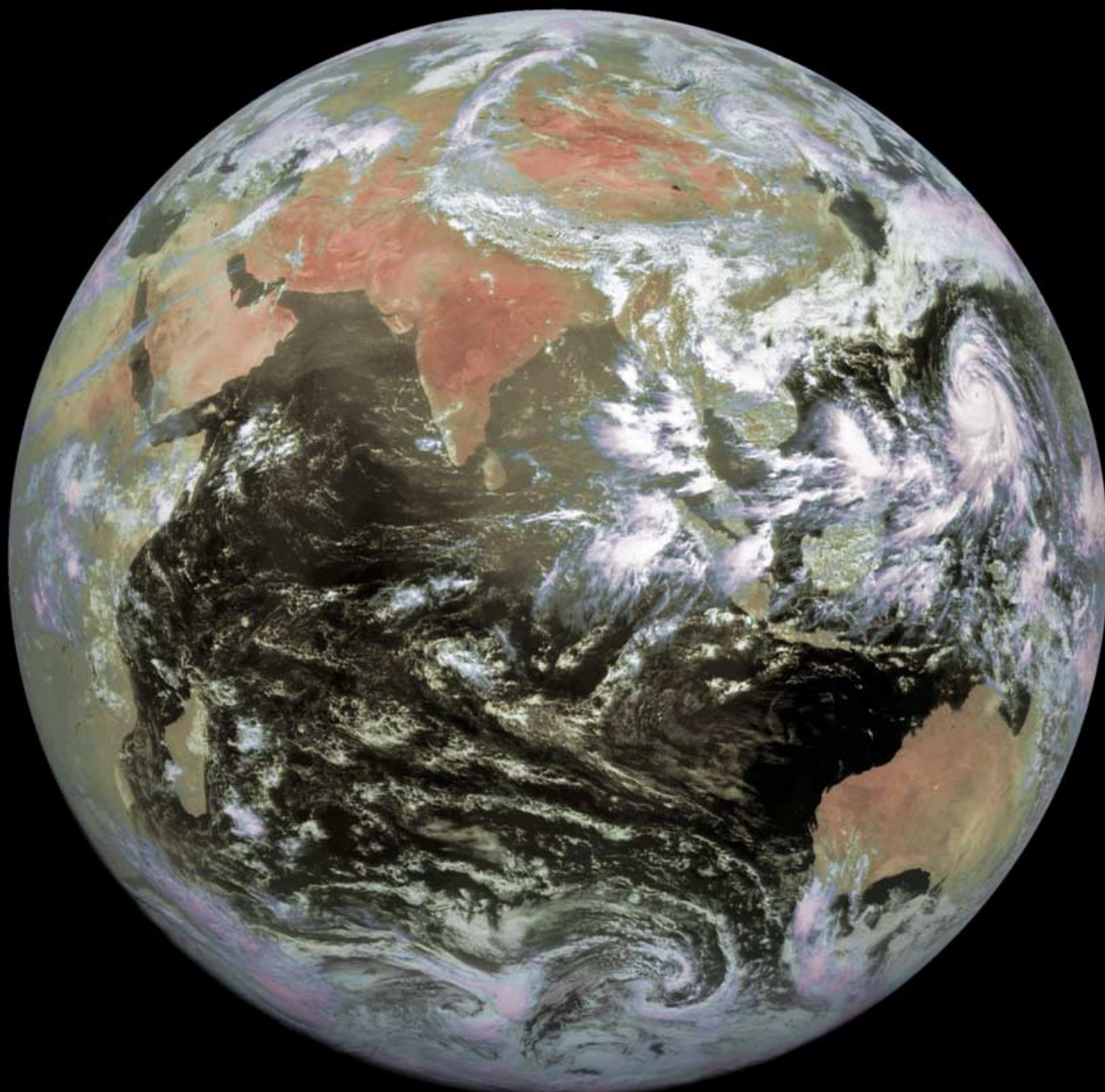
Our Readers' Survey showed that the majority of you are still APT enthusiasts. Nigel Evans has decided to whet your appetites by running GEO's first APT Image competition

Marc Peigneux describes an expedition to evaluate APT imaging from a high pass in the French Alpes-Maritimes

Rob Alblas writes about the new BUFR scatterometer data that is now available over EUMETCast, and explains how you can use his Xrit2Pic software to superimpose it over weather satellite images

And much more ...

APT Image Competition

After an initially disappointing response, the GEO Readers Survey gathered momentum following publication of the June issue. We are grateful for this feedback which has now been circulated to everyone on the GEO Management Team. Comments were largely supportive of GEO but, as always, some readers have concerns and we will do our best to address these. A summary of the main points of the survey appears on page 10.

Another healthy outcome from Quarterly No 18 was the response to Laurence Holderness' article on *The Current Weather Satellite Scene*. Never before have we received such a comprehensive and animated response from readers—all strongly supporting his views. In a nutshell, it is perceived that setting up a *EUMETCast* system is fraught with difficulties and that the processing and imaging software is viewed as highly complex. Almost without exception the call is for simplified software with just enough options to download a few images per day. You can read our monster 'postbag' from page 42.

We also hear from time to time of the problems members have of restoring a failed *EUMETCast* system. This is not an everyday process, and currently one member, who had enjoyed a number of successful years of *EUMETCast* imaging, spent several weeks of effort before he was able to return his system to a working state. The problem is that the process if installing and configuring all the software is not entirely intuitive. With this in mind, now that *EUMETCast* is well established, it seems the ideal time to update our *Helplines* service. Any reader who now considers himself expert enough in any specific area is invited to add contact details to our regular *Helplines* column in the centrefold See *Updating GEO's Helplines* on page 11.

For the die-hard EUMETCast enthusiast looking for new types of data to analyse, both Rob Alblas and David Taylor explain how their software packages are being extended to interpret BUFR wind scatterometer data files.

And finally, for those with simpler tastes, Nigel Evans is running GEO's first ever readers' competition. Presented with a particular date, you are invited to submit a NOAA-18 APT image. The entry adjudged the best will be awarded complimentary entry to GEO's 2009 Symposium. Details on page 19.

Contents

The GEO Report

Francis Bell

I often start my Quarterly report with a welcome to new members of GEO. This is not a superficial remark because we need to maintain or increase our membership, not just for the sake of numbers but to have a pool of people who can share their technical skills: perhaps helping beginners who may be using weather satellite for the first time or the more experienced users by pushing back the frontiers of what is possible for individuals, educational and non-commercial users of weather satellites. If you can, please encourage others to join GEO.

On the subject of help, I would like to refer members to the published helplines which are available to those seeking help with satellite issues, either hardware or software. Please use these help lines because the people concerned have offered their services to our Group and it takes some of the workload off others. For example, our *GEO Shop*, which is run by Clive and Carol Finnis; they are very busy people dealing with the acquisition of stock and making it available to members and non members. It would be helpful if they were not contacted on routine matters relating to the operation of equipment. We are grateful to Clive and Carol, who are committed to running the Shop on behalf of GEO; they should not be further burdened with enquiries unless it relates to a specific order.

Do, please, research your requirement and then use the helplines on our centre pages if you need advice or have problems.

At this point it may be appropriate, on behalf on the membership, to thank all the management team for offering their services to the Group. All are busy people but offer to give up some of their time in pursuit of our common interests. And a reminder that nobody gets paid for doing this; in fact it often costs individuals money for telephone calls, postage and travel to service GEO. Membership subscriptions cover little more than the cost of printing and distributing our Quarterly.

Our Quarterly publication is perhaps the jewel in GEO's crown but it is currently at risk. For some time now our editor, understandably, has indicated his wish to retire. As best I know there have been no offers of help from others and unless there is, it's likely that the format and perhaps the frequency of our publication will change. If two or three members were to collectively share editorial duties there may be a solution. For example one person editing text, someone else looking after the layout and perhaps someone liaising with the printers. This would spread the workload. Other combinations of responsibilities may be equally appropriate. However, members must accept this notice that without additional help the Quarterly is certain to change.

On a positive note, GEO has been particularly active recently. In May we held our own symposium in Leicester and you can read a report on page 4. GEO was involved in the three day AMSAT-UK meeting in Guildford in the final week-end of July; David Taylor's illustrated report can be found on page 28. I also recently gave a public demonstration of live APT reception at the amateur radio station GB2 CPM located close to the telecommunications exhibition at Amberly Museum, West Sussex. At all these events, live weather satellite reception was demonstrated.

The Year Ahead

Thinking ahead to next year, I have been looking for an alternative venue for our own symposium, which has been staged at the NSC in Leicester for the past five years. A change of venue may be appropriate and I am researching several ideas. Sharing our symposium with another event may be an attractive idea. ***Please let me know what you think on this subject***. A full day conference—with lunch included—is available at one very attractive venue, but the cost is likely to be about £35. I just don't know whether members would like this.

Events

The programme of events which we have arranged for the rest of this year is

- September 28, 2008 - The west London Radio and Electronic Show at Kempton. Note this is a revised date.
- October 24/25, 2008 - The Leicester Amateur Radio Show, Donington.
- December 8-12, 2008 - The NOAA Direct Readout Conference, Miami, USA. For details of this event contact the web site at ***www.directreadout.noaa.gov/miami08***

Water Problems

GEO members seem to have very few problems using the equipment they buy from the *GEO Shop* and I attribute this the competence and technical skills of our members. Hence it was a little surprising when a PCI board was returned to the shop because it had developed a fault. When the board in question was forwarded to our hardware expert he suggested water damage was a likely cause of the fault. Perhaps water had worked its way down the coax and on to the PCI board causing corrosion.

Personally, I take care to wrap my external coax connections in self-amalgamating tape to keep them waterproof. However, to my consternation, a temporary dish and coax I had installed for *Hot bird-6* began losing signal strength. I had left the signal strength meter in the circuit and lying on the grass, which must have become wet at some stage. Investigation revealed considerable water condensation inside the meter, hence the reduced signal strength. I took the meter out of the circuit and a full signal was restored.

It may be better not to leave the meter in the circuit but that is not quite the point of the story; *that* was the ease with which water can enter joints and cause problems. I disassembled the meter and over a period of two days it dried out. The joints in the meter case are not waterproof and I will take more care in future.

A final note. GEO is almost five years old with a distinguished and talented membership recognised internationally by agencies such as BNSC in the UK, EUMETSAT in Europe and NOAA in the USA. To maintain the quality of our activities and contributions to the world wide observation of our planet we need constant support from our membership. Please consider what you can contribute to GEO in the form of articles, images reminiscences and wxsat experiences.

QUARTERLY❓QUESTION

The question posed in *Quarterly No 18* related to the boundary layer above Earth's surface, known as the *thermopause*. This is a rather indistinct boundary where any given particle is as likely to drift off into 'deep' space as it is to remain associated with the Earth.

I became interested in the thermopause because its altitude range lies close to the region occupied by sun-synchronous polar

orbiting satellites such as the NOAAs and Metop at around 800 km and Jason-2 at 1336 km. My reference answer was taken from BNSC's *Space:UK* issue 23 which gave a figure of 'about 690 km'. This boundary is somewhat dynamic so some research on the Internet produced more details. Try typing 'thermopause' into a search engine such as *Google* and you can discover a wealth of information.

Disappointingly, I only received three responses, from Andreas Lubnow, Ian Leitch and Sally Wannop. All answers I considered to be correct although they quoted slightly different figures. My thanks to them for their responses: as for the rest of the membership—well, you can't be too interested in the environment in which weather satellites operate!

I have recently received the summer copy of *Space:UK,* issue number 25. It's always a very interesting publication. If you would like to receive a regular copy (published three times per year), I suggest you write to

> British National Space Centre
> Publications Office
> Kingsgate House
> 66-74 Victoria Street
> London SW1E 6SW

and ask to be put on their mailing list. Alternatively email them, or visit their web site,

www.bnsc.gov.uk

The Quarterly Question for this month, I'm pleased to say, was submitted by EUMETSAT. I take it as a compliment on behalf of GEO that EUMETSAT takes an interest in GEO's activities.

Background to the Question

Approximately 70% of Earth's surface is covered by water, some, marginal seas, others, major oceans. These have a major influence on the planet's climate: for example, the top three metres has as much thermal capacity as the whole of the atmosphere—and it's worth noting the average depth of the sea is about four kilometres.

A number of Earth observation satellites have been specifically designed to measure sea surface height. This has to be done against a background of sea surface waves, tides and noting that the Earth is not a perfect sphere, being distinctly flattened at the poles. The other variable is the observing satellite itself and knowing its exact position when taking measurements.

The success of high precision altimetry started in 1992 with the *TOPEX/Poseidon* mission which was generated by international cooperation between NASA (USA) and CNES (France). This was followed by *Jason-1*. The next satellite, Jason-2, involves

EUMETSAT, together with CNES, who provide the European contribution towards the mission. Jason-2 was recently launched and is currently in the commissioning phase. With a further anticipated rise in sea level as a result of Global Warming, it's critical to secure reliable data relating to global sea levels.

Quarterly Question 19

This question was submitted by Sally Wannop, user support manager at EUMETSAT, following consultation with their resident Jason-2 expert. Well, if you anticipate this will be a hard question, you're right: here it is!

> **What are the instruments required to build a high-accuracy altimetry mission such as Jason-2, giving a measurement accuracy of 3 to 4 cm for sea surface height?**

I do have a model three-line answer from EUMETSAT, which will be published in the December Quarterly. However, having read the answer, it might have taken me three years of PhD research to come up with the correct answer. On the other hand EUMETSAT's web site and their publications give most of the answer. Visit their web site at

www.eumetsat.int

as a first step in researching any answer.

> The inducement to submit an answer is the promise by EUMETSAT to send Jason-2 resource materials and 'goodies' to those providing correct answers. Your answers should be sent to Francis Bell

francis@geo-web.org.uk

not to EUMETSAT. Even a reasonable fraction of the model answer, I will judge as correct. With the prospect of receiving materials from EUMETSAT, please include your name and full postal address in any email you send to me.

If you can't manage the main question, here is an alternative straightforward question.

> **What was the date and time, in UTC to within one minute, of Jason-2's launch and what was the launch vehicle?**

If you can't manage either of the above here is a final question.

> **What is the classical connection between Poseidon and Jason?**

A clue here is that my Citroen Xsara car is a pretty blue colour which the manufacturer describes as 'Poseidon blue'. No prizes here, but email me your single three-letter word answer anyway.

Thunderstorm Season begins with a bang

EUMETSAT

A May with record amounts of sunshine ended with a bang in Europe as the thunderstorm season began. The EUMETSAT Rapid Scanning Service from Meteosat-8 became operational in early May, in time to support observations and severe weather warnings.

Convective activity dominates the weather of Central Europe in the summer. Especially during the first part of the summer, in June and July, the frequency of severe thunderstorms is significantly increased and associated phenomena such as strong winds, hail and sometimes even tornadoes can cause serious damage and endanger lives. Such severe weather situations are often quite small and evolve very rapidly, making it difficult to work with computer models. The new *Rapid Scanning Service* consists of a five-minute (instead of 15-minute) delivery of convective cloud imagery that helps to spot and monitor potentially dangerous situations of severe weather. Accurate forecasts of weather developments can be made and if necessary, public safety officials can issue warnings to travellers on the roads, industry and the population in general.

Germany was hit by thunderstorms and torrential rain over the final weekend of May, with city streets and cellars flooded and trains disrupted. The bad weather spread to neighbouring countries, thunderstorms and rain arriving from the east over the Netherlands, with showers ending in the North Sea. Rail lines were hit by lightening and there were problems with the electricity grid. A very warm weekend in the Czech Republic was interrupted both days by heavy local rainfall, flash floods and hail stones measuring up to 2.5 cm.

This severe weather followed Saturday, May 31, when temperatures of 32.5°C broke a 140-year-old record in the oldest observatory in the centre of Prague, where measurements first began in 1775. Similarly, the Netherlands experienced its warmest May since measurements began in 1901 while Denmark received more sunshine in May than it has in over 60 years: 347 hours, averaging 11 hours and 12 minutes a day. A second wave of thunder storms and torrential rain hit again on the Monday night and severe weather warnings remained in effect for the remainder of that week.

Symposium 2008

GEO's 5th Symposium took place within the National Space Centre, Leicester on May 10 when the keynote presentations were given by Professor Grant Bigg, head of the geography department at Sheffield University and Dr John Remedios from Leicester University's Space Research Centre, who heads the team which has responsibility for the GERB instrument aboard Meteosat and its data.

Grant Bigg's Presentation

Grant Bigg spoke on the subject of polar lows and their impact on the northeast Atlantic. His team have been looking at images that are familiar to *GEO Quarterly* readers: infrared Meteosat images of the North Atlantic.

Professor Grant Bigg

In particular, the lecture drew our attention to the small weather systems that form, mainly along the ice edge at the very north of the ocean, where the warm Atlantic meets cold air and water from Arctic regions. The systems formed—polar lows—are just a few tens of kilometres across. Some of these are in the upper atmosphere and never touch ground, others may be formed as part of (or contribute to) the formation of the more familiar synoptic weather systems that are a feature of our weather on the European Atlantic seaboard.

These systems may be either short- or long-lived but those that last longest are generally formed over warmer water. Are these little weather systems worth watching? Well, yes they are! If they touch the ground they will significantly enhance wind speeds. Polar lows may set off oceanic convection that would not otherwise have happened, thus contributing to Atlantic storms; so observations of

polar lows, small as they may be, is important for shorter-term weather forecasting. Also, they can speed up the mixing of cold and warm water in the Nordic Sea, which has longer-term impacts on oceanic circulation.

John Remedios' Presentation

John Remedios provided an excellent and lively presentation about '*The Geostationary Earth Radiation Budget (GERB) instrument aboard Meteosat*'. GERB data is not available to amateurs as it is not disseminated via the EUMETCast system, so John's talk opened up new horizons for the audience.

Dr John Remedios

John covered all aspects of the GERB device, including the need for the instrument; the wavebands covered (long-wave, short-wave and total); the design of the detectors and their calibration; the results achieved from the GERB and the requirements for complex post processing to correct for earth-satellite-sun geometry and so forth. Although little-known, the UK builds and operates some of the most accurate instruments for these measurements, and of course accuracy and long-term stability of calibration are of paramount importance when climate change observations are being made.

David Taylor

David Taylor spoke about changes over the past year, both in terms of the new data services which are now available from EUMETCast and the software required to handle them. *Windows Vista* has become widely used, and this has affected the way that software is written and deployed. There are some updates due from EUMETSAT soon, and these were discussed. On the hardware side, David explained that new USB2 DVB boxes had made

reception of the full EUMETCast data stream even easier because there was no longer any requirement to open up PCs to insert receiver cards. Additionally, the new receivers are accompanied by drivers which work reliably even on the newest operating systems. No wonder these boxes were so popular at the GEO Shop!

GEO Shop

The GEO Shop stall manned by Clive and Carol Finnis enjoyed brisk trade throughout the day, selling a wide range of items, including LNBs, Satmeters, PICs, Bias Tees, an R2ZX APT receiver and various antennas. Best sellers by far, however, were John Silver's lightning radar board (6), which was featured in GEOQ 17 and the new *DVBWorld* USB2.0 box (13).

Workshops

The remainder of the day was taken up with informal discussions and workshops and allowed members the opportunity to discuss his latest software with David Taylor. Throughout the day, live MSG systems were on display, illustrating to the uninitiated just how spectacular 24-hour animations of our weather can be.

Other interesting hardware demonstrations included Fred van den Bosch's home-built, highly portable APT antenna, which he finds invaluable for maintaining APT reception while holidaying around the world and an attempt by Arne van Belle to rescue important data from a failing PC hard drive.

AGM

Late in the afternoon, Francis Bell presided over the GEO AGM, covering a variety of topics ranging from finances to the continued need of support from readers regarding the supply of satellite images and interesting articles for GEO Quarterly. This concluded with the popular raffle which provided a wide range of 'goodies' to be won.

The symposium was particularly well attended, mainly from members in the UK, but we also welcomed members who had travelled from France, the Netherlands, Italy, and Bulgaria.
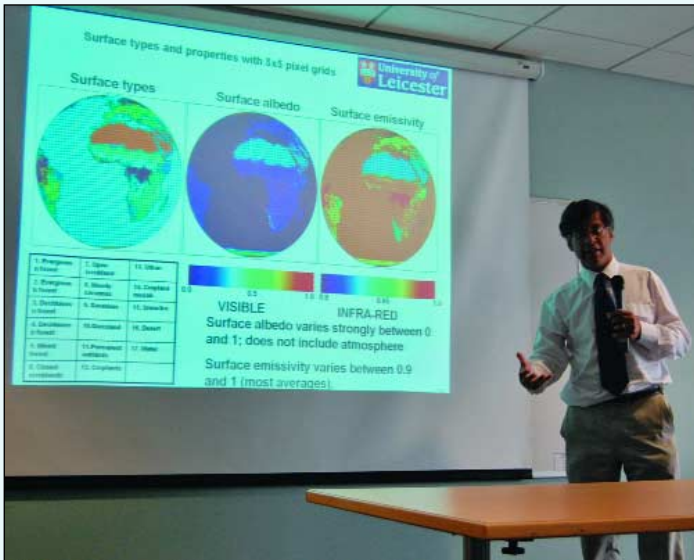
John Remedios speaking about the specific characteristics
of different wavelengths during Symposium 2008
Photo: David Taylor

David Taylor's presentation on the latest developments
and news from EUMETSAT
Photo: Cecilia Taylor

Marc Peigneux watching an HD replay while the PC
simultaneously processes and displays *EUMETCast* data
Photo: David Taylor

Marc Peigneux (right) and John Tellick look on as
Arne van Belle rescues data from a failing hard drive
Photo: David Taylor

John Tellick leading a EUMETSAT Workshop
during Symposium 2008
Photo: Clive Finnis

Left to right: Guiseppe Cico (Italy) Arne van Belle (Holland)
Marc Peigneux (France) and Rob Hollander (Holland)
Photo: Clive Finnis
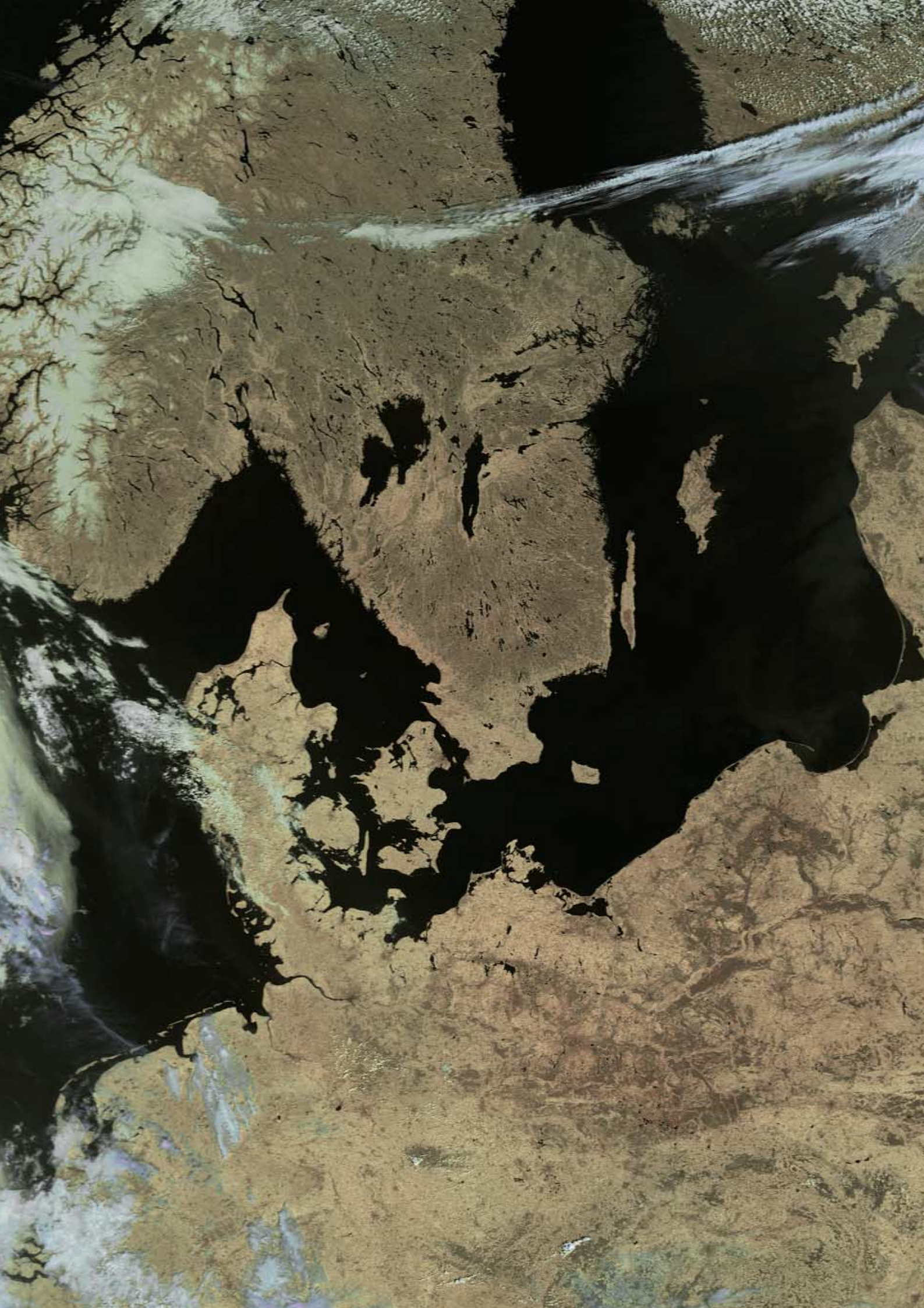
Total Solar Eclipse
August 1, 2008

David Taylor
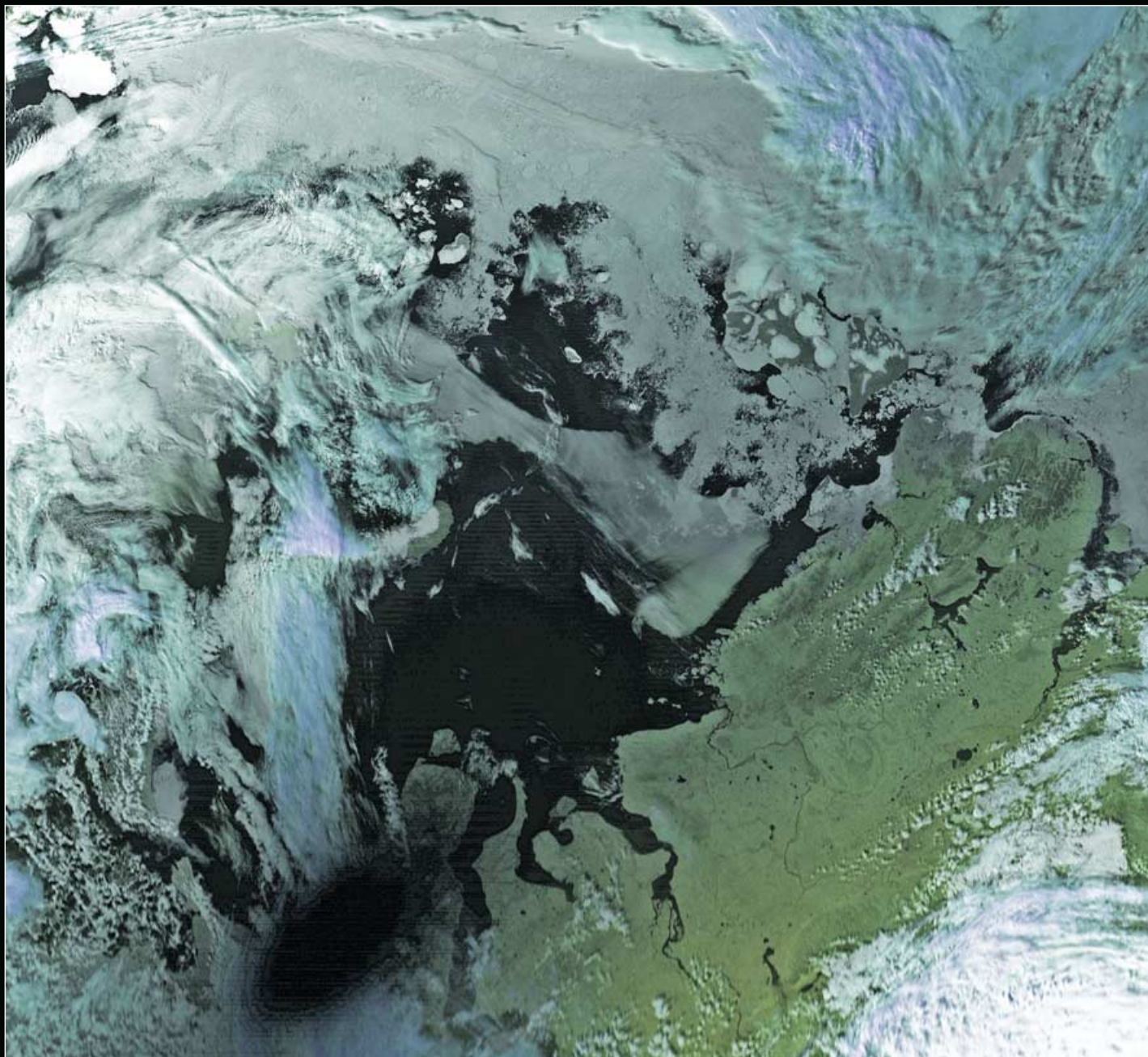
The total solar eclipse on August 1, 2008 was captured on the extreme edge of this Metop-A pass, imaged by the AVHRR instrument at 10:11 UT. I have processed the Metop-A data in my *HRPT Reader* program to bring out the moon's shadow in the image, and rotated the image by 90° so that north is approximately at the top of the scene. The moon's shadow can be seen as a dark oval at the lower-left of the image; it appears elongated because of the very high latitude of the region. I estimate the centre of the shadow to be at 66.5°E and 69.5°N, which is in the Yamal Peninsula. To the immediate right of the moon's shadow is Obskaya Guba, the gulf of the Ob River, which reaches over 90 km in width in places. Farther

east is the estuary of the Yenisei River, the largest river flowing into the Arctic Ocean and, at 5539 kilometres in length, the fifth longest in the world. The prominent landmass to the northeast (right) of the Yenisei is the Taimyr Peninsula, the northernmost region of mainland Asia. The twin islands of Novaya Zemlya are visible halfway up the left side of the image and in the top left corner is the ice-covered island of Nordaustlandet, the second largest of the Svalbard archipelago.

My thanks to Mike Jupp for discovering the Metop pass.

Metop data copyright (c) EUMETSAT 2008.

THE CURONIAN SPIT

A NASA Earth Observatory Newsroom Report

In the southeastern corner of the Baltic Sea lies a narrow stretch of land known as the Curonian Spit. Largely forested, the spit separates the Curonian Lagoon from the Baltic Sea: measuring just 3,800 meters across at its widest point, it encloses a lagoon with an area of 1,620 square kilometers.

In this image, dark blue indicates deep water, and lighter blue shallow or sediment-laden water. Different shades of blue distinguish the deeper Baltic Sea at left from the shallower Curonian Lagoon.

Vegetation appears in varying shades of green, paved surfaces and bare ground in shades of beige and gray, and sandy areas appear off-white. Obvious sandy areas can be seen along the length of the spit. On the Baltic Sea side, a thin off-white band of beach runs the entire length of the spit; on the Curonian Lagoon side, intermittent beaches carve their way into the narrow strip of land.

Both the spit and the lagoon fall within the borders of Lithuania in the north and Kaliningrad Oblast (Russia) in the south. The lagoon is fed primarily by the Nemunas River, whose delta is prominent at the upper right of the image. Between its sandy beaches, pine forests and attractive views, the area is a popular tourist destination. Yet the area is fragile.

Natural forces of wind and tide constantly threaten the spit, and human efforts at stabilisation by reforestation are needed to preserve it.

The United Nations Educational, Scientific and Cultural Organisation designated the Curonian Spit as a World Heritage site in 2000, after receiving a joint nomination from Lithuania and the Russian Federation.

This image, captured on July 25, 2006 by the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), flying on NASA's *Terra* satellite, captured this image of the spit, the lagoon it encloses, and part of the Baltic Sea.

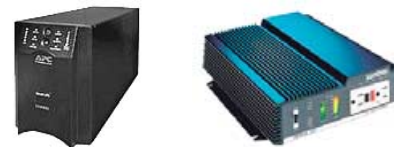*NASA image created by Jesse Allen, using data provided courtesy of NASA/GSFC/METI/ERSDAC/JAROS, and the U.S./Japan ASTER Science Team.*

UPS or Inverter?

Applying a power back up System to your Computer Weather Station

Rob Denton LZ/G4YRZ - email g4yrz@wxsat.org

How many times have you been receiving a satellite image and the power went off? Or been out for the day and come home to find your PC off due to a power disconnection? For me, living in Bulgaria, this tends to be a weekly occurrence—and very frustrating, with a <u>minimum</u> of three power cuts (also known as 'brownouts', blackouts and outages to some) per week. I was going through a phase where I was changing my hard drives every other month due to them being damaged by the PC not shutting down correctly.

What is needed is a system which allows time to shut down the computer properly in the event of a power outage. Thankfully, a UPS (uninterruptable power supply) or inverter offers you that opportunity.

Providing the outage is brief (15 minutes or so), a UPS will allow the system to continue operating normally, switching to battery back-up in the blink of an eye. You don't even realise it's happened except for the beeping sound of the UPS warning that you are running on battery power. The UPS will switch back to mains power as soon as this is restored, again in a fraction of a second. You don't have to do anything as the UPS is fully automatic.

An inverter can maintain power for a lot longer than a UPS, depending on how it's configured, and gives you time to shut down your equipment safely in the event of a longer disconnection.

In this article, I am going to compare the UPS and inverter to help you determine which is most suitable for your computer system. Most people prefer to use a UPS, which is what I would recommend in most cases. This is what is sold in most PC shops around the globe,

The UPS

An uninterruptible power supply (UPS), also known as a continuous power supply (CPS) or a *battery backup*, is a device which maintains a continuous supply of electrical power to connected equipment. It does so by supplying power from a separate source when utility power is not available. The UPS differs from an auxiliary power supply or standby generator, which does not provide *instant* protection from a momentary power interruption. Integrated systems that have UPS and standby generator components are often referred to as emergency power systems.

There are three distinct types of UPS: off-line, line-interactive and double conversion (also called on-line). An off-line UPS remains idle until a power failure occurs and then switches from utility power to its own power source—almost instantaneously. An on-line UPS continuously powers the protected load from its reserves (usually lead-acid batteries or stored kinetic energy), while simultaneously replenishing the reserves from the AC power. It also provides protection against all common power problems, and for this reason it is also known as a power conditioner and a line conditioner.

While not limited to safeguarding any particular type of equipment, a UPS is typically used to protect computers, telecommunication equipment and other electrical equipment where an unexpected power disconnection could cause injuries, fatalities, serious business disruption or data loss. UPS units come in sizes ranging from those which will back up a single computer without monitor (around 200 watt) to units which will power entire data centres or buildings (several megawatts). I use a 600 W and a 1500 W UPS. The 600 W model typically supplies power for 15-20 minutes for a Pentium 4 PC with CRT monitor.

Historically, UPS units were expensive; they were most likely to be used on expensive computer systems and in areas where the power supply was interrupted frequently. As prices have fallen, UPS devices have become essential equipment for data centres and business computers, and may also be used for personal computers, entertainment systems etc.

I purchased my 600 W model in Bulgaria, new from the shop, for 90 *leva* (around £35). The 1500 W model was bought second-hand in the UK on *eBay* for £50, a real bargain. I can recommend the *APC's Smart* UPS range, as you can download associated software which has a monitoring agent showing status, power outages, voltages, battery condition etc. Furthermore, the batteries are exchangeable when they come to the end of their life (3-5 years).

A UPS is generally very easy to use. It's just a matter of connecting your equipment to it, plugging it into the mains supply and away you go, ready to use!

The Inverter

An inverter is an electrical or electro-mechanical device that converts direct current (DC) into alternating current (AC).

Inverters are used in a wide range of applications, from small switching power supplies for computers to large electric utility applications that transport bulk power.

Most inverters operate from a 12, 24 or 48 volt DC source and output to 110 or 230 volt AC. My inverter has a 24 volt input and outputs 1500 watts at 230 V. I use two 12 volt, 110 amp, deep-cycle batteries, wired in series, which I obtained from my local caravan shop in the UK. They retail for around £100 each. You can purchase an inverter with a power output to suit your requirements: from about 30 watt to several kilowatts.

Please note

Before rushing out to purchase your inverter, make sure you use **deep-cycle batteries** and <u>not</u> normal car batteries. The latter are not suitable for use with an inverter, whereas deep-cycle batteries are made specifically for such a device.

There are two types of inverter: those that output true sine wave AC and exactly match mains AC, and the more common inverters that produce modified sine wave AC. The latter will work for most applications but do tend to give a buzzing sound on some radios, TVs and Hi-Fi equipment.

Without a doubt a *pure sine wave inverter* is best and I recommend a firm called *Xantrex*, which offers top quality models. I use my inverter for general purposes around the home so that I can still perform normal duties without it making crazy while the power is off for up to 5 hours at a time!

Of course, the inverter will usually provide more back-up time than the UPS because it draws on larger batteries with greater charge capacity. The more batteries you connect, the longer run time you will have.

Safety

When using an inverter, it is important that all connections are made correctly using the correct type of cable. Connecting cables the wrong way round (reverse polarity) can permanently damage your inverter and/or equipment, and too thin a cable can lead to overheating. If in doubt consult a qualified electrician. Remember, with an inverter you are working with a **high current**, which can kill if not handled carefully. Most inverters come with instructions on how to connect the unit and what type cable to use.

More information on inverters and batteries can be found in my book review: *Emergency Power for Radio Communications*, GEO Q10, page 4.

GEO Readers' Survey

It's really encouraging to report that, following our June issue, readers have supported the GEO Reader Survey in numbers, providing valuable feedback for the Management Team. Knowing your likes, dislikes, and 'wish lists' will greatly assist us in addressing members' needs in the future.

Most Interesting Article

Three articles that appeared in *GEO Quarterlies* during the past 12 months came equal top of readers' preferences and accounted for over half of all selections, as listed below.

• SatSignal Animations	18%
• Lightning RADAR	18%
• Arctic Meltdown	18%
• LRIT (Ed Murashie)	12%
• Aral Sea	9%
• Unseasonable Weather	5%
• Falkland Reminiscences	5%
• Comparison of Antennas for 137 MHz	3.5%
• PC Networking	3.5%
• Trialling the Dexatek USB box	2%
• EUMETCast Articles	2%
• Other Satellites (Peter Wakelin)	2%
• Cloud Streets	2%

Broadly, these returns suggest readers' main priorities to be

- Articles dealing with novel ways of manipulating their *EUMETCast* images
- Construction projects
- Factual articles using satellite imagery to describe and explain the state of our planet

Topics Requested

Requests for future topics generally fell into three broad categories. Hardly surprisingly, more information relating to *EUMETCast* came top of the 'wants list' but APT still retains a strong following, as do requests for more articles related to meteorology.

EUMETCast / MSG
- EUMETCast with Linux distributions (Ubuntu)
- Using EUMETCast for beginners - the basics, getting started without too much hassle
- Beginners 'step by step' EUMETCast column/series
- Other 'Metcast systems' coming into being.
- Cheapest way to receive data
- How to make use of the different types of data from MSG in simple terms. A series of articles which show typical settings for David Taylor's software and pictures of likely outcomes.
- Ground-up install and tweaking of satellite dish for *EUMETCast*
- Anything to simplify the computer complications of *EUMETCast* (e.g. file organisation)
- Descriptions of uses for the flood of secondary and processed data we are now getting on EUMETCast (i.e. not primary images).
- Interpreting ATOVS data

APT
- Construction details on any APT item
- More coverage of APT and basic setups
- More on APT
- Weather satellite station setup for beginner (APT and HRPT)
- Antenna's, receivers, demodulators, APT software
- Maintenance / repair and recalibration of Az/El rotators, particularly the Yaesu/Kenwood G5*** range

Meteorology
- Maybe a little more on meteorology
- Weather forecasting from satellite images
- More on meteorological interpretation of images
- After effects of major quakes/tsunamis on Earth structure

Miscellaneous
- More construction projects
- Weather satellites for beginners
- PC networking for dummies
- Picture manipulation, e.g. *Photoshop* to improve images
- Hearing about other people's experiences and their set-ups
- News and images from around the planets - the ultimate in imaging
- Weather software

Statistics

Some general statistics offered by respondents revealed that only 15% of them were aged under 50. This comes as little surprise, but starkly illustrates that GEO is not succeeding in attracting younger members. It does rather appear that the demands of weather satellite imaging, and of *EUMETCast* in particular, mean that many GEO members have only found time to engage in our hobby after retirement from work made sufficient leisure time available.

Additionally, almost two thirds of those who replied are radio amateurs, a statistic that suggests that GEO must do much more to attract members from the non-radio fraternity.

• Aged 50 and over	85%
• Radio Amateurs	65%
• Receiving MSG	57%
• Receiving APT	69%
• Receiving HRPT	11%

As to what readers actually receive in the way of satellite imagery, it is clear that, even after over five years of free access to MSG/EUMETCast, the majority remain loyal devotees of APT while direct reception of HRPT is very much a minority interest.

General Comments

Many readers included their own comments, most of which were complimentary: GEO Quarterly was described several times as 'professional' and the overall organisation of GEO received numerous comments such as 'excellent', '1st class', and 'well run'.

On the down side, though, came several comments along the lines that GEO is 'too technical' (related to the quantity of computer programming featured in the *Quarterly*), 'not everyone is an Einstein' and requests for more APT, DIY articles, kits and activities and a regular Quarterly section on how to install EUMETCast. There was a request that the Symposium be held closer to the south coast.

Some specific comments were:

> *"Without dumbing down the excellent standard of the quarterly, perhaps the occasional 'Idiots guide' would not be amiss"*

> *"Where else could one find such depth of knowledge and experience so freely and graciously afforded to all members, particularly the tyros"*

> *"I find the magazine very interesting but I am a bit overwhelmed by all the different 'lingo' and trying to understand all the programs"*

> *"Is there any way to have a members list printed so that members can get in touch with each other. Since I am new I have a lot of questions.?"*

> *"Would like to see more articles for the common layman"*

Help

How to solve your wxsat problems

The GEO Readers' Survey did produce one rather scathing comment, regarding the GEO Shop.

'No backup from the GEO Shop ... Having recently purchased the R2ZX receiver and the WXtoIMG software I have had virtually no luck with receiving any decent pictures. All cries for help have fallen on deaf ears.'

This comment begs the question: 'How should readers seek help?'

Over the years, we have received nothing but supportive comments on the efforts of Clive and Carol Finnis for the GEO Shop service that they offer. But it must be pointed out that Clive and Carol provide the Shop service in their spare time (they run their own full-time business during working hours) and that their principal expertise lies in marketing—sourcing equipment on GEO's behalf, making it available at the best possible price to members and providing a distribution service. Neither of them is embedded in weather satellite imaging as a hobby

Getting Help from the *GEO-Subscribers* Internet Forum

Since GEO started, an Internet discussion forum managed by Nigel Evans has been in existence, **specifically to enable readers to exchange information and to request help with their problems**. A multitude of difficulties have been resolved using this forum; where a plea for help fails to turn up a solution it probably simply means that no-one knows the answer! In any event, your first port of call for help on any weather satellite matter should be to the *Geo-Subscribers* forum at

http://tech.groups.yahoo.com/group/GEO-Subscribers/

There are many other weather satellite related forums (including one specifically related to *WXtoImg* software) listed in the centre pages of GEO Quarterly. These offer more specific and specialised support in a variety of fields.

GEO Helplines

Appearing regularly in the centre pages of GEO Quarterly is the *GEO Helplines* column. The members listed in this column are only a telephone call or email away if you require assistance.

Updating **GEO***'s Helplines*

The *GEO Helplines* section was set up over four years ago when expertise in the field of *EUMETCast* and the relevant imaging software was in its infancy. Many GEO readers will these days be much more expert in this arena.

If you who would like to join the *GEO Helplines*, on any specific topic of your choice—even if it is just one particular software package that you know and understand expertly—please feel free to email the editor with your contact details, stating the topic(s) on which you are interested in helping, to

geoeditor@geo-web.org.uk

Finding Local **Help**

As GEO is bound by the *Data Protection Act*, making a Membership List generally available is not feasible. If you feel you need help on a one-to-one basis from someone in your locality, contact David Anderson, our Membership Secretary, at

members@geo-web.org.uk

David may be able to put you in touch with other members in your region of the country, who can then offer assistance.

As far as we know, there are no **Local Area GEO Groups**. If you would like to set one up in your area, contact the editor and we can publish your contact details in our next issue.

GEO Needs You!

When the December 2008 issue of GEO Quarterly appears it will mark five full years of activity for our still youthful organisation.

Throughout this period, the names of Peter Wakelin and Les Hamilton have been ever-present features of the 'Contents List', indeed, more often than not with multiple entries.

Activity on this scale—researching, checking facts, sourcing appropriate images and massaging everything into a coherent narrative—is immensely time-consuming. Both authors have indicated that they wish to devote more time to their other interests and will therefore be downscaling their writing for GEO from this year's end onward.

Expertise

When GEO first came into the world, *EUMETCast* was in its infancy. During the years since, GEO readers have experienced a revolution in the manner in which weather satellite imagery is received. It also goes without saying that GEO must now number among its readership many who can now be considered *experts* in this field, with a combined wealth of knowledge that should stand the Group in good stead for years ahead. GEO now needs ***you***, our collective cohort of seasoned experts, to take up the mantle and start producing articles which share your knowledge and experiences with newcomers.

Already, Mike Stevens, Rob Denton, Kobus Botha and Marc Peigneux have risen to the challenge with offerings in this issue. But we do need a constant supply of material to satisfy our readers' demands throughout each calendar year.

Topics

There is now no secret as to what GEO readers wish to read about in their Quarterlies. The bulleted list in the 'Topics Requested' section (previous page) makes it plain where readers' interests lie. Initial quality of presentation need not be a matter of concern; many are those who have initially been hesitant about writing for GEO, only to be delighted with what they see once editor Les Hamilton has processed their material. If you have doubts, do feel free to discuss any ideas you have with the editor first by email to

geoeditor@geo-web.org.uk

Information Required

I seek any information (pin-outs, manuals etc.) for an early *Timestep/Griffin* colour framestore and the matching APT receiver. The board on the framestore is marked RT403 and is 1985 vintage.

Any help appreciated. OK OK, I know it's ancient, but I'd like to see it working!

Glenn Rainey

email: geo@rainey.org.uk

Here is the Weather Forecast

How satellites have led to improved weather forecasting

Mike Stevens (G4CFZ)

Back in the days before satellites or other means were invented for meteorological purposes and forecasting it must have been very difficult to make accurate weather predictions. Something had to be done to improve this situation.

One of the early methods used was to gather information by balloons, which soon became a feature of meteorological science. One of the early ones was manned by a British scientist, James Glaisher, in 1862; he managed to reach an altitude of almost 9000 metres, complete with several thermometers, two barometers and a compass. At one point he passed out due to lack of oxygen but recovered and returned safely to Earth—albeit rather cold. Following that experience, it was decided to make use of unmanned balloons, a technique that was further developed and improved in the 1930's into the *radiosonde* weather observation system. Today there are various forms of meteorological balloon: some remain at a constant height for long periods; some are used to ascertain cloud height; yet others measure high altitude winds.

Balloons also played a part in the early quantification of the high altitude westerly winds that we know today as the jet streams. Between 1923 and 1925, Japanese meteorologist Wasaburo Ooishi tracked the westerly movement of weather balloons in the stratosphere. Unfortunately, he chose to publish his work in Esperanto in the mistaken belief that this would bring widespread recognition. Alas, the opposite was true, and his work only surfaced after the discovery of the jet stream following studies by Carl-Gustaf Rossby in the USA during the 1940s. Rossby himself is credited with coining the term 'jet stream'.

There were also weather ships. Riding out the storms at sea these could send back all the relevant information to Bracknell and other weather centres—to be deciphered and translated into weather forecasts for shipping and the general public. These ships have now been replaced by over 6 000 weather buoys—some moored, others drifting around the seas and oceans—which send back their information to central weather centres, often via satellite relays.

I well remember the BBC weather forecasters relying on plastic symbols being stuck on to a plain map of the United Kingdom. Somehow these managed to give us a basic idea of the approaching weather, reliable for about eight hours at most, and sometimes not even that. I marvelled that they ever got it right with our fluid atmosphere.

The Atmosphere

The structure of our atmosphere consist of four principal layers. Firstly we have the *troposphere*, stretching from sea level to around 18 km, the layer where the clouds are formed and where the air moves both vertically and horizontally. The contents of the troposphere are in constant motion and are well and truly mixed; this is the part of the atmosphere that concerns us most because it's where our weather occurs. In the Troposphere the temperature decreases with altitude: in other words, the higher you go

the colder it becomes. Above regions such as Britain and Europe the temperatures are around -55 to -60°C.

Extending above the troposphere, to approximately 45 km, is the *stratosphere*, which includes the ozone layer. Above this comes the *mesosphere*, followed by the *thermosphere*, which stretched between 80 and 120 kilometres above the Earth.

The satellite era started with the launch of the Russian *Sputnik-1*. This was truly exciting and I well remember listening for the tell-tale bleep it transmitted as it appeared over the horizon and which faded away again as it passed over. It left me wondering how it all happened and what the future might hold. From then on satellites became the 'in thing', and the Super Powers forged ahead, launching all manner of satellites. There are now over 11 000 circling above the Earth.

Weather Satellites

The polar orbiting weather satellites were the first to come to the attention of the amateur fraternity. The composite image below was produced from a number of photographs received during *Tiros-1's* second orbit, and show the Gulf of St Lawrence with the St Lawrence River to the left.
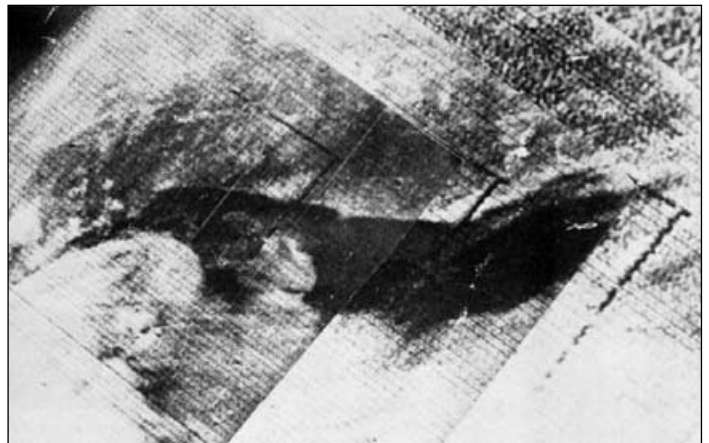
Figure 1 - An early composite Tiros-1 image
Credit: NASA

This was followed by the *Nimbus* series of research satellites when *Nimbus-1* gained orbit on August 28, 1964. The Soviet program started shortly thereafter when *Cosmos-45* (September 13, 1964) returned some experimental images and really took off with their first confirmed weather satellite, *Cosmos-122*, in June 1966, to be followed by the first of their *Meteor* range of weather satellites on March 26, 1969. The first sun-synchronous weather satellite, *ITOS-A*, was launched on December 11, 1970, by the USA's newly formed National Oceanic and Atmospheric Administration (NOAA).

It was, however, very difficult to receive images from these satellites in those days as receivers for the frequencies utilised were not commercially available. The only answer

Figure 2 - Metop image from May 24, 2008
Image © EUMETSAT 2008
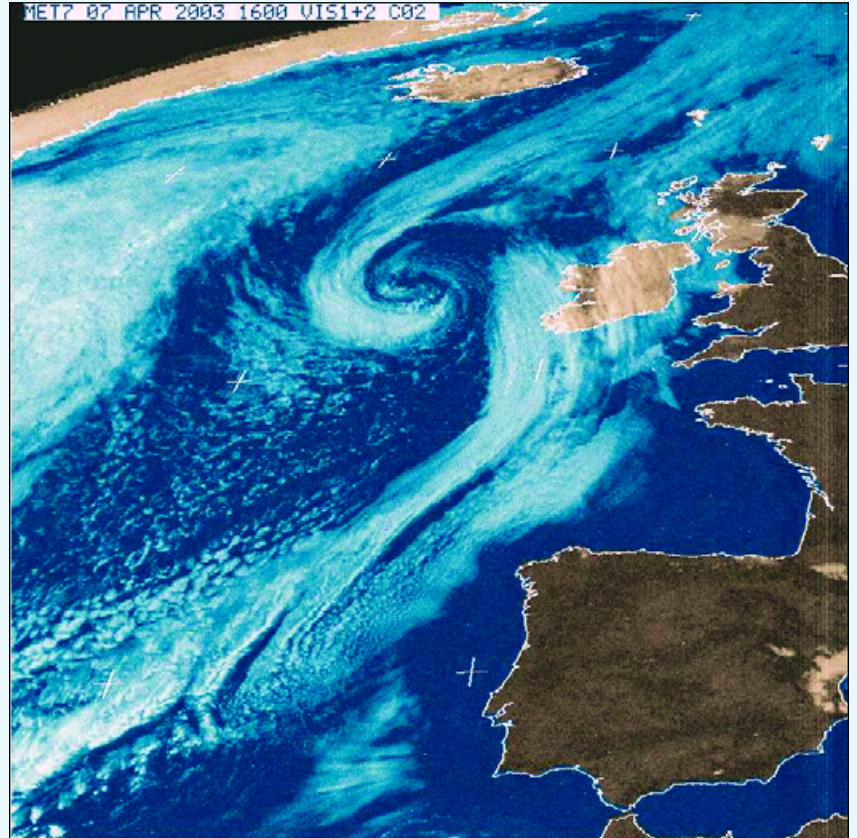
Figure 3 - An April 2003 false-colour WEFAX image from Meteosat-7
Image © EUMETSAT 2003

Figure 4 - A NOAA-14 image taken from the 14:49 UT pass on August 9, 1998

was to obtain and modify a military receiver to access the information, but it did not stop there. You then had to produce images, normally using a chart-recorder. It was only the most ardent amateur with the requisite skill and expertise who could make sense of the transmitted signals and turn them into pictures. But they did, and it was to the credit of these people that we have the knowledge today to receive the data that is on offer to us.

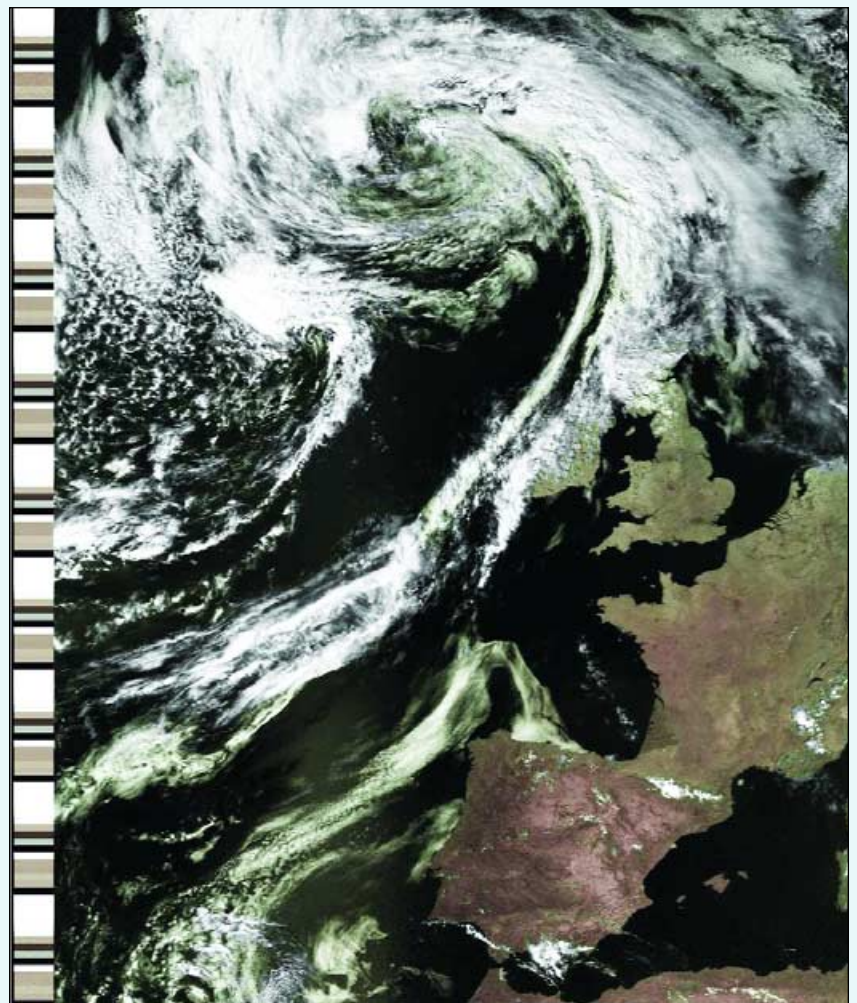### Personal Computers

Once home personal computers became readily available things really started to get very interesting. The *BBC Computer* and the *Commodore* are just two of the popular ones that come to mind. We were all keen to get our hands on one, but to some they were just too expensive; but once enthusiasts did acquire them, things started to move forward very quickly indeed.

Software was, of course, required to decipher the signals into something sensible and at that time there were very few companies in the business of supplying software to amateurs. The first two who come to mind were *Spacetech* of Portland, Dorset, and *Dartcom* from Yelverton in Devon. Both were most helpful and assisted the amateurs in achieving some excellent results.

Amateur Radio

I myself came into the weather satellite imaging hobby from amateur radio and, with my interest in receiving all types of signals, it seemed a natural progression. As I worked for the MoD and we had an excellent hobbies website, it did not take long to identify other people with the same interest. I was soon hooked on weather satellite reception.

Polar Satellites

The first satellites I received were NOAAs 12, 14 and 15 (figure 4) and the Russian Meteor range (figure 5). I well remember receiving my first images. Fantastic! The NOAA range of Satellites are still going strong. Though several have been decommissioned, new ones have been launched, and NOAAs 15, 17 and 18 are still giving excellent pictures in both APT and HRPT. Many of us started with these and are still receiving them today as part of this fascinating hobby.

Like many, I turned my attention to David Taylor's excellent range of satellite software, which I use to this day. I still wonder how he does it so well, with so much clarity and detail. And for most beginners, APT is the easiest form of weather satellite reception to start with. It's relatively cheap and simple, with some stunning pictures at the end of it.

But of course the most recent orbiting satellite is Europe's Metop, launched on October 19, 2006 from the Baikonur cosmodrome in Kazakhstan. Following its first orbit, telemetry was received at the main ground station on Svalbard. The satellite was then placed under the control of the ESA Space Operations Centre for systems checking before finally coming under the control of EUMETSAT. Metop is now fully commissioned and sending down the most exciting pictures via the EUMETCast service that any of us have ever seen. The detail is exquisite (figure 2).

Geostationary Satellites

Meteosat-1 launched in November 1977, was the first of the geostationary satellites, heralding the beginning of a new era in weather satellites. It marked the start of a continuous high quality scanning service, initially covering Europe, Africa and the Atlantic and from 1977, part of the Indian Ocean as well. If you read the excellent article by John Tellick in the March 2005 *GEO Quarterly*, he gives a complete run down of the Meteosat programme.

Meteosat-1 failed fairly early in its life, causing quite a gap in the service, until Meteosat-2 was launched in June 1981.
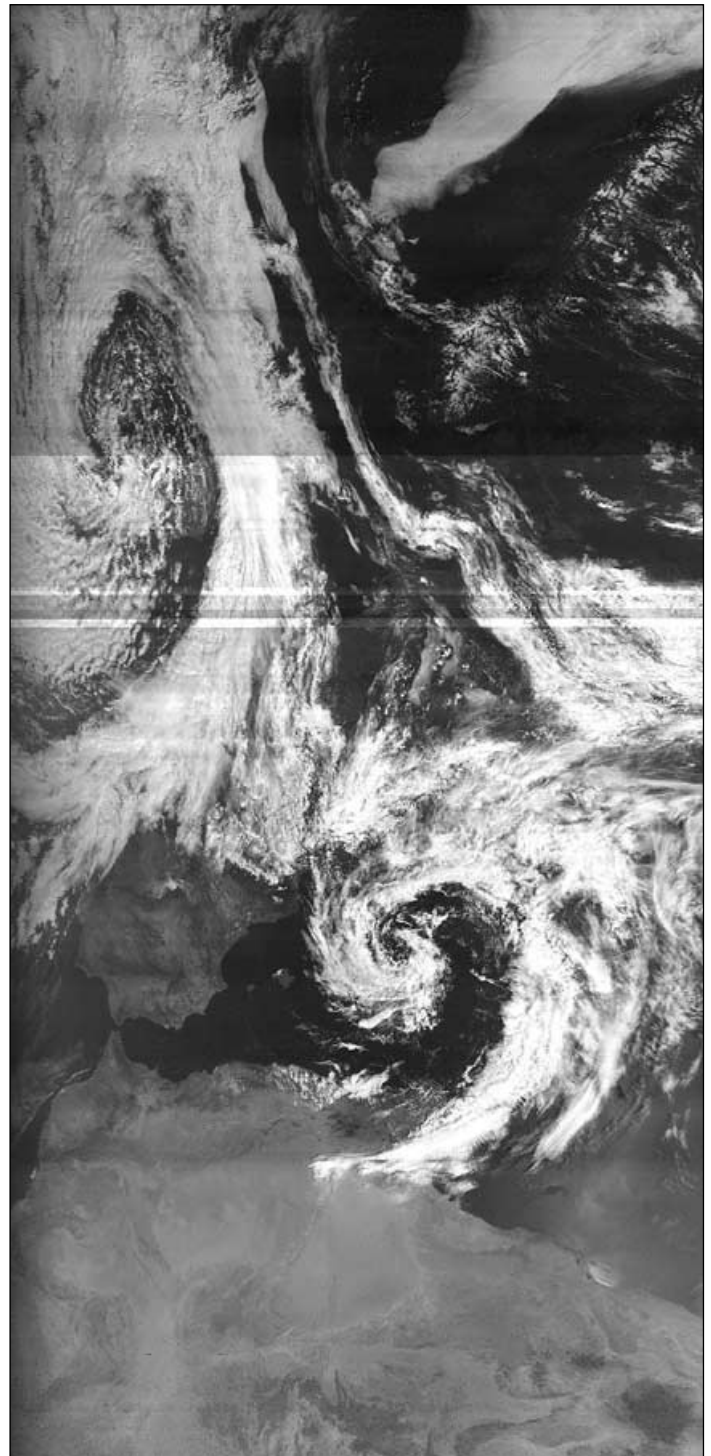
Figure 5 - A typical Russian *Meteor* image

Five more Meteosats followed, culminating with Meteosat-7 in September 1997. My first pictures from Meteosat-7 were of course in WEFAX format (figure 3) and very different from the latest transmissions. WEFAX continued right up to the time that this satellite was moved across to the Indian Ocean in December 2005.

Meteosat Second Generation

In August 2002 came another new era with the launch of the first *Meteosat Second Generation* (MSG) geostationary weather satellite, MSG-1. There was great excitement by many throughout the weather fraternity, but for amateurs it looked as if it would require an expensive set of kit to receive these transmissions.But fate played a hand, an on-board solid state power amplifier failed during the commissioning, testing was halted and an enquiry was held to ascertain the damage to the programme.

USING THE BUFR FORMAT

Presenting Scatterometer results with xrit2pic

Rob Alblas

In meteorological circles, the BUFR format is commonly used to interchange data.

"BUFR (Binary Universal Form for data Representation) has been designed to achieve efficient exchange and storage of meteorological and oceanographic data. It is a self defining, table driven and very flexible data representation system, especially for huge volumes of data."

Extracting data from a BUFR file needs an executable (the BUFR reader) and tables. The tables contain information on how to extract the data. This allows new data types to be defined without changing the BUFR extractor itself. There are three main table sets, coded B, C and D. Some of these have the extension '.TXT' and are in ASCII format, making them readable using a text editor (although this is not intended as it's a huge amount of figures, not easily understandable by 'normal humans'). For more information about these tables, including descriptions of the BUFR format, have a look at the website of the *European Centre for Medium-Range Weather Forecasts* [7].

Files in BUFR format are also broadcast via the *EUMETCast* system. However, up till now this format was not easily usable for amateurs. Decoding software had been (partly) written in Fortran, and primarily compiled for Unix systems.

KNMI Software

One of the projects of KNMI, the Royal Dutch Meteorological Institute, is the development of scatterometer processing software for operational use in weather and marine forecasting. On their website [1] they offer free source code for a BUFR translator, primarily for scatterometer data, but with some adaptations other data types in BUFR format should also be extractable. With some help from KNMI, I was able to compile this software for both *Linux* and *Windows*. As a result, BUFR formatted data is now within reach of amateurs. The name of the program is *Bufr2Asc*.

Scatterometer Project; ERS-2 Satellite

The Wind Scatterometer (SCAT) is a radar instrument on board ERS-2 (European Remote-Sensing Satellite). ERS-2 was launched in 1995, but is still in operation. Metop carries a comparable instrument (ASCAT, Advanced Scatterometer) on board.

The received radar reflections from sea waves are used to calculate wind speed and direction; a so-called 'wind cell' of about 50 by 50 km is used for each measurement.

Measuring is done using a C-band microwave sensor, in three directions relative to the satellite orbit: 45° forward, sideways and 45° backwards. . Figure 1 shows how satellite track and measurement areas are related. The C-band radar frequency used is almost unaffected by heavy rain, so it can return useful wind data even from the heart of the fiercest storms.

The ERS-2 satellite carries a lot more instruments [2]: these include synthetic aperture radar to monitor vegetation, growth, flooding and land cultivation and a microwave sounder which provides measurements of the total water vapour content in the Earth's atmosphere.

For more information about the scatterometer project, including current measurements, have a look at the KNMI website [1].

Decoding the BUFR Format

Raw data from the satellite is downloaded at Svalbard, processed at ESRIN (ESA Centre for Earth Observation) in Italy and then broadcast as BUFR via *EUMETCast* Channel-1 (the same channel used for NOAA AVHRR and a lot of other BUFR files).

Files are named like

```
scatt_20080705_142916_ers2___00000_ear_o_250_ovw.l2_bufr
```

The KNMI BUFR translator is basically a command line program. Executing the command

```
Bufr2Asc inputfile outputfile
```

will translate the input file (e.g. the mentioned 'scatt_..' file) into 'outputfile'. This is an ASCII file, which can be viewed with a text editor like *Wordpad*. It contains a table with positions and wind speed/directions:

#	Lat	Lon	Date	Time	Speed	Dir
	-62.26	143.70	20080705	1430	2.33	258.50
	-62.15	144.13	20080705	1430	2.69	255.90
	-62.05	144.55	20080705	1430	3.10	253.10
	-61.95	144.97	20080705	1430	3.35	255.40
	-61.84	145.39	20080705	1430	3.57	258.90

....

etc.

The speed is stated in m/sec while the direction is coded using meteorological convention, where 0° is south, 90° is west, 180° is north and 270° is east.

Before executing *Bufr2Asc,* an environment variable has to be set, e.g.:

```
set BUFR_TABLES=C:\bufr_tables/
```

This is to tell the BUFR extractor that it can find the tables, necessary to do the extraction, in directory 'C:\bufr_tables'.

(Note that there are currently some limitations on the location of the BUFR tables: see chapter 'Installation'.)

Using Xrit2pic to Decode Scatterometer Data.

I have adapted *Xrit2Pic* so it can deal with scatterometer results. Wind speeds can be plotted as vectors on satellite pictures from Meteosat, GOES, Metop etc., as well as on Earth maps (e.g. from Blue Marble). *Xrit2pic* will deal with executing the BUFR translator, including setting the environment variable.

Figure 2 shows how the received ERS-2 data pops up in Xrit2Pic's main window. By selecting a line, the content (amount of numbers, location) becomes visible at the end of the line. Sometimes the content is zero. This means that the selected data doesn't contain scatterometer information,
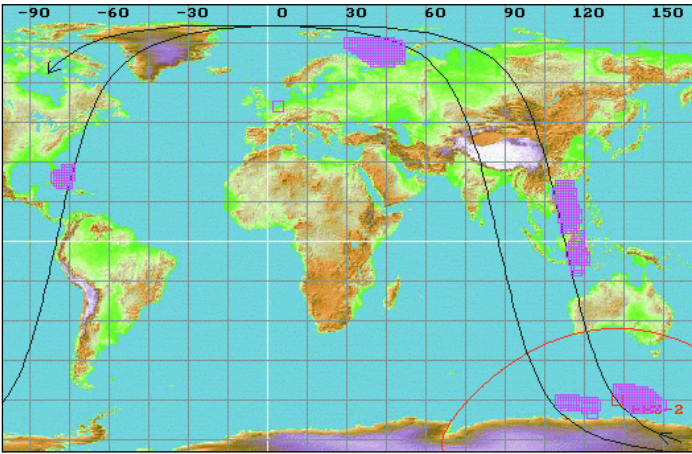
Figure 1 - Relation between satellite track and measurement areas

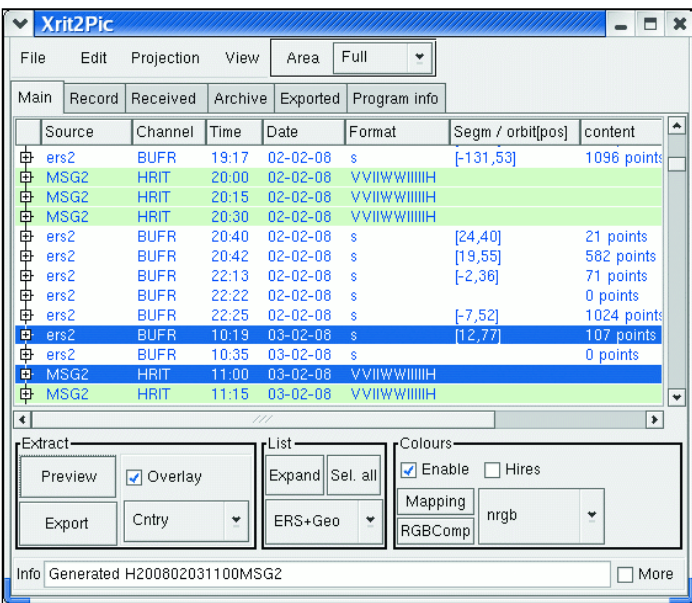Figure 2 - Decoding scatterometer data with Xrit2Pic

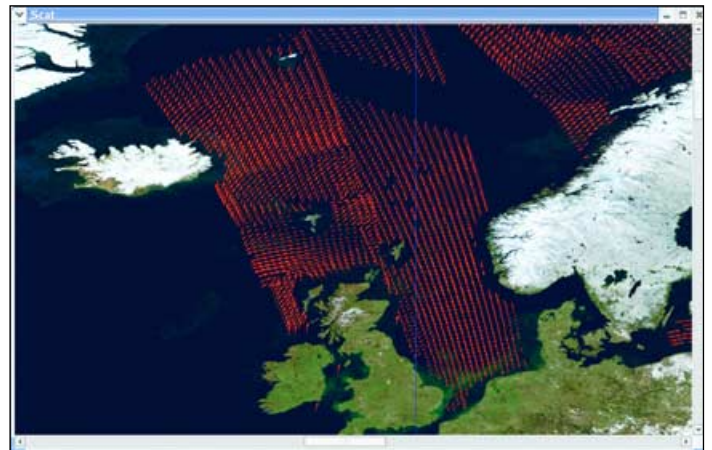Figure 3a - Scatterometer data plotted on a map of the Earth

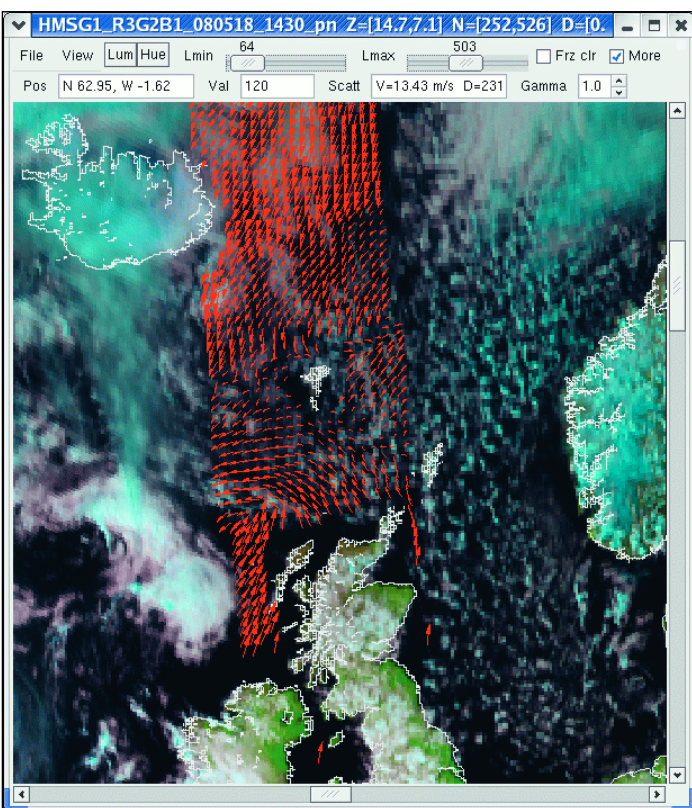Figure 3b - Scatterometer data plotted on a local area

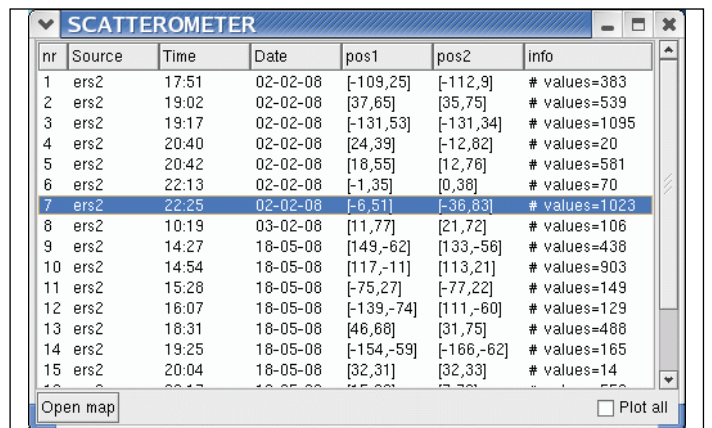Figure 4 - Scatterometer data combined with a satellite image

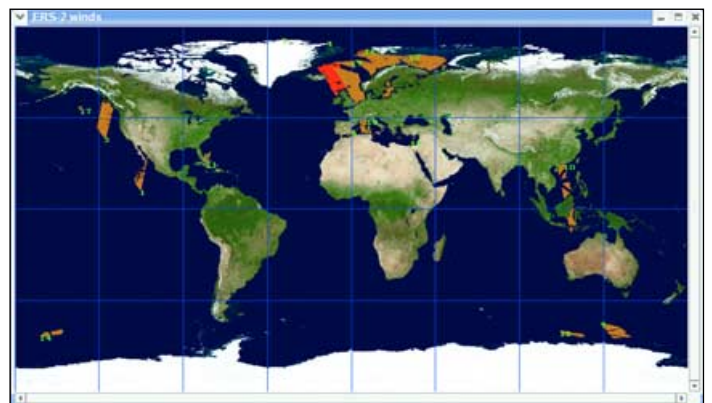Figure 5 - Selecting vectors to add to an image

Figure 6 - Identifying scatterometer data sets on a world map

which is the case at times when ERS-2 isn't above the sea. The BUFR file is nevertheless broadcast because it also contains other (non-scatterometer related) information. One or more (or even all) the available ERS-data may be selected. Now, by simply clicking on *Preview,* a map is opened with the scatterometer data plotted on it (figures 3a and 3b). Note that vectors are plotted only at sea locations; above land there is of course no wind data available.

In **<Preferences>** the background map may be defined; currently this must be a full-Earth map (gif or jpeg) in *Plate Carree* projection. By default, the same map as for plotting polar tracks is used, but this is a very low resolution picture. It's OK to see which part of the world the data is related to, but to examine the individual vectors a far-zoom-in is needed. In that case a high resolution background map like one of the Blue Marble charts [3] is advisable. Both 8 km/pixel and 2 km/pixel ones are usable, although the latter needs some time (15 seconds or so) to set up, and a PC with at least 1 GB RAM is advisable. See 'Installation' for more details.

Clicking on **<Export>** will simply extract the data in the BUFR file into an ASCII file (see example above). Actually, this option will just invoke the *Bufr2Asc* program. Since *Xrit2Pic* also handles satellite pictures from Meteosat, GOES, Metop etc., it can easily combine data of one of these with the ERS-2 scatterometer data. As a result, wind vectors can be plotted on satellite pictures.

To do this the location of the wind vector (longitude and latitude) must be translated into picture pixel position (x/y). If a NOAA AVHRR picture is used an appropiate Kepler file is needed (i.e., Kepler data of about the same date as the used NOAA picture).

Metop and NOAA GAC files, which contain Kepler data, are broadcast using the EPS format. This orbit information is used by *Xrit2Pic*, so a Kepler file isn't necessary for these satellites. HRIT/LRIT files of geostationary satellites (Meteosat, GOES etc.) also contain all required figures to calculate the longitude/latitude position of every pixel.

A note has to be made about whether it makes sense to combine an image from one satellite with the wind information from an other.

There are 2 possibilities:
1. Use a cloud free image as the background for the wind vectors. This is like using the *Blue Marble* maps.
2. Use an image from the same date and about the same time as the wind vectors.

Although possible, plotting wind vectors of one date on an image from another date, with completely different weather conditions, doesn't make any sense.

Finding a satellite image with nearly the same date, time and position as the wind vectors for plotting purposes is only possible with geostationary satellites. Meteosats 8/9 are particularly useful because of their high image repeat rate. Combining images of one polar satellite with the wind vectors from another polar satellite (ERS-2) at the same time/date is maybe not feasible; for this, the positions of both satellites would fortuitously have to be about the same. If Metop scatterometer data can be decoded, then of course this would perfectly match with the images of the <u>same</u> satellite. Something to work on ...

Although *Xrit2Pic* displays all received satellites by default, it is possible to list only satellites of a certain type (figure 2). I have added an option to show both ERS-2 and geostationary satellites. Because they are listed in time order, it is easy to select the ERS-satellite of interest and the geostationary

satellite nearest in time. Pressing **<Preview>** will then show the combined picture. All features like special projections (Plate Carre, polar), colour mapping, special mappings for dust, fog etc. are possible (figure 4).

Adding Vectors to a Predefined Image

Instead of selecting ERS-data and then choosing a nearest-in-time satellite picture, it is also possible to do it the other way round: plotting wind vectors for one or several ERS-2 datasets on to one predefined satellite image. First, select and preview an image in the usual way. For polar satellites, a projection (Mercator, Polar north/south, Plate Carre) has to be chosen: for geostationary satellites this isn't necessary.

Now, choose **<Preview → View → Scatterometer>**, which will open a new window showing all ERS-data present in the 'received' folder (figure 5). Select one or more lines, and the vectors will be plotted on the satellite picture. If the **<Plot all>** button is checked the wind vectors of all available ERS-2 data will be plotted. Vectors of the selected data will be in a different colour.

If no data is shown, or some indistinct shading appears at the very margin of an MSG image, then the selected scatterometer data must apply to a different part of the world not shown in the image you have selected. To locate the scatterometer data click on **<Open map>**. This will open the same map as when previewing scatterometer data alone, but now with all available scatterometer data plotted, together with identification numbers. Again, selected data is in a different colour, so you know 'where you are' (figure 6).

To examine the individual vectors a 'far zoom-in' is needed. The length of each vector shows the wind speed. The actual speed and direction at each location is available by clicking on **<More>** at the very top-right of the *Preview* window. The cursor may now be moved over the picture, and position (lon/lat) and wind speed/direction are shown. Zooming in at the cursor position is possible by pressing shift-I.

Saving the result in a picture file is done using menu item **<File → Screendump>**. Generated picture format is *ppm*.

The menu items **<Save jpeg>**, **<Save pgm>** etc. don't work at present (they will not show the wind vectors). A screendump was the easiest way to get the vectors perfectly into a picture. (lines drawn in a picture may look broken if zoomed out after adding them). The *ppm* format was chosen because lines in a jpeg formatted file may look grubby.

Installation

For Windows there is a self-installing executable for the scatterometer part, like the one for *Xrit2Pic*. By default the BUFR extractor, *Bufr2Asc.exe*, is installed in the same directory as *Xrit2Pic* (C:\Program Files\xrit). The tables are installed by default in C:\bufr_tables. (if Windows is installed on the C: drive). This is also the default in *Xrit2Pic*, so normally, after default installation, everything should work.

In the *Xrit2Pic* **<Preferences>** menu, you can choose an alternative location for the tables. Note, however, that currently *Bufr2Asc* <u>doesn't allow spaces in the directory name</u> (because as far as I know spaces are not allowed in environment variables). This is also the reason why BUFR tables are not installed near the program. I'll change that in the future.

Another important point is that the path to the bufr_tables folder **must** end with the Unix-type directory separator (forward slash). So the path must look like

<div align="center">c:\bufr_tables/</div>

Xrit2Pic will take care of this, so it doesn't matter if you

forget or use the forward slash at the end. I just mention it here to prevent confusion should this strange mixture of directory separators pop up. (*Xrit2Pic* will use this path to set the environment variable before executing *Bufr2Asc*.)

If BUFR translation doesn't work, a message is placed in the information bar at the very bottom of the *Xrit2Pic* window. For cases where this message doesn't point to the problem, a debug feature is added. If the **<Test BUFR extractor>** button in the *Viewers* tab of the **<Preferences>** menu is checked then, every time the BUFR extractor is executed, a window with messages from this program pops up, which hopefully gives a clue to what is going wrong.

Defining the background picture is done in the *Files* tab of the **<Preferences>** menu. *Blue Marble* maps need first to be downloaded from the NASA website [3]. Follow the 'Monthly global images' link. Take care if downloading a 2km/pixel map. These are very big jpeg files (21600 x 10800 pixels) and your browser may not be able to display them. It is best to download these by **right**-clicking on '2km/pixel'. This will give a pop-up window where you can download by selecting the 'Save as' option from the menu. Now the picture will be downloaded without being displayed in the browser.

Using this picture needs 1 GB of RAM, otherwise things become unacceptably slow. It's best to start by using one of the lower resolution 8km/pixel maps.

For installation on Linux, the tarball *bufr2asc.tgz* needs to be downloaded. This contains both program and tables. Extract it in *$HOME/bin*, and check the BUFR table location in *Preferences* (by default $HOME/bin/bufr_tables/).

Using BUFR Extractor Standalone

The actual scatterometer extractor, *Bufr2Asc*, is a separate program, so it may be used stand-alone or in combination with other programs. The required environment variable may be set together with the actual execute command.

For Windows

set BUFR_TABLES=c:\bufr_tables/ & Bin2Asc inputfile outputfile

For Linux (bash)

export BUFR_TABLES=$HOME/bin/bufr_tables; Bin2Asc inputfile outputfile

with 'inputfile' replaced by the scatterometer file name to translate.

(By the way, these are exactly the commands as executed by *Xrit2Pic*.)

Future Developments

The Metop satellite is especially interesting because here both image and scatterometer information are available from one and the same satellite. The BUFR files seem to be a bit different, however, and I have yet to find out how to decode them. Furthermore, it would be interesting to see what other types of data in BUFR format is available, and how they may be represented.

References

1   KNMI
    http://www.knmi.nl/scatterometer
2   ERS-2
    http://www.deos.tudelft.nl/ers/instruments.html
3   Blue Marble maps:
    http://earthobservatory.nasa.gov/Newsroom/BlueMarble
4   Compiled BUFR extractor:
    http://www.alblas.demon.nl/wsat/software/soft_msg.html
5   Orbit figures of ERS-2 can be found at:
    http://celestrak.com/NORAD/elements/resource.txt
    Note: This is not necessary for using the BUFR extractor! For plotting wind vectors on a NOAA AVHRR picture the orbit figures of NOAA itself are needed: (use the download option in Xrit2Pic, Preferences tab Files.)
6   http://celestrak.com/NORAD/elements/weather.txt
7   Description of BUFR (and other formats):
    http://www.ecmwf.int/products/data/software/

Wind Data on EUMETCast

David Taylor

For some time, wind data has been available on the EUMETCast stream, but if has been in the BUFR format, which has proved rather more difficult to decode than some of the various other formats such as GRIB and HDF used for weather data. Fortunately, a couple of programs have come to hand which can decode the BUFR data into a text format which can be read and displayed more easily.

Data Sources

This data is available from two basic sources—scatterometer data from radar sensors carried on polar orbiting satellites which look at sea-surface reflections to determine the surface wind speed, and air-motion data which is derived from the 'image' data available from both polar orbiting and geostationary weather satellites.

For the scatterometer data, *EUMETCast* offers data from three different sources, the sensors on *Metop-A*, those on the *ERS-2* (Earth Resources Satellite 2), and both the 25 km and 100 km data from the *QuikSCAT* polar orbiting satellite.

For air-motion vector data, EUMETCast carries both data derived from the operational Europe/Africa geostationary satellite (Meteosat-9), and from the MODIS satellites, *Aqua* and *Terra*. These latter products cover the north and south polar regions (although the Antarctic station is down at the time of writing).

The Software

To allow readers to visualise this data, I have written a simple BUFR Viewing program which converts the BUFR data into text using the programs already mentioned. It then displays the text graphically as

BUFR Wind Vector Data for Hurricane Bertha

either direction arrows (showing the direction of air motion) or the more classic wind-barb display (showing the direction from which the wind is coming). Once the data has been converted to text, the text version is used for future display to save the repeated conversions.

I had earlier been dubious about using a conversion program but, with modern PCs, there is not a lot of waiting around! The largest files take the longest to convert, and these are the air-motion vector files (AMV) from the full disk Meteosat-9 data.

The *BUFR Viewer* program may be downloaded here, and includes a 30-day trial period before registration is required.

http://www.satsignal.eu/software/BUFR-viewer.html

GEO Readers' APT Image Competition

Nigel Evans

One of the frequent requests from the recent *GEO Readers' Questionnaire* was for more articles relating to APT imaging. This immediately struck a chord with me for, although I have considered moving on to *EUMETCast*, I have so far remained a 100% APT satellite imager.

What better than to hold a competition for the best APT image obtained by a GEO Reader on a specific date in the second half of September.

The Plan

To make sure that everyone will have received this issue of *GEO Quarterly* in good time to be primed for the competition, the date is Saturday, September 20.

The Satellite

Images should be from a daytime NOAA-18 pass. In the unlikely occurrence of a serious NOAA-18 malfunction, NOAA-17 may be substituted.

The Image

The image you submit for the competition should be either

- a monochrome channel-2 (visible) image or
- a channel 2+4 false-colour image

Images should be as realistic as possible: this means no entries, please, with exotic colour schemes (cloud top temperatures, rainfall etc) or overlays.

Information Required

Your image, as a good quality JPEG file, should be submitted along with the following information:

- Your name and postal address
- Your email address
- The receiver and antenna used
- The software used to process the image
- The date and time (UT) of the pass

Judging and Closing Date

Images will be judged by Nigel Evans, whose decision shall be final and binding. Closing date for receipt of entries is Saturday, <u>October 25, 2008</u>.

Prize

The entry adjudged the winner will earn the reader submitting it a prize of free entry to GEO's 2009 Symposium.

Submission of Entries

It is anticipated that readers will submit their entries by email, to

nigel@geo-web.org.uk

Where this is not possible, they may be sent on disc or CD to

Nigel Evans
L'Eventail
7 Gloster Ropewalk
Aycliffe, Dover CT17 9ES
ENGLAND

And Finally

Thumbnails of all images submitted will be posted on the GEO website.

GEO Members Worldwide

David Anderson

Much has been said over the years about GEO's status as an *international* weather satellite group. So it seemed a useful exercise to reveal just where our membership comes from.

The table opposite shows where all our members come from, though does not include those whose subscriptions expired with the delivery of Quarterly No 18. We very much hope that all these people will have renewed their subscription by the time this appears in print.

Just over two thirds of GEO members reside in the United Kingdom (68%). The Netherlands, with 29 members comes next on the list, closely followed by the USA and Germany.

Country	No	Country	No
Australia	9	Mauritius	1
Austria	3	Netherlands	29
Belgium	9	New Zealand	7
Bulgaria	1	Norway	2
Canada	5	Portugal	1
Cyprus	2	Singapore	1
Finland	1	South Africa	3
France	8	Spain	7
Germany	21	Sri Lanka	1
Guernsey	1	Sweden	4
Ireland	3	Switzerland	1
Italy	11	Turkey	1
Japan	3	United Kingdom	336
Liechtenstein	1	USA	21
Malaysia	1		

Cover and Full Page Images

Front Cover
Anthony Lowe sent us a CD full of APT images acquired since the turn of the year. This quarter's cover image comes from his selection, the NOAA-17 pass at 11:00 UT on May 7. A large region of high pressures reveals the entire British Isles, along with France, Denmark and Norway.

Inside Front Cover
This false-colour image was created from an HDF file downloaded from the China Satellite Data Service Center. The image dates from 05:30 UT on May 10, 2008, and was processed using the latest version of GeoSatSignal. You can learn how to process such images in our article on page 34.

Image: CSDSC

Back Cover
This fine Metop-A image sent to us by Mike Stevens dates from May 5, 2008 and clearly shows both the Canary and Cape Verde island groups off the coast of west Africa. The Canaries can be seen generating an interesting set of cloud vortices.

Image © EUMETSAT 2008

Page 6
This lovely Metop-A AVHRR image dating from the morning of June 2, 2008, showing much of Scandinavia free of cloud, was submitted by Alan Banks.

Image © EUMETSAT 2008

Page 38
Mike Stevens downloaded this fine Meteosat-9 image at 13:10 UT on April 14
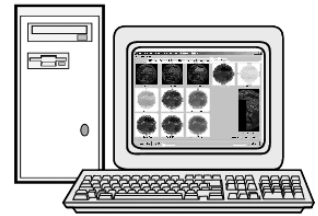
Image © EUMETSAT 2008

Page 40
Another image from Mike Stevens, this time from Metop-A, imaged by the AVHRR at 10:37 UT on May 5.

Image © EUMETSAT 2008

Computer Corner

Douglas Deans - dsdeans@tiscali.co.uk

Let me start off this quarter by expressing my thanks to those who took the trouble to provide some feedback on my new look column. Although only a few passed comments, those who contacted me were all very positive, particularly in respect of the Q and A content. It seems that my concerns regarding the rather simplistic level of my first questions were unfounded. as one reader put it 'it is just what was needed.'

This quarter I take a look at another few interesting computer questions and also have a couple of updated programs to bring to your attention.

Upgrading to Vista?

From time to time, I read comments regarding Microsoft's latest operating system and questions relating to the need or worth in upgrading to Vista. I can only offer my own experiences with this as I have both an XP and a Vista computer in constant use. My XP unit is the 'receive' computer for the *EUMETCast* system while the Vista one is the processing computer for EUMETCast data and everything else that I do—including typing this article using *AbiWord* .... now there is an incredibly good free program. Sorry back to topic.

I do get asked about the merits of Vista, whether it is worth upgrading and what problems are encountered with drivers etc.

Firstly, let me say that I have found the 'Home Premium' edition of Vista to be superb. There are many useful features and visually, it is stunning. It is probably the most secure of all Microsoft's operating systems but, that said, I do not think that upgrading is the best route to follow. Upgrading is expensive and, despite the many improvements, it is difficult to justify the cost.

What *is* very attractive, however, is the price when purchased bundled with a new computer. When I bought my AMD dual 64-bit 6400, Vista Home Premium (32-bit) was provided for £59, complete with a Microsoft CD ..... none of this recovery disc nonsense: exceptionally good value. All my programs were loaded back in without issue, although I had to check for the latest Vista drivers for my all-in-one printer/scanner/copier. I really don't

recommend purchasing the 64-bit version of Vista for the moment as that is not so well supported just yet. In addition, I have read that Microsoft will offer an upgrade to their 64-bit software, although I have to assume it would be a 'start again' installation.

So there it is! When it's time to purchase your next new computer, *then* move to Vista, relatively cheaply and without issue. It is, in my opinion, a superb operating system, although meantime, XP will (properly kept up to date) satisfy all your requirements and needs.

Computer Q and A

I am often asked about computer clock inaccuracies and how to correct them, so this quarter I want to have a look at the thorny issue of keeping your computer accurately at the correct time. I also discuss a handy utility for taking the hassle out of issues associated with memory upgrading, something that can be very useful in view of those ever increasing image file sizes.

Correcting Computer Time

For our hobby, it is essential that computer clocks are accurate. If we are tracking polar orbiting (or indeed any other) satellites, it is essential that the computer time is correct and that up to date Keplerian elements are installed; otherwise, the satellite may appear earlier or later than expected. Although I have found more modern computers to be better timekeepers, I have always been surprised at just how poor computer clock chips are. I have owned computers where the clock chip was out by minutes a day. Of course, if you are using an older computer, firstly make sure that the problem is not caused by a run-down CMOS battery. Replacement of this is a straightforward and inexpensive job.

There are a number of ways of keeping your computer clock accurate, some better than others and some more automatic than others.

One of the best methods nowadays is the public standard *Network Time Protocol* (NTP). I don't intend to discuss this option as David Taylor wrote a very detailed article explaining its use in the launch issue of *GEO Quarterly*, which I strongly recommend you to read.

However, for those who may find the NTP concept a little daunting, fear not, as there are many other ways to keep you computer clock sufficiently accurate for the requirements of our hobby. Indeed, you need not look any further than the PC's operating system itself.

Windows XP

If your computer is a member of a domain, your computer clock is probably synchronised automatically by a network time server. If your computer is not a member of a domain, you can synchronise your computer clock with an Internet time server.

Open **<Control panel → Date and Time>** and select the *Internet Time* tab. If '*Automatically synchronise with an Internet time server*' is ticked, the clock will be updated once per week. However, if you don't have a continuous Internet connection through a cable or DSL modem, the automatic synchronisation might not always occur. In that case, you can force an immediate synchronisation by clicking the *Update Now* button on the *Internet Time* tab. This tab is only available if your computer is <u>not</u> a member of a domain.

When you click the *Update Now* button, your clock should be synchronised immediately. If this fails, it might be for one of the following reasons:

- You have forgotten to connect to the Internet
- Sometimes a firewall can prevent synchronisation. Check your documentation for a remedy.

A quick search on the Internet will reveal a multitude of programs written just to ensure your computer clock is kept accurate. The majority of them are free. There are far too many to mention and most will do the job efficiently and automatically.

Windows Vista

This is one of the few occasions where Vista and XP are almost identical so you should follow the same instructions as detailed above for XP. Remember my comments in the last Quarterly about the Control Panel viewing options in Vista.

Most of the free programs written to keep your clock accurate will work equally well with Vista but check the documentation just to be sure.

Upgrading Computer Memory

With the ever-increasing size of image files for processing and viewing, and that long list of animations to be run, extra memory can be a huge help. Having said that, there are limitations on the maximum amount of memory that can be installed and indeed addressed by a computer. Obviously, the number of memory slots provided on the motherboard is one constraint, as are the type and size of memory module supported. So three memory slots that can take a maximum of 512 MB modules each will be much more limiting than three slots able to take 1 GB modules.

Also, whilst Windows ME, XP and Vista support up to 4 GB of RAM, in reality, 32-bit operating systems can only address slightly over 3 GB RAM (in fact somewhere between 2.75 GB and 3.25 GB depending on setup).

For 64-bit operating systems, anything from 8 GB up to 128 GB can be supported, dependant on the operating system itself.

Now some of you may have diligently kept your motherboard booklets, but even if you have, you may not understand the complex references to memory specifications— latency, clock speed and DDR to mention just a few. Without a motherboard reference life is going to be very difficult indeed. Remember, mixing memory types will at best cause problems; more likely, your PC will just not work.

Crucial

Crucial, one of the top memory companies in the UK, have an excellent website which includes a very useful scanner tool. This investigates your computer and provides a most detailed analysis of its architecture

(number of slots, memory size and type etc.) and offers a whole range of possible update options, costs and ordering details. It is a superb service which removes all the anxiety and hassle associated with identifying and choosing memory. I have used *Crucial* on a number of occasions and, even ordering late in an afternoon, I found the memory delivered (free of charge) the next morning. At the moment memory is relatively inexpensive and it will only cost about £40 to add 1 GB of fast DDR RAM. Crucial's web site can be accessed at

http://www.crucial.com/uk/

where you can follow links to the *Crucial System Scanner* tool and also the *Crucial Memory Advisor* tool. Of course, if you already know what you want, skip the tool options and go straight to ordering.

Software Updates

APT Decoder v 2.0.5.83 (April 6, 2008)

Although I did a quick review of updates to this program last quarter, a couple of new features have been added since then. The latest release of Patrick Tast's excellent program now provides an *Automatic Restart* feature and an *Automatic Update* facility.

For full details of those additions and other extras, and to download the program or updates please visit

http://www.poes-weather.com/

XRIT2PIC v 2008.06a

Let me remind readers of this very versatile program from Rob Alblas. The program

was initially written to decode HRIT and LRIT files from MSG-1 and convert the data to images.

However, Rob has, over a period of time, continued to update the program to deal with the multitude of data types now available over EUMETCast. These include Metop data, NOAA data, SAF files, DWDSAT files and a wealth of meteorological products, including recent ASCAT data. The program is completely free and is available for *Linux* as well as *Windows* operating systems. For further information, and to download the program go to

http://www.alblas.demon.nl/ wsat/software/soft_msg.html

Latest Releases from David Taylor

To learn more about those programs and to download the latest updates please go to

http://www.satsignal.eu

ATOVS Reader	v 1.1.2
AVHRR Manager	v 1.5.0
DWDSAT HRPT Viewer	v 1.1.0
GeoSatSignal	v 7.0.0
GRIB Viewer	v 2.1.8
GroundMap	v 2.0.6
HDF Viewer	v 1.2.2
HRPT Reader	v 2.8.0
Kepler Manager	v 1.3.0
MapToGeo	v 1.1.6
Metop Manager	v 1.2.4
MSG Animator	v 2.5.20
MSG Data Manager	v 2.5.20
PassControl	v 3.1.0
SatSignal	v 5.1.2
Sea-Ice & Viewer	v 1.3.4
Wxtrack	v 3.6.8

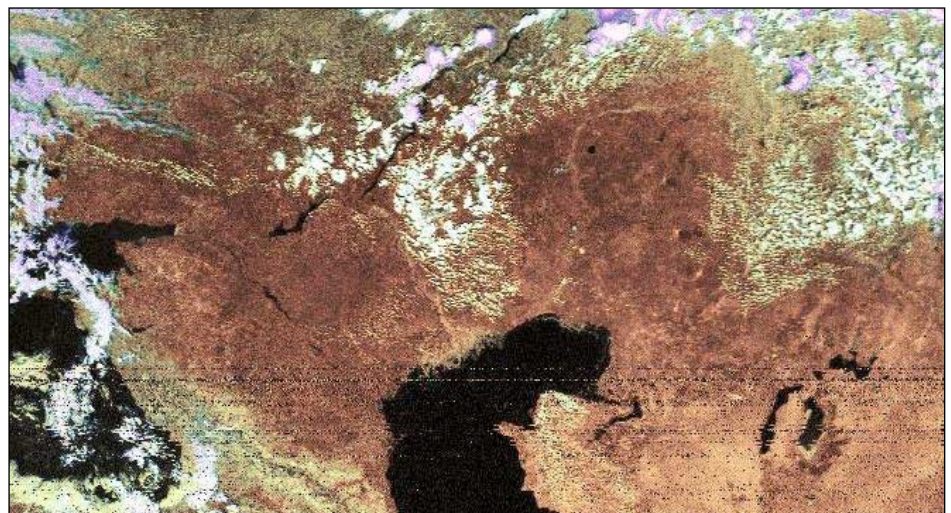# NOAA-18 Image of the Aral Sea

Anders Höök

A spell of incredibly fine and warm weather in nearly all of Sweden during July has resulted in me obtaining some exceptionally good low elevation APT images, compared with my usual standards. This has probably made all humidity disappear from my antenna and also that the outside contacts are very dry.

The attached image, which includes the Aral Sea itself and parts of the Caspian Sea and the Black Sea came from NOAA 18 at 10:03 UT on July 25.

From my QTH, the elevation of the satellite when it images the Aral Sea is between 4° and 9° and azimuth between 120° and 123°. Some noise lines are clearly visible on the image, which isn't very astonishing regarding the low elevation, and also due to the fact that I have a power line roughly in this direction.

The receiver was an R2FX; decoding and processing were done with APT Decoder from Patrik Tast.

A NOAA-18 image from Sweden, including the Aral Sea, from 10:03 UT on July 25, 2008

APT Audio Control

Francis Bell

I have read recent emails and Internet discussion group queries relating to problems in setting the audio level from a VHF receiver into a computer soundcard. This happened to me some years ago and I thought I might describe the solution I employed then and still use today.

My first APT receiver was a *Dartcom* model, purchased in the 1980s. I still use it occasionally. The receiver itself has never given me a problem but, in those early days, I was using a '486' computer and a decoding card bought from an educational scientific supplier. It all worked well but initially I had difficulty adjusting the audio level for the interface card. The adjustment had to be made at the back of the computer using a tiny trimmer on the card. It was difficult to access quickly and while receiving a live signal it was nearly impossible.

I didn't want to make alterations within the radio receiver but while reading the manual I noticed the specification for the audio output to the computer was 1 volt rms. against a given resistance. Subsequent receivers I have used have had the same 1 V rms. output standard.

Now, I'm not particularly technical but I thought that if I connected the receiver's audio output across a suitable potentiometer I could sweep off any voltage I wished (up to the maximum) and send that signal to the decoding card.

This worked well. I set my potentiometer to approximately mid scale and, with an incoming signal, set the trimmer on the card to give an acceptable image. I never touched the card again. Further signal level adjustments were made easily, in real time, just by using my external potentiometer, now in a box and carefully labelled (figure 1).

Nowadays, I have five APT receivers and several computers. The computers now have built in soundcards. Although the days of plug-in decoder cards are long gone, I still use the potentiometer box for feeding in the audio signal from the receiver. I set the initial audio input level to the computer using the operating system's *sndvol32.exe* utility, with my external box set in the mid position.

This is a one-off adjustment; thereafter I use the box with its potentiometer for fine adjustments. The system has worked well with all the receivers I have and with all the computers that I use for APT. I even take my external control box on my travels. See GEO Q 15 page 45 'Peripatetic APT'

It's unlikely that I will make another external control box because I now have three of them, but if I did I would make some small modifications. First, I would use different types of plugs and sockets for the input and out put so there was no chance of connecting them the wrong way round. I would also add a 1 kilo-ohm 0.25 W resistor in series with the potentiometer, thus making it impossible to short circuit the audio line from the receiver (figure 2).

All the APT weather display programs which I have tried respond to the external box adjustments in real time. One small point I have noticed is that *WXtoImg* takes three or four display lines to adjust to a change is signal level.
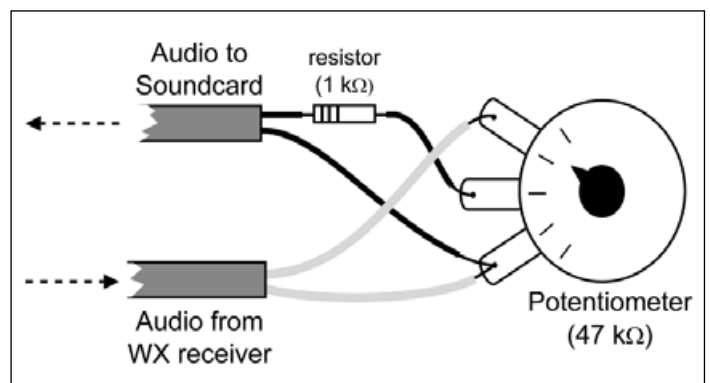

Figure 1 - The boxed and labelled potentiometer

Figure 2 - Connection diagram for the potentiometer

Construction

Figure 2 illustrates how to construct the signal level controller. The output signal from the receiver must be connected across the two outer terminals of the potentiometer (i.e. across the full 47 kiloöhms resistance of the device).

The output to the computer soundcard must connect between the centre terminal of the potentiometer and one of the side terminals.

The 1k resistor on the output line guards against a short circuit should the unit be connected the wrong way round.

Components

- A small project box
- 47k potentiometer (linear scale). Rating is not critical, and anything from 10k to 100k would be eminently suitable.
- 2 sockets for connecting the leads, different types preferred
- A control knob (with a scale attached) is useful
- A 1k, 0.25 W resistor

This should be an easy small project. I certainly find the product very useful.

NOAA Satellite Predictions

(Based on Latitude 52°N, Longitude 2°W, UT/GMT)

NOAA 15 137.50 MHz	NOAA 17 137.62 MHz	NOAA 18 137.10 MHz
Sep 01 05:24 07:04 15:12 16:52	09:08 10:48 20:36 22:17	01:55 03:36 11:49 13:29
Sep 02 05:00 06:40 14:49 16:27	10:25 12:05 20:13 21:53	01:45 03:25 11:38 13:19
Sep 03 04:36 06:16 16:04 17:45	10:02 11:42 19:50 21:29	01:34 03:15 11:28 13:08
Sep 04 05:52 07:32 15:40 17:20	09:38 11:19 19:28 21:06	01:24 03:04 11:18 12:57
Sep 05 05:28 07:08 15:16 16:56	09:15 10:55 20:43 22:24	01:13 02:54 11:08 12:47
Sep 06 05:04 06:44 14:53 16:32	10:32 12:12 20:20 22:00	01:03 02:43 12:36 14:19
Sep 07 04:41 06:20 14:30 16:08	10:09 11:49 19:57 21:37	02:33 04:14 12:26 14:08
Sep 08 04:17 05:57 15:44 17:25	09:46 11:26 19:35 21:13	02:22 04:03 12:16 13:57
Sep 09 05:33 07:13 15:21 17:00	09:23 11:02 20:50 22:32	02:12 03:53 12:05 13:46
Sep 10 05:09 06:49 14:57 16:36	10:39 12:20 20:27 22:08	02:01 03:42 11:55 13:36
Sep 11 04:45 06:25 14:34 16:12	10:16 11:56 20:04 21:44	01:51 03:32 11:45 13:25
Sep 12 04:21 06:01 15:48 17:29	09:53 11:33 19:42 21:21	01:40 03:21 11:34 13:14
Sep 13 05:37 07:17 15:25 17:05	09:30 11:10 19:19 20:57	01:30 03:11 11:24 13:04
Sep 14 05:13 06:53 15:01 16:41	09:07 10:46 20:34 22:15	01:19 03:00 11:14 12:53
Sep 15 04:49 06:29 14:38 16:17	10:23 12:04 20:11 21:51	01:09 02:50 12:43 14:25
Sep 16 04:25 06:05 15:53 17:34	10:00 11:40 19:49 21:28	00:59 02:39 12:32 14:14
Sep 17 05:41 07:22 15:29 17:09	09:37 11:17 19:26 21:05	02:29 04:10 12:22 14:04
Sep 18 05:17 06:58 15:06 16:45	09:14 10:54 20:41 22:23	02:18 03:59 12:12 13:53
Sep 19 04:54 06:34 14:42 16:21	10:30 12:11 20:19 21:59	02:08 03:49 12:01 13:42
Sep 20 04:30 06:10 15:57 17:38	10:07 11:47 19:56 21:35	01:57 03:38 11:51 13:31
Sep 21 05:46 07:26 15:33 17:14	09:44 11:24 19:33 21:12	01:47 03:28 11:41 13:21
Sep 22 05:22 07:02 15:10 16:49	09:21 11:01 20:49 22:30	01:36 03:17 11:30 13:10
Sep 23 04:58 06:38 14:47 16:25	10:38 12:18 20:26 22:06	01:26 03:07 11:20 13:00
Sep 24 04:34 06:14 16:01 17:43	10:14 11:55 20:03 21:42	01:15 02:56 11:10 12:49
Sep 25 05:50 07:30 15:38 17:18	09:51 11:31 19:40 21:19	01:05 02:46 12:39 14:21
Sep 26 05:26 07:06 15:14 16:54	09:28 11:08 20:56 22:37	02:35 04:16 12:28 14:10
Sep 27 05:02 06:42 14:51 16:30	09:05 10:45 20:33 22:13	02:25 04:06 12:18 13:59
Sep 28 04:38 06:18 16:06 17:47	10:22 12:02 20:10 21:50	02:14 03:55 12:07 13:49
Sep 29 04:15 05:54 15:42 17:23	09:58 11:39 19:47 21:26	02:04 03:45 11:57 13:38
Sep 30 05:30 07:11 15:18 16:58	09:35 11:15 19:25 21:03	01:53 03:34 11:47 13:27
Oct 01 05:06 06:47 14:55 16:34	09:12 10:52 20:40 22:21	01:43 03:23 11:37 13:17
Oct 02 04:43 06:23 14:32 16:10	10:29 12:09 20:17 21:57	01:32 03:13 11:26 13:06
Oct 03 04:19 05:59 15:46 17:27	10:06 11:46 19:54 21:34	01:22 03:02 11:16 12:55
Oct 04 05:35 07:15 15:23 17:03	09:42 11:23 19:32 21:10	01:11 02:52 11:06 12:45
Oct 05 05:11 06:51 14:59 16:38	09:19 10:59 20:47 22:28	01:01 02:41 12:35 14:17
Oct 06 04:47 06:27 14:36 16:14	10:36 12:16 20:24 22:04	02:31 04:12 12:24 14:06
Oct 07 04:23 06:03 15:50 17:31	10:13 11:53 20:01 21:41	02:20 04:01 12:14 13:55
Oct 08 05:39 07:19 15:27 17:07	09:50 11:30 19:39 21:17	02:10 03:51 12:03 13:44
Oct 09 05:15 06:55 15:03 16:43	09:27 11:06 20:54 22:36	01:59 03:40 11:53 13:34
Oct 10 04:51 06:31 14:40 16:19	09:03 10:43 20:31 22:12	01:49 03:30 11:43 13:23
Oct 11 04:27 06:07 15:55 17:36	10:20 12:00 20:08 21:48	01:38 03:19 11:32 13:12
Oct 12 05:43 07:24 15:31 17:11	09:57 11:37 19:45 21:25	01:28 03:09 11:22 13:02
Oct 13 05:19 07:00 15:08 16:47	09:34 11:14 19:23 21:01	01:17 02:58 11:12 12:51
Oct 14 04:56 06:36 14:44 16:23	09:11 10:50 20:38 22:19	01:07 02:48 12:41 14:23
Oct 15 04:32 06:12 15:59 17:40	10:27 12:07 20:15 21:55	00:57 02:37 12:30 14:12
Oct 16 05:48 07:28 15:35 17:16	10:04 11:44 19:52 21:32	02:27 04:08 12:20 14:01
Oct 17 05:24 07:04 15:12 16:51	09:41 11:21 19:30 21:08	02:16 03:57 12:09 13:51
Oct 18 05:00 06:40 14:48 16:27	09:18 10:58 20:45 22:27	02:06 03:47 11:59 13:40
Oct 19 04:36 06:16 16:03 17:45	10:34 12:15 20:22 22:03	01:55 03:36 11:49 13:29
Oct 20 04:12 05:52 15:40 17:20	10:11 11:51 19:59 21:39	01:45 03:26 11:39 13:19
Oct 21 05:28 07:08 15:16 16:56	09:48 11:28 19:37 21:16	01:34 03:15 11:28 13:08
Oct 22 05:04 06:44 14:53 16:32	09:25 11:05 20:52 22:34	01:24 03:04 11:18 12:57
Oct 23 04:40 06:20 14:29 16:08	09:02 10:41 20:29 22:10	01:13 02:54 11:08 12:47
Oct 24 04:17 05:56 15:44 17:25	10:18 11:58 20:07 21:46	01:03 02:43 12:36 14:19
Oct 25 05:32 07:12 15:20 17:00	09:55 11:35 19:44 21:23	02:33 04:14 12:26 14:08
Oct 26 05:08 06:48 14:57 16:36	09:32 11:12 19:21 21:00	02:22 04:03 12:16 13:57
Oct 27 04:45 06:24 14:34 16:12	09:09 10:49 20:36 22:17	02:12 03:53 12:05 13:46
Oct 28 04:21 06:01 15:48 17:29	10:25 12:06 20:14 21:54	02:01 03:42 11:55 13:36
Oct 29 05:37 07:17 15:24 17:05	10:02 11:42 19:51 21:30	01:51 03:32 11:45 13:25
Oct 30 05:13 06:53 15:01 16:40	09:39 11:19 19:28 21:07	01:40 03:21 11:34 13:14
Oct 31 04:49 06:29 14:38 16:16	09:16 10:56 20:44 22:25	01:30 03:11 11:24 13:04

NOAA 15 137.50 MHz	NOAA 17 137.62 MHz	NOAA 18 137.10 MHz
Nov 01 04:25 06:05 15:52 17:33	10:32 12:13 20:21 22:01	01:19 03:00 11:14 12:53
Nov 02 05:41 07:21 15:29 17:09	10:09 11:49 19:58 21:37	01:09 02:50 12:43 14:25
Nov 03 05:17 06:57 15:05 16:45	09:46 11:26 19:35 21:14	00:58 02:39 12:32 14:14
Nov 04 04:53 06:33 14:42 16:21	09:23 11:03 20:51 22:32	02:29 04:10 12:22 14:03
Nov 05 04:29 06:09 15:57 17:38	10:40 12:20 20:28 22:08	02:18 03:59 12:11 13:53
Nov 06 05:45 07:25 15:33 17:13	10:16 11:57 20:05 21:45	02:08 03:49 12:01 13:42
Nov 07 05:21 07:01 15:09 16:49	09:53 11:33 19:42 21:21	01:57 03:38 11:51 13:31
Nov 08 04:57 06:37 14:46 16:25	09:30 11:10 19:19 20:58	01:47 03:28 11:40 13:21
Nov 09 04:34 06:13 16:01 17:42	09:07 10:47 20:35 22:16	01:36 03:17 11:30 13:10
Nov 10 05:49 07:30 15:37 17:18	10:23 12:04 20:12 21:52	01:26 03:06 11:20 12:59
Nov 11 05:26 07:06 15:14 16:53	10:00 11:40 19:49 21:28	01:15 02:56 11:10 12:49
Nov 12 05:02 06:42 14:50 16:29	09:37 11:17 19:26 21:05	01:05 02:45 12:38 14:21
Nov 13 04:38 06:18 14:27 16:05	09:14 10:54 20:42 22:23	02:35 04:16 12:28 14:10
Nov 14 04:14 05:54 15:41 17:22	10:31 12:11 20:19 21:59	02:24 04:05 12:18 13:59
Nov 15 05:30 07:10 15:18 16:58	10:07 11:48 19:56 21:35	02:14 03:55 12:07 13:48
Nov 16 05:06 06:46 14:54 16:33	09:44 11:24 19:33 21:12	02:03 03:44 11:57 13:37
Nov 17 04:42 06:22 14:31 16:09	09:21 11:01 20:49 22:30	01:53 03:34 11:46 13:27
Nov 18 04:18 05:58 15:46 17:27	10:38 12:18 20:26 22:06	01:42 03:23 11:36 13:16
Nov 19 05:34 07:14 15:22 17:02	10:14 11:55 20:03 21:43	01:32 03:13 11:26 13:06
Nov 20 05:10 06:50 14:59 16:38	09:51 11:31 19:40 21:19	01:21 03:02 11:16 12:55
Nov 21 04:46 06:26 14:35 16:14	09:28 11:08 19:18 20:56	01:11 02:52 12:45 14:27
Nov 22 04:23 06:02 15:50 17:31	09:05 10:45 20:33 22:14	01:00 02:41 12:34 14:16
Nov 23 05:38 07:19 15:26 17:06	10:22 12:02 20:10 21:50	02:30 04:12 12:24 14:05
Nov 24 05:15 06:55 15:03 16:42	09:58 11:39 19:47 21:26	02:20 04:01 12:13 13:54
Nov 25 04:51 06:31 14:39 16:18	09:35 11:15 19:24 21:03	02:09 03:51 12:03 13:44
Nov 26 04:27 06:07 15:54 17:35	09:12 10:52 20:40 22:21	01:59 03:40 11:53 13:33
Nov 27 05:43 07:23 15:30 17:11	10:29 12:09 20:17 21:57	01:48 03:29 11:42 13:22
Nov 28 05:19 06:59 15:07 16:46	10:05 11:46 19:54 21:33	01:38 03:19 11:32 13:12
Nov 29 04:55 06:35 14:44 16:22	09:42 11:22 19:31 21:10	01:27 03:08 11:22 13:01
Nov 30 04:31 06:11 15:58 17:40	09:19 10:59 20:47 22:28	01:17 02:58 11:11 12:51
Dec 01 05:47 07:27 15:35 17:15	10:36 12:16 20:24 22:04	01:07 02:47 12:40 14:22
Dec 02 05:23 07:03 15:11 16:51	10:13 11:53 20:01 21:41	02:37 04:18 12:30 14:12
Dec 03 04:59 06:39 14:48 16:27	09:49 11:29 19:38 21:17	02:26 04:07 12:19 14:01
Dec 04 04:35 06:15 16:03 17:44	09:26 11:06 19:16 20:54	02:16 03:57 12:09 13:50
Dec 05 04:12 05:51 15:39 17:20	09:03 10:43 20:31 22:12	02:05 03:46 11:59 13:39
Dec 06 05:27 07:08 15:15 16:55	10:20 12:00 20:08 21:48	01:55 03:36 11:48 13:29
Dec 07 05:03 06:44 14:52 16:31	09:56 11:37 19:45 21:24	01:44 03:25 11:38 13:18
Dec 08 04:40 06:20 14:29 16:07	09:33 11:13 19:22 21:01	01:34 03:14 11:28 13:07
Dec 09 04:16 05:56 15:43 17:24	09:10 10:50 20:38 22:19	01:23 03:04 11:17 12:57
Dec 10 05:32 07:12 15:20 16:59	10:27 12:07 20:15 21:55	01:13 02:53 12:46 14:29
Dec 11 05:08 06:48 14:56 16:35	10:03 11:44 19:52 21:31	01:02 02:43 12:36 14:18
Dec 12 04:44 06:24 14:33 16:11	09:40 11:20 19:29 21:08	02:32 04:13 12:25 14:07
Dec 13 04:20 06:00 15:47 17:28	09:17 10:57 20:45 22:26	02:22 04:03 12:15 13:56
Dec 14 05:36 07:16 15:24 17:04	10:34 12:14 20:22 22:02	02:11 03:52 12:05 13:45
Dec 15 05:12 06:52 15:00 16:40	10:11 11:51 19:59 21:39	02:01 03:42 11:54 13:35
Dec 16 04:48 06:28 14:37 16:16	09:47 11:27 19:36 21:15	01:50 03:31 11:44 13:24
Dec 17 04:24 06:04 15:52 17:33	09:24 11:04 19:14 20:52	01:40 03:21 11:34 13:14
Dec 18 05:40 07:21 15:28 17:08	09:01 10:41 20:29 22:09	01:29 03:10 11:23 13:03
Dec 19 05:16 06:56 15:04 16:44	10:18 11:58 20:06 21:46	01:19 02:59 11:13 12:52
Dec 20 04:52 06:32 14:41 16:20	09:54 11:35 19:43 21:22	01:08 02:49 12:42 14:24
Dec 21 04:29 06:08 15:56 17:37	09:31 11:11 19:20 20:59	00:58 02:38 12:31 14:13
Dec 22 05:45 07:25 15:32 17:13	09:08 10:48 20:36 22:17	02:28 04:09 12:21 14:02
Dec 23 05:21 07:01 15:09 16:48	10:25 12:05 20:13 21:53	02:17 03:58 12:11 13:52
Dec 24 04:57 06:37 14:45 16:24	10:01 11:42 19:50 21:29	02:07 03:48 12:00 13:41
Dec 25 04:33 06:13 16:00 17:42	09:38 11:18 19:27 21:06	01:56 03:37 11:50 13:30
Dec 26 05:49 07:29 15:36 17:17	09:15 10:55 20:43 22:24	01:46 03:27 11:40 13:20
Dec 27 05:25 07:05 15:13 16:53	10:32 12:12 20:20 22:00	01:35 03:16 11:29 13:09
Dec 28 05:01 06:41 14:49 16:28	10:08 11:49 19:57 21:36	01:25 03:06 11:19 12:58
Dec 29 04:37 06:17 14:26 16:04	09:45 11:25 19:34 21:13	01:14 02:55 11:09 12:48
Dec 30 04:13 05:53 15:41 17:21	09:22 11:02 20:50 22:31	01:04 02:44 12:37 14:20
Dec 31 05:29 07:09 15:17 16:57	08:59 10:39 20:27 22:07	02:34 04:15 12:27 14:09

GEO Helplines

Douglas Deans
Dunblane, Perthshire, SCOTLAND
All aspects of weather satellites from APT, HRPT to Meteosat-8 DVB/EUMETCast systems.
- telephone:(01786) 82 28 28
- e-mail: dsdeans@tiscali.co.uk

John Tellick
Surbiton, Surrey, ENGLAND
Meteosat-8 advice - registering for the various MSG services, hardware and software installation and troubleshooting. John will also field general queries about any aspect of receiving weather satellite transmissions.
- telephone: (0208) 390 3315
- e-mail: info@geo-web.org.uk

David Strickland
Truro, Cornwall, ENGLAND
David has set up his own wireless network system of three computers. He has interests in electronic design and prototyping, general computing, microchip processors with various facilities and of course MSG satellite imaging. He will be happy to discuss any of the above topics, and to help anyone local, including viewing his setup.
- e-mail: David@Strickland.uk.com

Geoff Morris GW3ATZ
Shotton, Flintshire, NE WALES
Geoff has lots of experience with aerial, co-ax,connectors, mounting hardware etc. and has also done a lot of work with the orbiting satellites. Geoff has been a EUMETCast Meteosat-8 user for some time and is familiar with David Taylor's MSG software; he should be able to share his experiences with newcomers to this branch of the hobby.
- Tel: (01244) 818252
- e-mail: gw3atz@btopenworld.com

Guy Martin G8NFU
Biggin Hill NW Kent, ENGLAND
Guy is prepared to advise anyone who wishes to receive MSG under Windows 2000.
- agm@tonbridge-school.org

Hector Cintron
San Juan, Puerto Rico, USA
Hector is prepared to field enquiries on HRPT, APT, EMWIN and NOAAPORT
- Phone: 787-774-8657
- e-mail: n1tkk@hwic.net

Email contact can of course be made at any time, but we would ask you to respect privacy by restritricting telephone contact to the period 7.00-9.00 pm in the evenings.

Internet News/Discussion Groups

There are a numerous Internet-based discussion groups available to weather satellite enthusiasts. You can join any of these by sending an e-mail to the appropriate address, with a request to subscribe. Indeed, a blank e-mail containing the word 'subscribe' in its Subject line is all that is required. Some of the more useful groups and their contact addresses are listed below.

APT Decoder
This is a group where users of Patrik Tast's APTDecoder can share information and problems.
> *http://tech.groups.yahoo.com/group/APTDecoder/*

GEO-Subscribers
This is a group where GEO members can exchange information relating to either GEO itself or Earth observation satellites and related matters.
> *http://tech.groups.yahoo.com/group/GEO-Subscribers/*

Satsignal
An end-user self help group for users of David Taylor's Satellite Software Tools (SatSignal, WXtrack, GeoSatSignal, HRPT Reader, GroundMap, MSG Data Manager, AVHRR Manager and the ATOVS Reader.
> *http://tech.groups.yahoo.com/group/SatSignal/*

MSG-1
A forum dedicated to Meteosat Second Generation (MSG), where members share information about the *EUMETCast* reception hardware and software.
> *http://tech.groups.yahoo.com/group/MSG-1/*

METOP
A forum for users of high-resolution AHRPT data from the MetOp satellite, available via *EUMETCast*.
> *http://tech.groups.yahoo.com/group/METOP/*

AVHRR
A forum for users who download high-resolution EARS-AVHRR data from the NOAA polar orbiting weather satellites via *EUMETCast*.
> *http://tech.groups.yahoo.com/group/AVHRR/*

ATOVS
A Group for discussions about using ATVOS data. Data from the whole world is available from CLASS (www.class.noaa.gov) and for an extended Europe, via *EUMETCast*.
> *http://tech.groups.yahoo.com/group/ATOVS/*

Weather Satellite Reports
A group providing reports, updates and news on operational aspects of weather satellites.
> *http://tech.groups.yahoo.com/group/weather-satellite-reports/*

WXtoImg
Users of the WXtoImg software package for capturing and imaging NOAA APT can air their problems, discuss its features and ask questions about it.
> *http://groups.yahoo.com/group/wxtoimg-l/*

Websites

There are numerous websites devoted to Earth observation and weather satellite images. Here are just a few of the best ones. Note that some of these are *Case Sensitive*.

NASA Earth Observation Newsroom
A high-resolution satellite image of an interesting area or weather event is posted each day. An archive of such images stretching back several years is available.
> *http://earthobservatory/nasa.gov/Newsroom/NewImages/images.php3*

Earth Observatory Natural Hazards
Images of recent major hazards (severe storms, fires, volcanic eruptions, floods) are posted. A great site for images of tropical cyclones and hurricanes.
> *http://earthobservatory/nasa.gov/NaturalHazards/*

MODIS Rapid Response System
Recent high-resolution imagery from NASA's Terra and Aqua satellites is posted here. There is also a gallery of near real-time current images.
> *http://rapidfire.sci.gsfc.nasa.gov/gallery/*

The Editor is always on the lookout for articles and images for inclusion in GEO Quarterly. These can relate to any aspect of Earth Imaging, especially:
- Technical articles concerning relevant hardware / software
- Construction projects
- Weather satellite images
- Reports on weather phenomena
- Descriptions of readers' satellite imaging stations
- Activities from overseas readers
- Letters to the Editor
- Problems and Queries for our experts to answer

Contributions should of course be original and, where possible, should be submitted to the editor in electronic format (floppy disc, e-mail attachment, CD). But of course we will also accept handwritten or typed copy should the need arise.

Please note, however, that **major articles** which contain large numbers of satellite images, photographs or other illustrations should be submitted **as early as possible** so that they can be prepared and made up into pages in time for publication.

Images and Diagrams
Images can be accepted in any of the major bitmap formats, e.g. JPG, BMP, GIF, TIFF etc. Images in both monochrome and colour are welcomed for inclusion. Line drawings and diagrams are preferred in Windows metafile and postscript formats. We can also scan original photographs, negatives and slides.

Gridding, Overlays and Captions
Please note that readers' satellite images should be provided *without* added grid lines, country outlines or captions *unless* these are considered essential to illustrate an article.

If your article submission contains embedded images and diagrams, please note that it is essential that you **also submit the individual images** in one of the formats described above: these are essential for page make-up purposes.

Submission of Copy
All materials for publication should be sent to the Editor, Les Hamilton, 8 Deeside Place, Aberdeen, AB15 7PW, Scotland.

Materials may also be sent as attachments to the following e-mail address:
> *geoeditor@geo-web.org.uk*

Larger attachments (1 Mb to 10 Mb) are best sent to:
> *editor.geo@googlemail.com*

And finally . . . if you do have material ready for the next GEO Quarterly, please submit it as soon as it is ready—do not wait till the deadline before sending it in. This simply creates an editorial log-jam.

Group for Earth Observation

Membership Application Form

PayPal

Current Subscription Rates

United Kingdom ... £20   Europe .... £24   Rest of World £28

You can make your annual GEO Membership payment by any of the following means:

1. **PayPal** - Visit the GEO Shop web page at *http://www.geo-web.org.uk/shop.html* and add your subscription to your basket
2. **Credit/Debit card** - Complete your details below and mail/FAX this form to the Membership Secretary (details below)
3. UK residents may also pay by **personal cheque** or **Postal Order** made payable to ⊔Group for Earth Observation⊔

I enclose my payment of .... £

Mastercard ☐   VISA ☐   Switch ☐   Switch Solo ☐   Issue No ☐/☐

Credit Card Number ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐   **Expiry Date** ☐/☐

If you would like to renew your subscription automatically by credit card each year, please tick the box opposite ⟶ ☐

Name (please PRINT clearly)

Address

Town/City

Postcode/ZIP   **Callsign**

Country

Telephone Number   **FAX**

Email Address (please print very clearly)

Declaration

I wish to join GEO for a period of one year.

I sign below to confirm that I have no objection to my membership details being held on a computer database and understand that these details will be used *exclusively* for internal GEO administration purposes.

Signature

Date

Your subscription is valid for one year from your date of application and entitles you to all the privileges of membership of the Group for Earth Observation, including four issues of GEO Quarterly. Please note that your subscription will commence with the issue of GEO Quarterly that is current at the time of your application. Back issues, where available, may be ordered from the GEO Shop.

Please send your completed form to:
David Anderson (GEO subs),
35 Sycamore Road,
East Leake
Loughborough LE12 6PP, UK

If paying by credit card, you may FAX a copy of this form to +44 (0) 1509 277 220

*GEO Subscriptions
35 Sycamore Road,
East Leake,
Loughborough LE12 6PP
England, UK.*

If you prefer, a photocopy or scan of this form is acceptable.

The Group for Earth Observation Limited is a company in England and Wales, limited by guarantee and having no shares. The company number is 4975597. The registered office is Coturnix House, Rake Lane, Milford, Godalming GU8 5AB.

Earth Imaging News

Peter Wakelin

TWINS Science Payloads on Classified Spacecraft

In June, 2006, the classified spacecraft code-named *USA 184* was launched to a highly eccentric 'Molniya' orbit. The characteristics of this useful orbit were described in GEO Quarterly, No 14 (June 2007), and the orbit of this spacecraft was used to illustrate the advantages of such an orbit. It was speculated that *USA 184* carried the first SBIRS (Space Based Infrared System) payload. *USA 200*, launched on March 13, 2008 to a similar orbit, but in a different plane, is believed to carry the second SBIRS payload.

Analysts now believe that these two spacecraft also carry the *TWINS* A and B payloads, designed to derive stereoscopic, three-dimensional observations of the Earth's magnetosphere, that all-important region of high-energy charged particles trapped within our planet's magnetic field, which protects all life from harmful components of the sun's emissions.

The feasibility of magnetospheric imaging was demonstrated more than 10 years ago and NASA's *IMAGE* (Imager for Magnetopause to Aurora Global Exploration) spacecraft, launched in March 2000, was the first dedicated platform for making ENA (energetic neutral atoms) measurements of Earth's magnetosphere. The *TWINS* (Two Wide-angle Imaging Neutral-atom Spectrometers) spacecraft permit simultaneous observations from two widely-separated vantage points at up to almost 40,000 km above Earth's surface. This stereo imaging is expected to greatly advance the understanding of the global aspects of Earth's magnetosphere.

Final SAR-Lupe Launched

Germany's fifth and final *SAR-Lupe* radar imaging satellite was launched by a Russian *Kosmos-3M* on July 22. It is identical to *SAR-Lupe 4*, launched in March and described in Earth Imaging News, GEO Quarterly 18, June, 2008.

Jason-2 Launched Successfully

This joint French-US (CNES-NASA) mission was launched on June 20 from Vandenberg's Launch Complex SLC2W by United Launch Alliance's Delta II 7320 vehicle at a time when the launch site was passing through the plane of Jason-1's orbit. It was reported that the first stage underperformed slightly but this was compensated for by the second stage and Jason-2 entered the planned orbit about 10 km lower than that of Jason-1. Jason-2 was then commanded to execute a series of manouevres to raise its altitude to match that of its predecessor and position it about one minute (500 km) ahead but slightly offset to allow for Earth's rotation during this short interval. This was to ensure that the nadir-pointing altimeters on both satellites were following precisely the same ground track. This delicate operation took about a month after which cross-calibration of the instruments on the two spacecraft began. These checks will take about six months but even before the end of July, valuable, high-quality data were being received from this Thales Proteus class satellite which had a launch mass of 506 kg.

Jason-2 data will contribute to the *Ocean Surface Topography Mission* (OSTM) which forms part of an integrated global strategy

Jason-2's under test
Credit: CNES

to map ocean currents, not only by satellites, but by utilising floats and buoys as well. Advances in radar altimetry in the 1980s proved that sea surface levels could be measured to better than 10 cm accuracy and satellite measurements have been maintained continuously since the launch of the joint NASA-CNES *TOPEX/Poseidon mission* in August 1992. This satellite was still operating nine years later when the technically more advanced Jason-1 was launched into the same orbit, enabling tandem operations to compare instrument characteristics and more than double the science return.
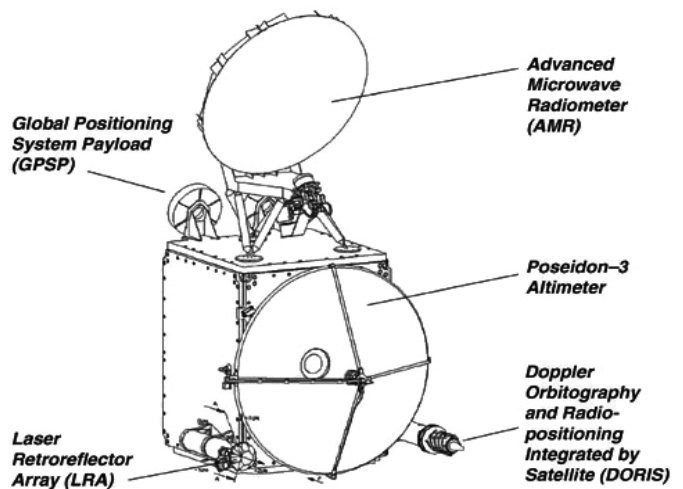
Schematic identifying Jason-2's instrument
Credit: CNES

Jason-1 continues to operate well and, once Jason-2's calibration is complete, the two will operate in tandem for as long as Jason-1 remains healthy. On completion of the calibration phase, the older craft will be manoeuvred so that its ground track is mid-way between two adjacent Jason-2 groundtracks. This arrangement will once again increase the data two-fold and also provide valuable data on smaller-scale ocean phenomena which would not be possible with a single spacecraft, such as eddies and tides in coastal areas and shallow seas .

Data from the satellites, which are in orbits inclined at 66° to the equator, thereby covering almost all Earth's oceans, are received at three ground stations located at Fairbanks in Alaska, Wallops Island, Virginia, and Usingen in Germany. After processing by CNES, EUMETSAT or NOAA (depending on the type of data) the products will be made available to users, some of them in near-real time.

Instruments on Jason-2 are similar to those on Jason-1 but the Poseidon-3 radar altimeter will improve ocean surface height accuracies to about three centimetres. The purpose of the other instruments on board is to precisely locate the spacecraft in its orbit and to determine atmospheric effects on the radar pulses. A brief description of the instruments follows but much more can be found on numerous websites such as

http://www.nasa.gov/ostm

The *Poseidon-3 dual frequency altimeter* is the main instrument on Jason-2 and measures the distance to the sea surface. An analysis of the return radar signal can also result in reliable measurements of wave height and surface wind speed.

The *Advanced Microwave Radiometer* is an improved version of that flown on Jason-1 and acquires measurements in three separate frequencies to determine the path delay of the altimeter's radar signal caused by water vapour in the atmosphere.

The *Doppler Orbitography and Radiopositioning Integrated by Satellite* (DORIS) system provides high-precision, real-time orbit determination and beacon positioning. Positions accurate to a few centimetres can be achieved with DORIS. Measurements can also be used in geophysical studies.

The *Global Positioning System Payload* (GPSP) is a tracking system that receives dual-frequency navigation signals continuously and simultaneously from several GPS satellites to determine Jason-2's orbit.

The *Laser Retroreflector Array* (LRA), developed by NASA, reflects laser beams from several laser-ranging stations and can measure Earth to satellite distances to an accuracy of a few millimetres. It is used to calibrate GPSP and DORIS.

Improvements to these instruments since Jason-1 was built will permit a significant increase in accuracy in measuring ocean surface heights: better than 3 cm is anticipated. A new instrument, the *Wide Swath Ocean Altimeter*, which was earlier planned for inclusion on Jason-2, did not fly but three experimental payloads were incorporated. They are *Time Transer* by *Laser Link* and *Environment Characterisation and Modelisation-2*, both from CNES, and Japan's *Light Particle Telescope*.

Enhanced Imagery for China's Flood Season

China's primary geostationary satellite is currently *Fengyun-2C* stationed at 105°E longitude from where it routinely images every 30 minutes. *FY-2D*, launched in November 2006, is located above 86.5°E and is normally in standby mode; but during the summer flood-risk season in China, which extends from June to September, *FY-2D* is being used to provide additional imagery. By interlacing 30-minute imagery from the two spacecraft, the China Meteorological Administration effectively gets 15-minute imagery for the four-month period. *FY-2E* is expected to be launched later this year and is destined to go to 123°E.

Changes to NPOESS and NPP

A sensor considered critical in monitoring global climate will be restored to the first satellite scheduled to fly in 2013 in the *National Polar-Orbiting Environmental Satellite System* (NPOESS). The Total Solar Irradiance Sensor (TSIS) had been removed during the 2006 restructuring of the NPOESS programme. The decision follows an earlier agreement to put another climate sensor, the Clouds and Earth Radiant Energy System (CERES) on NPP, the NPOESS Preparatory Project satellite. CERES data will complement TSIS measurements by shedding light on how clouds influence the Earth's energy balance and the role they play in regulating climate. Another instrument, the Ozone Mapping and Profiler Suite (OMPS), for measuring the vertical distribution of ozone, was restored to NPP in 2007, reversing an earlier decision not to include it.

India Launches CARTOSAT-2A

On its thirteenth flight, the Indian Space Research Organisation's Polar Satellite Launch Vehicle, *PSLV-C9* launched the 690 kg Indian remote sensing satellite *CARTOSAT-2A*, the 83 kg *Indian Mini Satellite* (IMS-1) and eight tiny nanosatellites for international customers into 637 km sun-synchronous orbits. The rocket lifted off

Part of Bangalore, India, imaged by Cartosat-2
Credit: ISRO

from the second launch pad at the Satish Dhawan Space Centre in Sriharikota, on India's east coast, at 03:54 UT on April 28.

CARTOSAT-2A carries a panchromatic camera capable of taking monochrome images in the visible part of the spectrum with a resolution of about one metre over a swath 9.6 km wide. The camera is steerable both along and across the direction of travel to facilitate imaging of any area more frequently. The high-resolution imagery is being used primarily in urban and rural development applications requiring large-scale mapping.

Indian Mini Satellite (IMS-1) was developed by ISRO for remote sensing applications and incorporates many new technologies. It carries two multi-spectral cameras with 37 m and 500 m resolutions at the nadir and is expected to operate for two years. IMS has been designed so that future craft in the series can incorporate a wide variety of payloads without significant changes.

Six of the eight nanosatellites are within the University of Toronto's *NLS-4* project and were developed by various universities in Japan, Canada, Denmark, Germany and the Netherlands. The other two are *RUBIN-8*, built by Cosmos International in Germany, and *NLS-5*, built by the University of Toronto.

Satellite to Map Earth's Soil Moisture

A new NASA satellite is being designed to collect global soil moisture measurements and other data seen as key to improving weather, flood and drought forecasts, and predictions of agricultural productivity and climate change. At present, scientists have no network for gathering soil moisture data as they do for rainfall, winds, humidity and temperature. NASA's *Soil Moisture Active-Passive Mission* (SMAP), scheduled for launch in 2012, aims to change that.

The SMAP mission is based on an earlier project that had been selected by NASA and scheduled for a 2009 launch but the *Hydrosphere State Mission* (Hydros) was axed in 2005 when funds were diverted. SMAP's instruments will gather both active (by radar) and passive low-frequency microwave measurements on a continuous basis, thereby creating a map of global surface soil moisture. The 6-metre mesh antenna will gather data along a 1,000 km swath covering the entire globe every few days. The satellite will also detect if the surface moisture is frozen and, in forests, the freeze/thaw state which determines the length of the growing season and hence the balance between carbon assimilation into biomass and the loss of carbon due to vegetation respiration. The result of this balance can tell scientists if a forest is a net source or net sink of carbon.

Chilean Volcano Chaiten Erupts

After lying dormant for thousands of years, Chile's 1,000 m high Chaiten Volcano, near the Gulf of Corcovado, began erupting on May 2 leading to the evacuation of thousands of people from the area. *Envisat's* Medium Resolution Imaging Spectrometer (MERIS), with a resolution of 1,200 metres, captured this image on May 2. It shows the ash cloud crossing the Andes mountain range and Argentina before reaching the Atlantic Ocean.
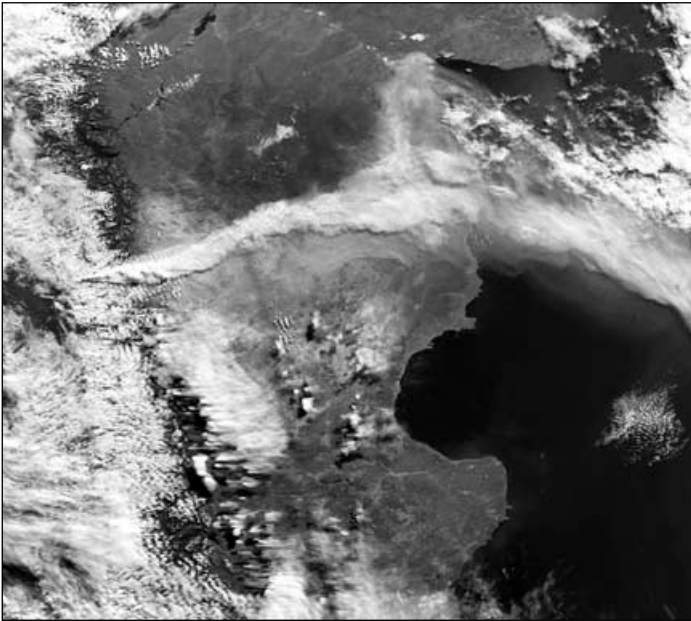
Envisat images the eruption of Chaiten volcano
Credit: ESA

To boost the use of Earth observation (EO) data at volcanic observatories, the European Space Agency has started to monitor volcanoes worldwide within the Agency's Data User Element Programme. The *Globvolcano* project, started early in 2007, will define, implement and validate information services to support volcanological observatories in their daily work by integration of EO data, with emphasis on observation and early warning.

Numerous Satellites Monitor Cyclone Nargis

Countries bordering the Bay of Bengal have experienced numerous severe cyclones in recent decades yet, despite plenty of satellite imagery and several day's warning, cyclone Nargis killed around 200,000 people in early May, mostly when sea water inundated low-lying areas of the Irrawaddy delta region of Burma.

On May 4, the UN Office for the Coordination of Humanitarian Affairs asked the International Charter on Space and Major

Cyclone Nargis in the Bay of Bengal on May 2 imaged by MODIS on *Aqua*
Credit: Jeff Smaltz, MODIS Land Rapid Response Team, NASA GSFC

disasters for support. The initiative, referred to as 'The Charter', was founded in October, 2002 by ESA, the French space agency (CNES) and the Canadian Space Agency. It is aimed at providing satellite imagery free of charge to those affected by disasters anywhere in the world. Radar imagery can be especially useful in the early stages when storm clouds may preclude optical imaging and, as modern radar satellites can adjust their 'look angle', there is a minimum of delay in assessing a disaster situation. Just a few days before cyclone Nargis struck, Canada's *Radarsat-2* imagery was used for the first time in an emergency situation. Public Safety Canada activated 'The Charter' on April 30 after heavy rain and melting snow caused the Saint John River in New Brunswick to overflow and cause widespread flooding.

Ikonos image of May 7 showing flooded fields in the Irrawaddy Delta region
Credit: GeoEye/CRISP

Geostationary satellites from Japan, China and India as well as EUMETSAT's Meteosat-7 cover southeast Asia but the two images selected here are from the polar-orbiting Aqua and Ikonos satellites.

EarthCARE Satellite Contract Signed

The European Space Agency and Astrium GmbH have signed a contract to provide the *EarthCARE* satellite, the sixth Earth Explorer mission in ESA's Living Planet Programme. As prime contractor, Astrium will be responsible for the satellite's design, development and integration.

The *EarthCARE* mission aims to improve the representation and understanding of the Earth's radiative balance in climate and numerical weather forecasting models by acquiring vertical profiles of clouds and aerosols, as well as radiances at the top of the atmosphere. The satellite, with a mass of about 1,700 kg, will be placed in a 400 km sun-synchronous orbit in 2013. The four instruments will be an atmospheric lidar, a broadband radiometer and a multispectral imager, all developed by ESA, and a cloud-profiling radar developed by the Japan Aerospace Exploration Agency.

GOES-3 Still Functioning after 30 Years

GOES-3 is one NOAA's early spin-stabilised weather satellites and was launched in June 1978. Although no longer imaging, and luni-solar perturbations have increased its inclination to 14°, it is still being used as a data-relay platform though not for NOAA-related data. *GOES-7* is also still relaying data but is a mere 21 years old. One advantage of the high inclination is that for part of each day these old satellites are accessible from polar regions.
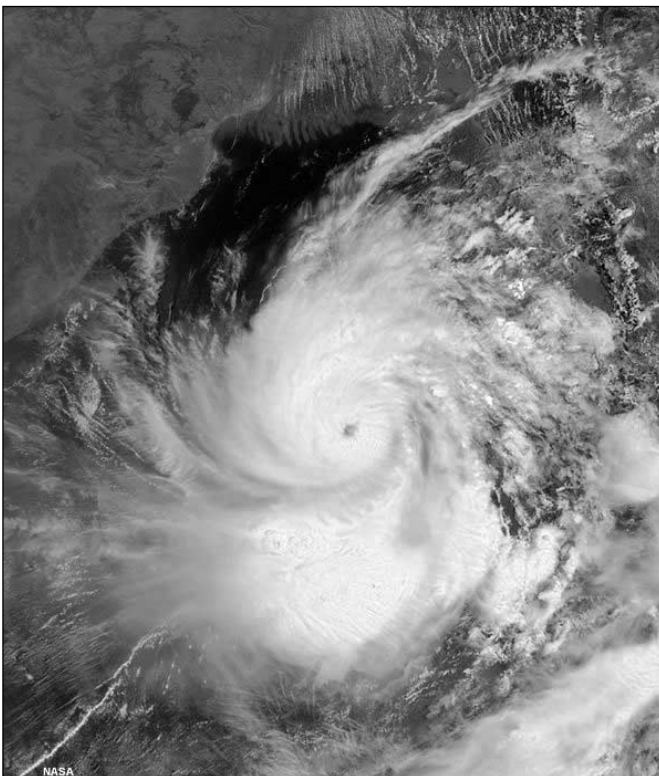
Ten Days in the

PHILIPPINES

Rob Denton LZ/G4YRZ

If I had been told that, one day, I would visit the Philippines, I never would have believed it. Even now it all seems like a dream to me. Not only was I there to meet the girl who was my pen-pal—while I was there I became engaged to my sweet Filipina friend, Rosalina, from the town of Calubian in the island of Leyte.

For those of you who are thinking 'Where are the Philippines?' and 'What's it like there?,' I hope this article will give you some insight to these beautiful unspoilt Islands. I can only describe them as paradise on Earth, where the people are so friendly and you can easily get lost in the darkness of their eyes.

If you have an atlas, take a minute to find the places I'm describing: it will help you to have a better understanding of the weather system there.

The Philippines, officially known as the *Republic of the Philippines,* is a nation located in southeast Asia with Manila as its capital city. The Philippine archipelago comprises over 7000 islands in the western Pacific Ocean, bordering countries such as Indonesia, Malaysia, Palau and Taiwan; it is the only southeast Asian nation to share no land borders with its neighbours. The Philippines is the world's 12th most populous country with a population approaching 90 million people.

The Philippines became a Spanish colony in the 16th century then a territory of the USA from early in the 20th century before gaining independence in 1946. Today, the Philippines has many affinities with the Western World, derived mainly from the cultures of Spain, Latin America, and the United States.

As GEO members, I'm sure you are all interested in the climate of the Philippines—to see what it's like on the 'other' side of the world. The Philippines enjoy a tropical maritime climate, characterised by high temperature and humidity with abundant rainfall, similar in many respects to that of the countries of Central America. The Philippines lies in the path of typhoons, as illustrated in the image opposite, obtained by Japan's MTSAT-1R satellite.

Temperature

Based on the average of all weather stations in the Philippines, excluding Baguio, the mean annual temperature is 26.6°C. The coolest months fall in January (mean 25.3°C) and the warmest month is May (mean 28.3°C). I visited in May and wish I had known this earlier. It was much hotter whilst I was there, with a minimum of 30°C at night and much higher in the day. Thank goodness for the air conditioning in the hotel and vehicles.

Latitude is not a significant factor controlling temperature variations throughout the islands: altitude produces greater contrasts in temperature. Thus, the mean annual temperature of Baguio, at an elevation of 1,500 meters, is 18.3°C, comparable with countries possessing a temperate climate. Because of this, Baguio is known as the *summer capital* of the Philippines.

The difference between mean annual temperatures at the southernmost station in Zamboanga and the northernmost station in Laoag is insignificant. In other words, there is essentially no difference in the mean annual temperature of places in Luzo, Visayas or Mindanao measured at or near sea level.

Humidity

Humidity refers to the moisture content of the atmosphere. Due to high temperature and the surrounding bodies of water, the Philippines has a high relative humidity. Average monthly relative humidity varies between 71% in March and 85% in September.The combination of warm temperature with high relative and absolute humidities gives rise to high sensible temperature throughout the archipelago. It is especially uncomfortable during March to May, when temperature and humidity both attain their maximum levels.

Rainfall

Rainfall is the most important climatic element in the Philippines. Rainfall distribution throughout the country varies from one region to another, depending upon the direction of the moisture-bearing winds and the location of mountain systems. The mean annual rainfall of the Philippines varies from 965 to 4,064 millimetres annually. Baguio City, eastern Samar, and eastern Surigao receive the greatest rainfall while the southern portion of Cotabato receives the least. At General Santos City in Cotabato, average annual rainfall is only 978 millimetres.

The Seasons

Using temperature and rainfall as bases, the climate of the country can be divided into two major seasons, the rainy season from June to November and the dry season from December till May. The dry season may be subdivided further into the cool dry season from December to February and the hot dry season from March to May.

Typhoons

Typhoons have a great influence on the climate and weather of the Philippines. A great portion of the rainfall, humidity and cloudiness are due to the influence of typhoons, which generally originate in the region of the Marianas and Caroline Islands of the Pacific Ocean, and which have the same latitudinal location as Mindanao. Their movements follow a northwesterly direction, sparing Mindanao from being directly hit by the majority of the typhoons that cross the country. This makes the southern Philippines very desirable for agriculture and industrial development.

Wind Systems in the Philippines

During the period from June to September, the *Habagat*, or southwest monsoon, blows strongly from the southwest. Originating in the region of Australia, the winds initially turn to the right and head toward low pressure near the equator. However, once north of the equator, they turn left due to the Coriolis effect and head instead towards low pressure over central Asia, passing over the Philippines on the way.
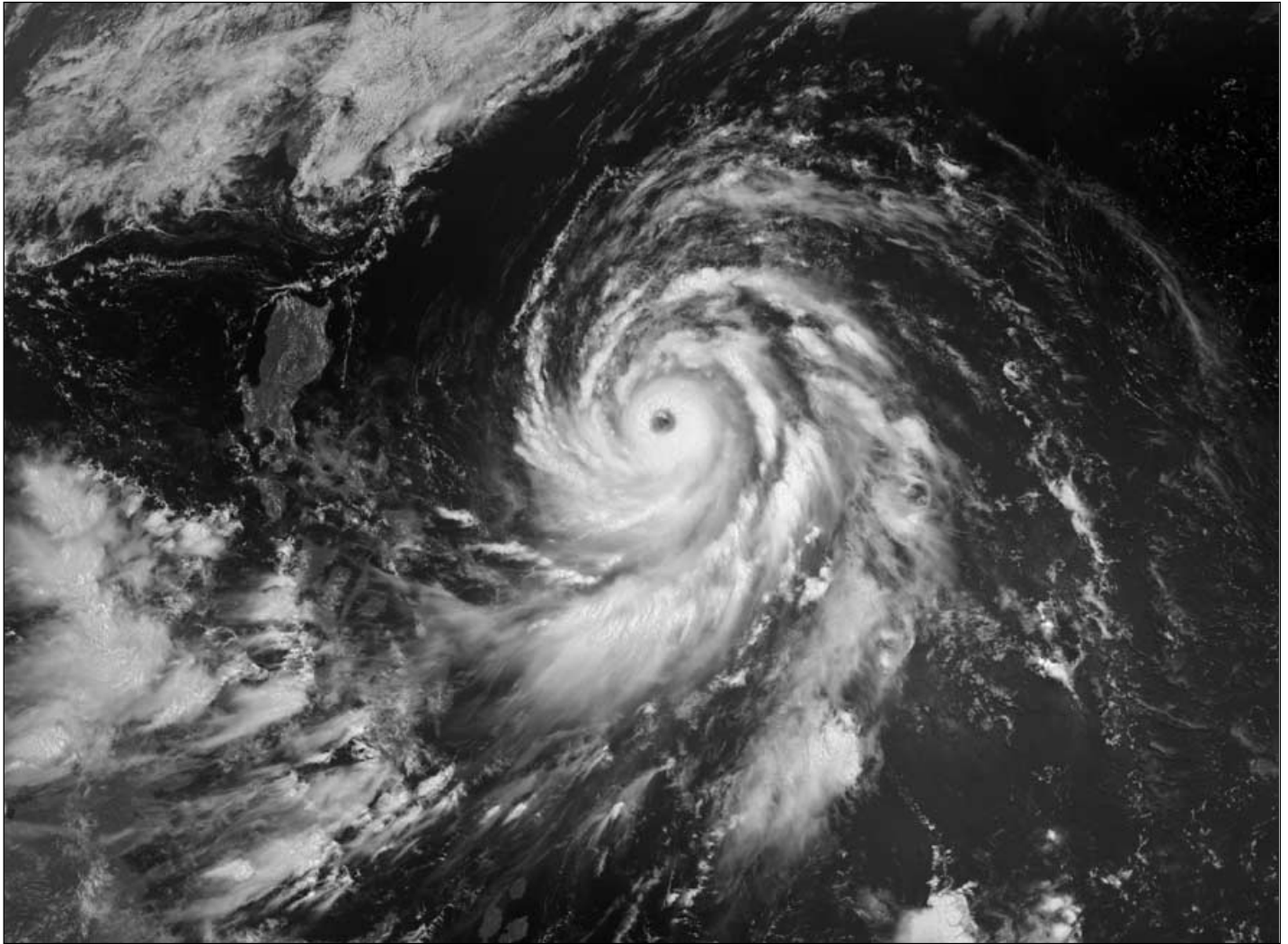

The SW Monsoon

From November to February, on the other hand, the *Amihan*, or northeast monsoon, starts as a stream of cold air from the high pressure region over Siberia, and moves south toward low pressure over the north Pacific Ocean. The Coriolis effect deflects these winds to the left

The NE Monsoon

Typhoon Rammasun closes in on the Philippines in this 1-km visible MTSAT-1R image acquired on May 10, 2008
Image: China Satellite Data Service Center

and over the Philippines from the northeast as they are drawn towards the low pressure over Australia.

Personal Experiences

Whilst I was in Leyte we just caught the aftermath of *typhoon Rammasun* (image above), which brought extra rain to the region but thankfully no loss of life or damage. The skies always seemed cloudy, but that did not mean it was always raining. If there were no clouds, there would be no shelter from the hot sun. When it did rain, it rained heavily and provided the perfect opportunity for Rosalina and the neighbour's children to take a cool, refreshing shower in the garden. It was interesting for me to see new flora and fauna, with coconut and banana trees in most gardens and lots of interesting new plants, with huge butterflies on them.

Being a radio ham, and also having an interest in antennas, one interesting point I noticed was the angle of the offset dishes; whilst almost vertical in UK, here they were pointing at a similar angle to prime focus dishes, due to the latitude being close to the equator at around 11°N.

Taking a cool shower in the garden
during the monsoon rains

I'm not sure how APT reception would be in the Philippines because everyone is cellphone crazy there, texting all the time. It seems to be the fashion. I can only imagine

Angled offset TV dish antenna

that there would be lots of pager interference, although that depends on the frequency of the pagers. Now that I have an R2ZX, maybe next time I go I can be portable and get some APT images. I just need to find a portable antenna. I'm sure there will be a design in one of the back issues of GEO. Of course, one way to find it quickly could be to use the GEO index which can be found on Les Hamilton's web page

*http://myweb.tiscali.co.uk/
wxsatellite/software.htm*

References

This article was compiled from my own experiences and various other sources from the Internet, courtesy *PAGASA*, *Learning Haven* and *Wikipedia*.

GEO at the 2008 AMSAT-UK Colloquium

David Taylor

Once again, GEO were invited to attend the AMSAT-UK Colloquium at the University of Surrey at the end of July, to put on a live display of weather satellite reception and provide a lecture for the programme.

Thursday's Precursor

As in some previous years, two GEO members who are also members of the *Three Counties Amateur Radio Club* enjoyed a visit to the club's Field Day where Francis Bell demonstrated live APT reception, helped by John Tellick (figures 1,2) while David Simmons demonstrated both live *EUMETCast* reception (almost) and live 'plane tracking with an *SBS-1* box (figure 3). Whether it was the heat or not, but Francis' portable PC was running out of power by the end of the day and David Simmons' inverter (to power his kit) gave up before *EUMETCast* reception was fully established. Oh well, ther'll be another day.

That evening was enlivened by visual observation of not one but two ISS passes in the Bell Garden. Prediction by *WXtrack* was three minutes out, leading to one GEO member saying: 'I always trust *Heavens Above*'. So a web browser was pointed to that site and (surprise, surprise) exactly the same predictions emerged (much to my relief as the author of *WXtrack*!). So it was off to NASA's own website, where the predictions were again identical!

Now, I know that Keplers need to be kept up-to-date, but these Keplers were only 1.5 days old, yet gave a three minute error—rather more than I would expect. So, for the next ISS pass, we added three minutes, and the very bright ISS appeared as expected. Very confusingly, it was an almost overhead pass, which I never see from Edinburgh. It turns out that the inclination of the orbit is the same as the latitude of Guildford, hence the potential for an overhead pass.

Later we heard that other Keplers were giving similar errors, and elements I downloaded the next day gave spot-on predictions. Theories please for the Great Kepler Mystery of July 2008....

Demonstrations

GEO provided live *EUMETCast* reception throughout the three days of the Colloquium, bringing two complete *EUMETCast* systems to the event, and setting up an antenna, cables and splitter to allow both systems access to the satellite data (figure 4). The systems were running the popular *MSG Data Manager* and *MSG Animator* software to demonstrate geostationary satellite data and its animation and false colouring (figure 5). To show how polar-orbiter data has been integrated onto the *EUMETCast* stream and what new possibilities this offers, the *AVHRR Manager* and *Metop Manager* software were used. There was a lot of interest from the delegates in viewing their home locations, seeing other places across the world and predicting whether they would need their umbrellas on the morrow (figure 6).

Fortunately, umbrellas were not needed as it was very hot throughout the three days—although this made it a little uncomfortable to be in the 'Street' ,where GEO was located (figure 7). Opposite the equipment demonstration, GEO had provided much literature, from a variety of sources, which gave more detail on Earth Observation and the uses to

which it is put. Our thanks to *EUMETSAT* and the *BNSC* amongst others.

Lecture

On the Sunday, I gave a talk to the Colloquium. Although I had given talks to AMSAT before, the feedback has been that a 'Getting Started' talk would be welcome, as well as 'more pictures, please'. Having only a twenty-five minute slot meant that long animations were out, which was a pity as I had been sent an instructive animation from a French GEO member which I would have liked to have used. So I concentrated on the 'how-to' of weather satellites, trying to cover reception of APT with omnidirectional antennas *and* reception of HRPT with steerable antennas, although the major part of the talk was about *EUMETCast* because of the quality and diversity of data which it offers. Back in Edinburgh, Cecilia managed to capture a few screen-shots of the BATC feed (figure 8).

Figure 1 - Live APT

A first for me, and for AMSAT, was feedback from the Internet as a result of the BATC streaming video, and I was able to add a slide to deal with question on HRPT from California. The first time I've 'played a request' for anyone (figure 9). There was a chuckle round the audience when I gave an example of why now-casting was important—answering the question 'Will it rain before the next pit-stop?'. I'm obviously not the only *Formula One* enthusiast in AMSAT!

Acknowledgements

Thanks to AMSAT-UK for inviting GEO to the colloquium, and to the BATC for making the event accessible across the country and the world.

My thanks for Francis and Nadine Bell for their excellent hospitality during the weekend, and to John Tellick and David Simmons for their expertise and help.

Useful Links

- AMSAT
  http://www.uk.amsat.org/
- BATC
  http://www.batc.org.uk/
- Three Counties ARC
  http://www.radioclubs.net/tcarc/

Figure 2 - Setting up the antenna for live APT reception

Figure 5 - Demonstrating false-colour imagery

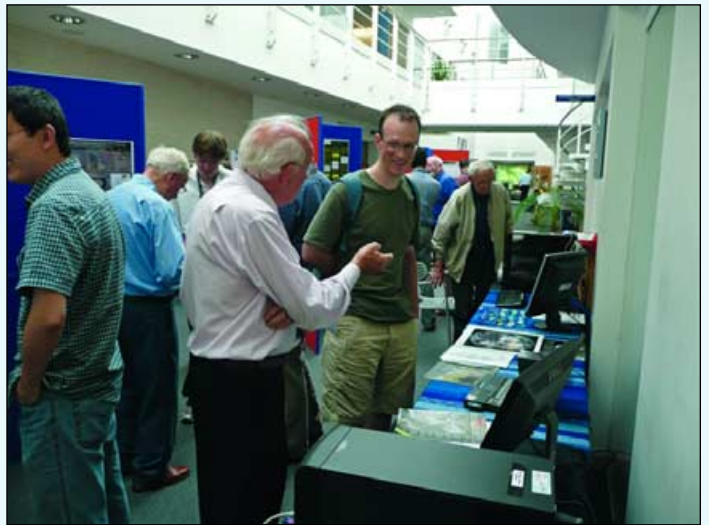Figure 3 - David Simmons' plane tracking kit and *EUMETCast* dish

Figure 6 - Debating the following day's weather

Figure 4 - The *EUMETCast* antenna
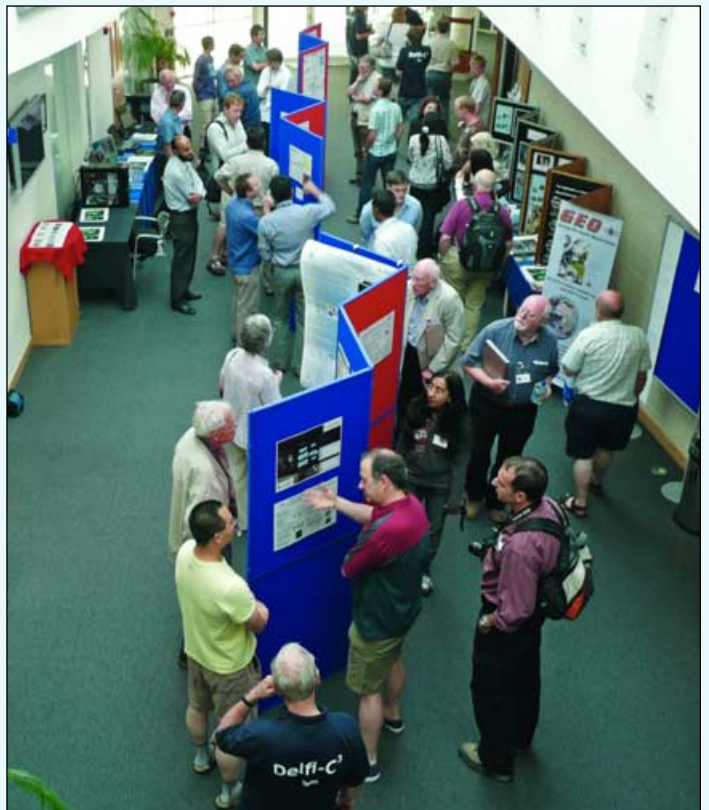

Figure 8/9 - David Taylor speaking on the BATC feed

Figure 7 - GEO's display in the 'Street'

Script Snippets

Automated Data Management – using TrimTree

David Taylor

Irrespective of which program you use to process *EUMETCast* or other data, you may wish to direct control over what data is kept and for how long. Your processing software may not be able to keep up with all the new data continually being introduced by EUMETSAT, leaving you with unprocessed raw data cluttering your hard disk and possibly slowing down your PCs performance. Additionally, you may have software which produces daily log files but which lacks a means of limiting the number of logs retained. Faced with these problems, I wrote a small utility called *TrimTree*. You can download TrimTree free-of-charge here:

http://www.satsignal.eu/software/disk.html#TrimTree

Please note that it is <u>unsupported</u> software, so ask any questions in my SatSignal Yahoo group at

http://tech.groups.yahoo.com/group/SatSignal/

Downloading and Installing TrimTree

In the Zip file you download, you will find two files: *TrimTree.txt* and *TrimTree.exe*. Open the *TrimTree.zip* archive with your favourite Zip program, or use the built-in Zip management software in Windows XP and Windows Vista.

The text file will open with *Notepad* and provides the latest information about TrimTree. If you copy the executable file, *TrimTree.exe* to the Windows\System32 folder, you will then be able to call up *TrimTree* from anywhere on your computer.

Using TrimTree

TrimTree is only partially interactive—it will display the results of its operation briefly but does not ask for user input in the conventional sense. Instead, the program reads its control information from parameters passed to it on the command line; it's designed to be run multiple times, from a batch file, with a fixed set of parameters. You would typically run the batch file once a night or, if you switch on your computer every day, you could run if from the *Startup* menu folder.

Example 1 - Managing Image Files from MSG Data Manager

```
@ECHO Delete the less interesting channels after 2 days
TrimTree 2 C:\MSG\images\ *-msg-ch06.* *-msg-ch07.*
@ECHO Delete the more interesting channels after 7 days
TrimTree 7 C:\MSG\images\ *-msg-ch02.* *-msg-ch09.*
```

In this example, files in the folder **C:\MSG\images** and below which are more than 2 days old, and which match either the file names for **MSG HRIT channel 6** or **MSG HRIT channel 7** would be deleted, as well as files more than 7 days old for **MSG channels 2 and 9**. This allows you to optimise disk storage by keeping the more interesting data for a longer period. The lines above could be entered into a command file with a name such as *Nightly.cmd*.

Some Notes on the Parameters

The first parameter after the command *TrimTree* specifies the number of days which should elapse before a file is considered 'old' and therefore a candidate to be deleted. This date is based on the file's modification date, which is the one usually displayed by Windows Explorer. In the first example it is 2 days.

The second parameter is the root of the directory tree from which you want to start the scan. I like to add the trailing '\' to clarify it as a directory specification.

The third and subsequent parameters specify the files which should be deleted. Note that I have used 'wildcard' file specifiers, so that any file with '-msg-ch06.' or '-msg-ch07.' in the file name will match for the first example.

You would then use the **<Control Panel → Scheduled tasks>** function to make *Nightly.cmd* run at, for example 03:05 in the morning. If your computer is not running 24 hours a day you could make the task run when you start up the computer by placing a shortcut to *Nightly.cmd* in your **<Program Files → Startup>** folder.

Each **@ECHO** command sends a line of text to the screen to show the comment following the @ECHO statement.

Example 2 - Managing Raw Data Files from EUMETCast

Another use for *TrimTree* might be to remove *EUMETCast* data which you don't process, although this is actually better done by editing entries in the *recv-channels.ini* file. Should you decide that any unprocessed *EUMETCast* data more than 2 days old is of no interest, and that you have a default *EUMETCast* installation where data is saved to the directory

C:\Program Files\T-Systems\BusinessTV-IP\received
(**Note**: there is a space character in 'Program Files')

You could add the following lines into your *Nightly.cmd* file.

```
@ECHO Delete the unprocessed data which is 2 days old
TrimTree 2 "C:\Program Files\T-Systems\BusinessTV-IP\received\" *.*
```

This would remove any files more than 2 days old which are in the *Received* directory, and in any directory below it. If you have other receiving directories in the TelliCast tree, you can process them too

```
@ECHO Delete the unprocessed data which is 2 days old
TrimTree 2 "C:\Program Files\T-Systems\BusinessTV-IP\received_EPS10\" *.*
```

Because the directory names contain spaces, be sure to enclose them in quotation marks (shift-2 on an English keyboard).

Example 3 - Managing Log Files

Here is a different example - to keep the log files from *Ship Plotter*, *Plane Plotter* and *SBS-1 BaseStation* software under control. *Ship Plotter* log files are retained for two weeks, and the aircraft-related files for seven days.

```
@ECHO Delete PlanePlotter and ShipPlotter log files
TrimTree 7 "C:\Program Files\COAA\PlanePlotter\log files\" pp*.log
TrimTree 14 "C:\Program Files\COAA\ShipPlotter\log files\" sp*.log
@ECHO Delete SBS-1 BaseStation log files
TrimTree 7 "C:\Program Files\Kinetic\BaseStation\" 20*.bst
```

Using the Windows Task Scheduler

If your PC is left on overnight, perhaps collecting data, you may wish to automate the operation of *TrimTree* by taking advantage of the Windows Task Scheduler. There is more information at

http://www.satsignal.eu/software/scheduled-tasks.html

News in Brief

Metop LRIT Abandoned

Readers will be aware that the projected LRIT dissemination on 137.1 MHz from Metop-A never materialised due to transmitter problems. Alas, as it has proved impossible to rectify these for the future Metop-B and Metop-C, it has been decided to discontinue the LRPT operational service. On the brighter side, this presumably guarantees NOAA satellites the use of the the 137.1 MHz frequency for a considerable time to come.

'Ondes' Magazine

Last April, French radiocommunications and electronics magazine *Ondes* carried a feature publicising GEO. The lead page is reproduced below.
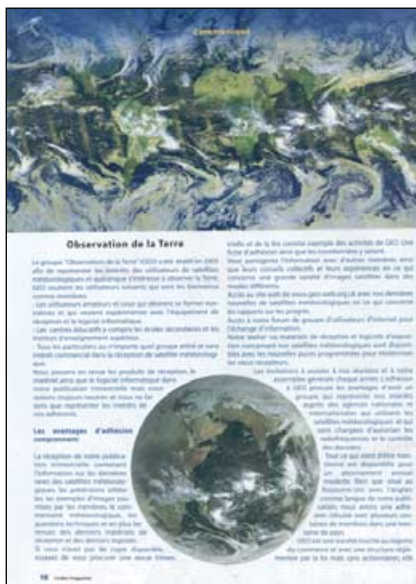
Another GEO!

Guess what! Someone has set up a rival GEO!

Antony Lowe spotted the culprit during a recent visit to St Helens and took this photograph as evidence.

GEO member Rob Denton of Bulgaria wishes to announce his engagement on May 21, 2008 to Miss Rosalina Majait, second daughter of Rodolfo and Rosemarie Majait of Calubian, Leyte, Philippines, an event which, romantically, took place while sailing on a bamboo boat between the Islands of Biliran and Leyte.
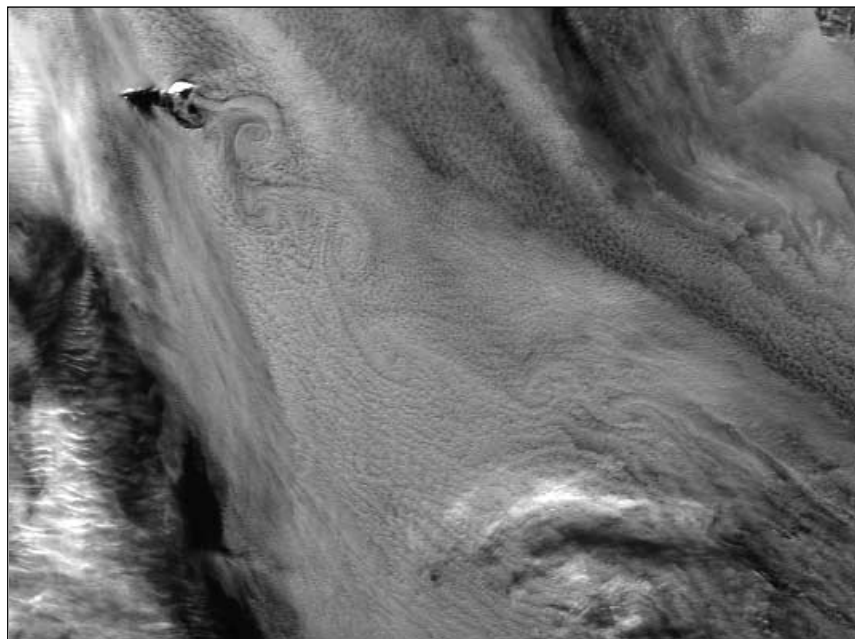
Alan Banks spotted these Von Kármán vortices being shed from Jan Mayen Island in the North Atlantic between Norway and Greenland , in this Metop-A image dated May 27, 2008.
Image © EUMETSAT 2008

Here is the Weather Forecast
How satellites have led to improved weather forecasting

EUMETCast

In April 2003, trials began to transmit the geostationary MSG image data by means of the operational EUMETSAT multicast system, via EUTELSAT's *Hot Bird 6* satellite located at 13°E. As it turned out, this has been a great success, much to the joy of amateur enthusiasts, and in January 2004 the MSG-1 imaging service became fully operational on what was then called the *EUMETCast* service. (EUMETSAT was formed June 19, 1986.) A typical full Earth Meteosat-9 image downloaded at 13:10 UT on April 14 is reproduced on page 38.

(image © EUMETSAT 2008)

This was great news because now amateurs could receive geostationary data through a standard satellite DVB broadcast system. There were many hurdles to overcome but, once the set up was operational, you could receive much higher resolution imagery, in twelve channels every quarter-hour. This was a major increase in the amount of available meteorological data and was produced and distributed by EUMETSAT for 24 hours per day.

Not all the devout APT enthusiasts moved on to this service. Because of the complexities in setting up the software and gaining the necessary licences, quite a few have been deterred. Also, costing the new system can be expensive, especially if you are starting from scratch. With the current credit restrictions and soaring fuel costs many people have to equate the priorities, and rightly so.

But given all that, I can assure readers that it is worth it in the end because the outstanding quality of these pictures has to be seen to be believed. EUMETSAT have to be congratulated and thanked for producing such an excellent service and allowing amateurs access to the data without charge. So please don't be deterred by all the technicalities it is worth it I assure you—just look at the amazing false colour Meteosat-9 image on the opposite page.

Back to the Weather Forecast

When you see the weather forecast on TV nowadays, it really does have some accuracy and credibility to it. From those early beginnings with balloons to the latest satellites, we have never had so much information to hand, available for anyone with appropriate hardware and software to use; and of course it enables the Met Office to produce highly accurate weather forecasts for shipping, aviation and the general public.

Acknowledgements

I would like to thank John Tellick and Peter Wakelin for the help they have given to me over the years, and also to David Taylor for all his assistance with the software.

High Altitude NOAA Imaging from
Col de la Cayolle

Marc   Peigneux

On a nice afternoon of June 2008, my son and I were enjoying a drive in the car between St Martin Vesubie in the Alpes-Maritimes and Barcelonette in the Alpes-de-Haute-Provence. As we reached Col de la Cayolle, a 2327-metre mountain pass on the border between the two provinces, it was just about time for a NOAA-15 pass, so we decided to stop and take advantage of this unique opportunity. As a faithful Earth observer, I always carry with me the necessary equipment to record an APT satellite pass.

Our temporary installation was not so difficult to build. However I paid very special attention to the power supply connections because a shortcut to the battery could have had some unpleasant consequences for the car; and in the event of a problem, we were a long way from the nearest garage!

The main question asked by my student son was about the difference we could see in tracking an APT satellite from our usual ground station, which lies at an altitude of 50 metres above sea level, compared with the Col de la Cayolle at 2327 m.

I tried to explain to him that, in this situation, it was necessary to consider three main reception criteria: the signal strength, the noise and the theoretical acquisition distance (which is linked to geometrical parameters, as illustrated in the diagram on page 33).

Signal Strength

Receiving VHF waves at nearly 2300 m altitude or from sea level does not have a big influence on the signal strength

The whip antenna used to receive NOAA-15
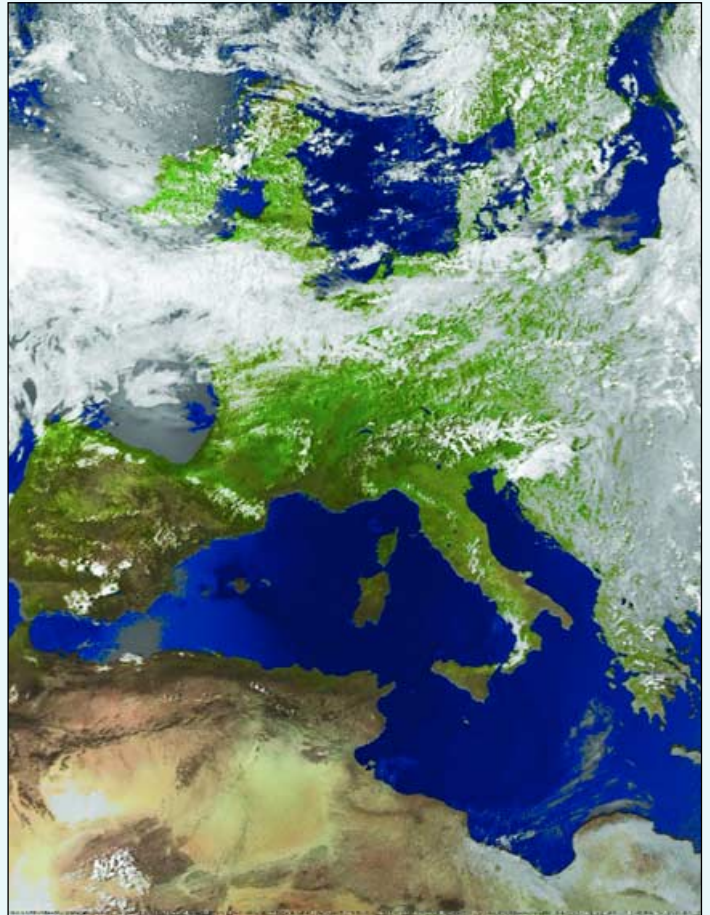
The 15:52 UT NOAA-15 image acquired on June 20 at Col de la Cayonne using my portable APT system and a simple whip antenna.

My son, Nicolas, at the summit of Col de la Cayolle

Here I am with my portable APT equipment

in an isotropic environment, such as the upper atmosphere as we are only dealing with a reduction in satellite distance from 840 km to 837.7 km.

In our particular situation, we had only to take advantage of the fact that there weren't any obstacles which could disturb the antenna reception for that particular northbound NOAA-15 trajectory.

Noise

The carrier signal strength could not be improved by our altitude. We did, however, think that the denominator of the S/N ratio could be improved by the certain attenuation of the Noise level. In this particular area, electromagnetic noise was considerably reduced because the power supply was produced by the car battery and we were far away from cities and industrial electromagnetic pollution.

Acquisition Distance

The simplified drawing below (exaggerated scale) shows how the acquisition distance varies with altitude above sea level.
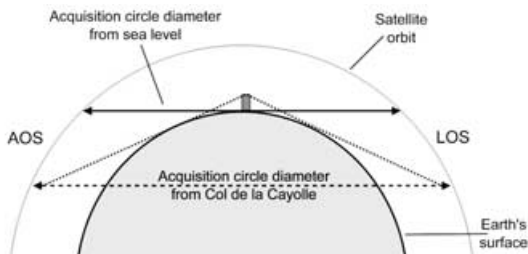
The solid horizontal line represents the acquisition distance when you are at sea level. From the Col de la Cayolle, however, you can see a little beyond the sea-level horizon (dotted lines), which means that the acquisition distance increases (because the satellite comes into range sooner). However, for an altitude of 2 km above sea level, this increase is negligible, being only from 6752 km to 6760 km. Anyway, probably due to the poor gain of my very basic whip antenna, we didn't get a spectacular result.

Antenna

A few words about this antenna. Everybody knows very well that, for holidays trips, our cars boots are usually full, so I decided to bring a very simple half-wavelength whip antenna. The whip was mounted on the magnetic base from an old citizen band antenna and placed on the roof of the car during reception. I have noticed a strong reflecting influence from the car roof, acting as a ground-plane. Moving the antenna away from the roof had an immediate impact, the VHF signal strength dropping some 2 dB.

Of course, we should certainly get some better results with a good QFH antenna. The NOAA-15 picture displayed opposite is not spectacular, but is the result of a convivial, experimental and educational time in a very nice location !

It is to be hoped that such an experiment could arouse some interest in young people who are very often curious to give a concrete expression to what they learn at school! Hopefully they will go on to use this type of knowledge in their vocation.

An Evening With Bill Giles

Peter Green

Recently, my wife and I spent a very pleasant couple of hours in the company of Bill Giles OBE, former senior weatherman at the BBC Weather Centre for 17 years.

Bill bought his one man '*Weather Show*' to the Landmark Theatre, Ifracombe, as part of the *North Devon Festival*. The theatre is located on the cliffs at Ifracombe overlooking the sea: a beautiful location in this quiet seaside town.

Bill, a son of Devon, was pleased to return to 'God's own county' as part of the festival. The evening was liberally splashed with anecdotes from his boarding school days in Crediton, near where I live, to his days at the Met Office and BBC.

There were stories from his days at boarding school, back in those innocent times when the boys had to share baths with matron looking on. Bill told how, one evening, he had to share his bath with a boy whom he had never met before; so, as he got in he introduced himself: "Hello I'm Giles". The other boy replied: "Hello, I'm Pidler" Bill was out the bath like a rocket.

Bill first became interested in meteorology whilst at school in Crediton and joined the Meteorological Office, then in Bracknell, in January 1957, on leaving Bristol College of Science and Technology. Later that year he was sent to Christmas Island to observe the immediate meteorological affects of the H-bomb tests.

Bill's broadcasting career began in 1972 when he transferred to the London Weather Centre to become part of the team forecasting for BBC Radio: he moved to television forecasting in 1975. In 1980, promotion brought Bill back to Bracknell, where he worked in public relations. Finally, in May 1983, he returned to take charge of BBC television's forecasting team, on the retirement of Jack Scott.

During the evening Bill related amusing tales on a variety of topic, including how Michael Fish missed the 1987 hurricane, why Ian McCaskill broadcasts without his shoes on and why some clouds are mistaken for UFOs.

Bill Giles has no pretensions of being an artist, and to show how to interpret a weather forecast he portrayed Great Britain as a triangle and Ireland as a rectangle! He showed what to expect from winds arriving from different areas at different times of the year and the effects they would have.

Bill is, however, a great communicator. He showed a film of the BBC Weather Centre when he was in charge and could talk on the subject for England—and does, having just returned from China, where he had been talking on *Global Warming* and *Climate Change*.

I didn't realise that Bill had been working on climate change nearly thirty years ago, getting into deep trouble with the senior managers at the Met Office and BBC because of his beliefs, even though they were backed up by maths and science.

Although he is now retired from the BBC, Bill is still very busy, giving talks to schools as well as government bodies and other interested groups, perhaps like GEO. He is able to pitch his talks to the level of knowledge of the audience. He is also a director of *The Weather People* with his friend from the BBC John Teather.

Following his show, Bill took questions from the audience, which was again amusing. But there were some excellent questions, even one from an elderly lady on jet streams, which surprised Bill as well as the rest of us.

If you get the chance to see Bill Giles' show, you are guaranteed a very enjoyable evening.

For More Information Visit

1   http://www.billgiles.co.uk/

2   http://www.weatherpeople.com/

3   Re-live the old days of BBC weather forecasting at:
http://www.beebweather.org.uk/

GEOSTATIONARY SATELLITE IMAGERY

DIRECT FROM

THE CHINA SATELLITE DATA SERVICE CENTER

中国卫星遥感数据服务网

Les Hamilton

In previous issues we have described how you can obtain AVHRR data for the various polar orbiting weather satellites from the NOAA *CLASS* Archive [1,2]. These data are available without cost after following a simple registration procedure. Now, a new source of weather satellite images has become available, the China Satellite Data Service Center (CSDSC).

CSDSC offers both polar and geostationary data, but be warned: the AVHRR data comes in unfamiliar formats that cannot be decoded by any of David Taylor's software. Unless you intend to engage in software development, give these files a miss. But the geostationary data from Feng Yun 2C, Feng Yun 2D and MTSAT-1R are another matter. These are supplied as HDF (Hierarchical Data Format) files which can be decoded by the latest version of *GeoSatSignal-7* and my own *HDF Reader* program.

Registering with CSDSC

Before you can download geostationary satellite HDF files from CSDSC you must register for the service by visiting the English language version of their website at

http://satellite.cma.gov.cn/eng/

In the upper left-hand region of the opening screen you will find the link '*New User?*' shown in figure 1. Click on this link to continue to figure 2 where you must click the '*agree*' button to progress further.

This done, you are presented with fields where you can enter your username, email address, password, name etc (figure 3). Write down the **username** and **password** that you decide to use: you will require these in future when you log into the site. As far as I can tell, the *Verify* button serves no purpose at present.

Although you can select the highest *user level* at this point (3GB/order), you will not automatically be able to download HDF files (which all exceed the basic user level of 200 MB/order). Orders will be rejected on the grounds that 'your shopping cart is full.'

Once your details are complete, click the *Submit* button, whereupon you can immediately log into the site by entering your chosen username and password into the fields in figure 1, typing the security code into its box then clicking the *GO* button.

Upgrading Your Subscription

To receive the higher user levels you must now send an e-mail to

dataserver@nsmc.cma.gov.cn

requesting access to the FY HDF data. They will then email you a *Microsoft Word* document to complete and return to them. In my case, this arrived the day after I requested it and an email confirming my upgrade was received three days later (sent off on Friday, received Monday). I was then immediately able to access and download the HDF data files.

Ordering Feng Yun HDF Data Files

Log into the site as explained above (figure 1), select *FY2/SVISSR* in the *Search Data* drop-down menu (figure 4) then click the *Search* button. The following screen will display two menus which allow you to select the files that you require (figure 5). On the left-hand menu panel select either 'FY2C' or 'FY2D' (there are no FY2B files available). On the right-hand panel you **must** select 'NOM (Normalized Dataset)'. Don't select the other option: although the files themselves exist, a means of decoding them doesn't!

It now remains to enter the start and end dates/times for the image you require. This can be done by manually editing the fields at the foot of figure 5; more conveniently, clicking on either date field opens an interactive calendar which makes selection much easier (figure 6). When complete, click the 'GO' button to open a screen displaying all available files within the time span you selected. Part of this screen is illustrated in figure 7.

Tick the box to the left of the file(s) you require and wait for the screen to refresh. When the line of text above the list indicates that there are items in your shopping cart, click the link to the shopping cart. *text continues on page 41 ...*
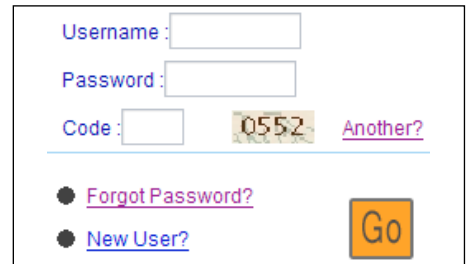
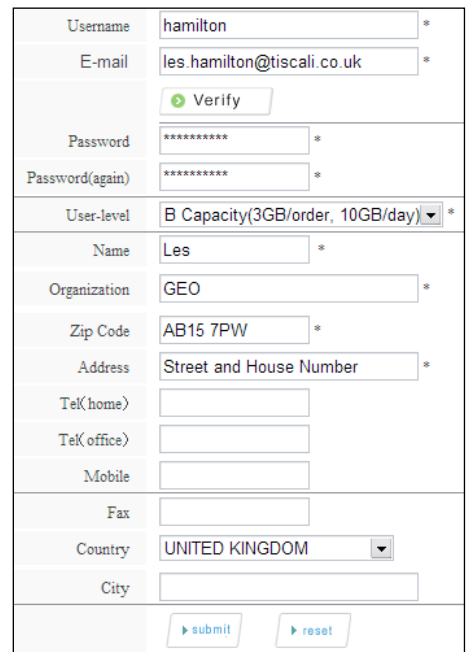

Figure 1 - Logging in

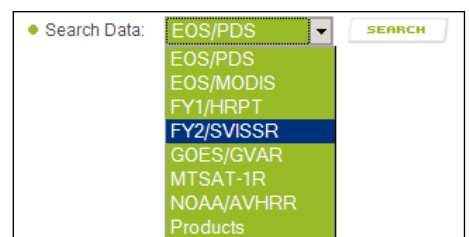Figure 2 - Agreement Screen

Figure 3 - Registration Details

Figure 4 - Selecting Data Type

Figure 5 - Selecting the correct files

Figure 6 - Selecting the Date

Figure 7 - Ordering the data

Figure 8 - Confirming the order

Figure 9 - Order Status

OPTIMISING YOUR C-BAND EUMETCAST SIGNAL

Kobus Botha

Properly aligning your satellite dish may seem a job reserved for the professional installer, but anyone with basic DIY skills can achieve this themselves. Once done, the reward will be a trouble-free MSG experience. Excellent signal quality is of utmost importance—it is non-negotiable for C-band reception!

C-band is Different from Ku-band

The African C-Band dissemination service for MSG data is transmitted from the *Atlantic Bird-3* satellite on a downlink frequency of 3726.7535 MHz using left-hand circular polarisation with a symbol rate of 11 963 ksymbol/s. Interestingly, when I change the *Polarisation* setting in my *Broadlogic Vbox 2030* DVB receiver card to 'horizontal' instead of 'left', the signal strength is still the same. I use a *Symbol rate* of 11 963 ksymbol/s.

Dish Azimuth and Elevation

To determine the elevation and azimuth of Atlantic Bird for your particular location, use the antenna pointing tool at

**http://oiswww.eumetsat.org/
antennaPointing/cgi/antennaPointing.pl**

Lat/Long (deg):	-31.3	/	20.13
Satellite:	Atlantic Bird at 5°W *		
		Calculate	
Elevation/Azimuth (deg):	44.48	/	317.92

Just select Atlantic Bird-3 from the drop-down list, enter your latitude and longitude, and click the *Calculate* button. Elevation and azimuth values for your location are immediately displayed.

The Dish

EUMETSAT recommend a 2.4-metre dish, much bigger than for Ku-Band, for the C-band service throughout Africa. I use two dishes, the second a standby so that I can immediately switch over without loss of data should a problem arise. Both dishes are fully equipped with an LNB and a separate cable to my main computer. This is also extremely handy to eliminate signal problems. My primary dish is a 2.4 m mesh type and the other one a 1.8 m solid model. The 1.8 m dish produces the stronger signal and is also much easier to handle.

Dishes of these sizes are prime-focus antennas, where the focal point (position of the LNB) is directly in front of the centre of the reflector where it is not always so easy to adjust and work with. The small offset-fed dishes as used for Ku-band are much easier to install, align and work with—and much cheaper.

Storms

The LNB is totally different and extremely sensitive to thunderstorms—much more so than a Ku-band type. The effect of these storms is very often not immediately apparent. Signal strength might remain normal for days following a storm then suddenly the 'red T' pops up and the signal strength is negative. When this happens you must check the alignment of the dish. If your satellite finder/meter does not react when you press slightly on the dish, your LNB will have been damaged and must be replaced. I always keep a spare.

The Alignment of the Dish

To receive an optimised signal, the dish must not only have a clear line-of-sight to the satellite but also the correct vertical (elevation) and horizontal (azimuth) alignments. <u>*Elevation*</u> refers to the angular displacement of the satellite above your horizon and <u>*azimuth*</u> to its east-west displacement with reference to the 0° meridian. The following steps assume you have a handy satellite finder/meter.

First disconnect the download from the DVB receiver card to prevent possible short circuiting. Next, disconnect this download from the LNB and connect it to the '*REC*' socket on the satellite meter then use a short patch cable from the LNB to the '*LNB*' terminal on the meter. Reconnect the cable to your DVB card and switch on the power. The meter should now be ready to help aligning the dish.

First, adjust the elevation, taking the angle calculated earlier as a rough guide. Next, set the azimuth roughly by means of a compass then start moving the dish slightly to east and west until the strongest signal is achieved. Tighten the azimuth bolts and adjust the elevation up and down slightly until the maximum signal level is attained. Tighten the elevation bolts and again adjust the azimuth slightly to peak the signal, then tighten all bolts.

Your dish should now be correctly aligned . Check that you have a strong.signal on your computer.

Optimising the LNB

You must now adjust the polarisation angle of the LNB, sometimes referred to as its skew or tilt, in order to get the best signal quality. With the meter still attached, slightly rotate the LNB to left and right till you get the strongest signal.

Finally, push the LNB back and forth in its fitting until you obtain the strongest signal (figure 2) to fine tune the focal length. Focal length is determined from the formula

$$F = D^2 / 16 \times H$$

where D = diameter and H = depth of dish.

I mark my final settings on the LNB and dish with a waterproof marker, which helps a lot with future problems. This is only a rough indication since, when the alignment of the dish is out due to strong wind, you will not be able to see this with your naked eye.

Errors of only a fraction of a millimetre will produce the 'red T' and no signal!

Your signal should now be fully optimised. You can now remove the meter and make sure that your fittings are properly protected with water tight tape.

Troubleshooting

Weaker signal than normal

In a recent case, I found the problem was with the EUMETSAT C-band service itself.The possibility of a DVB card problem can be checked on the *YAHOO* MSG Group, where speedy notification of 'signal problems' are posted.

Total loss of signal

You will have a 'red T' and a negative signal to noise ratio level on your card. I would check as follow: reboot the computer, check DVB card settings and check for an voltage output, check dish alignment cables: if need be, replace the LNB or DVB card.

Some Final Tips

Always use the best quality cables and sockets and make absolutely sure about the connections of sockets, grounding, etc.

Don't under estimate the possibility of damp entering connections, a sure cause of a short—especially if your system has been down for some time. This is very important during high humidity. Open the connections and check for moisture. I lost an LNB by not doing this!

An in-line amplifier has no noticeable benefit.

Figure 1
Make sure that the 'biscuit' is
properly installed inside the LNB

Figure 2
The LNB should be shifted up and down to
fine tune the focal length. Please note the
marks on the LNB, made for future
reference using a waterproof marker

Figure 3
A different view of the finally installed LNB

Figure 4
This LNB is slightly off alignment, which
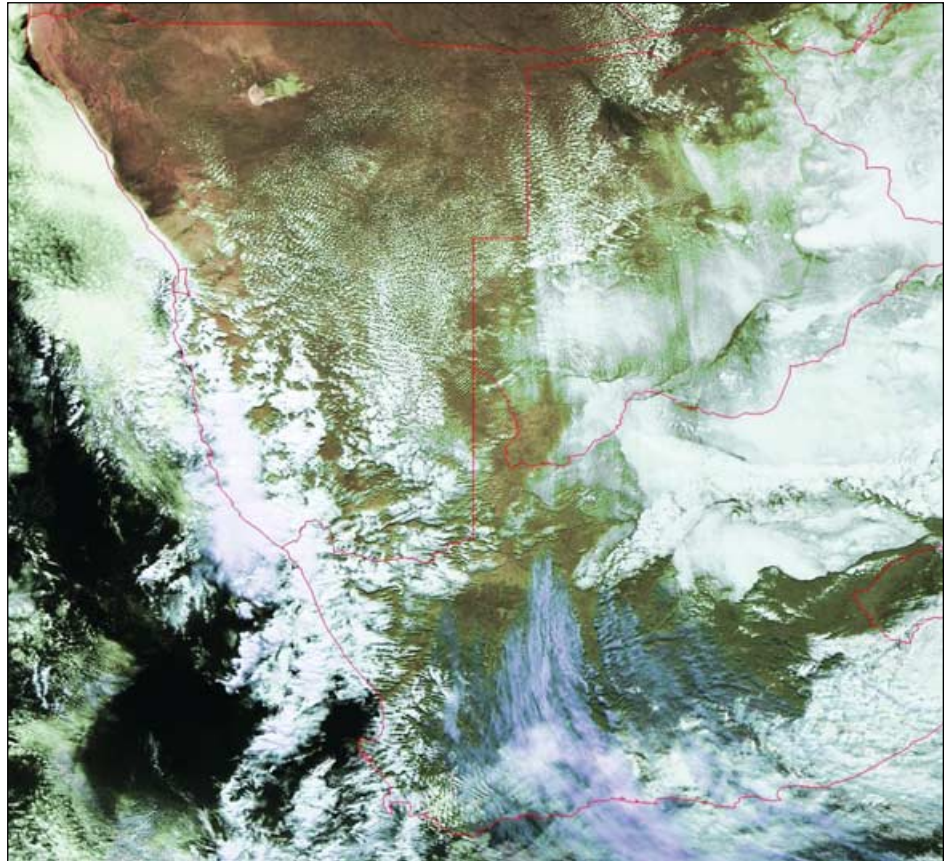may be the reason for a weak signal.

Figure 5
Severe weather in South Africa at.12:00 UT on June 17, 2008
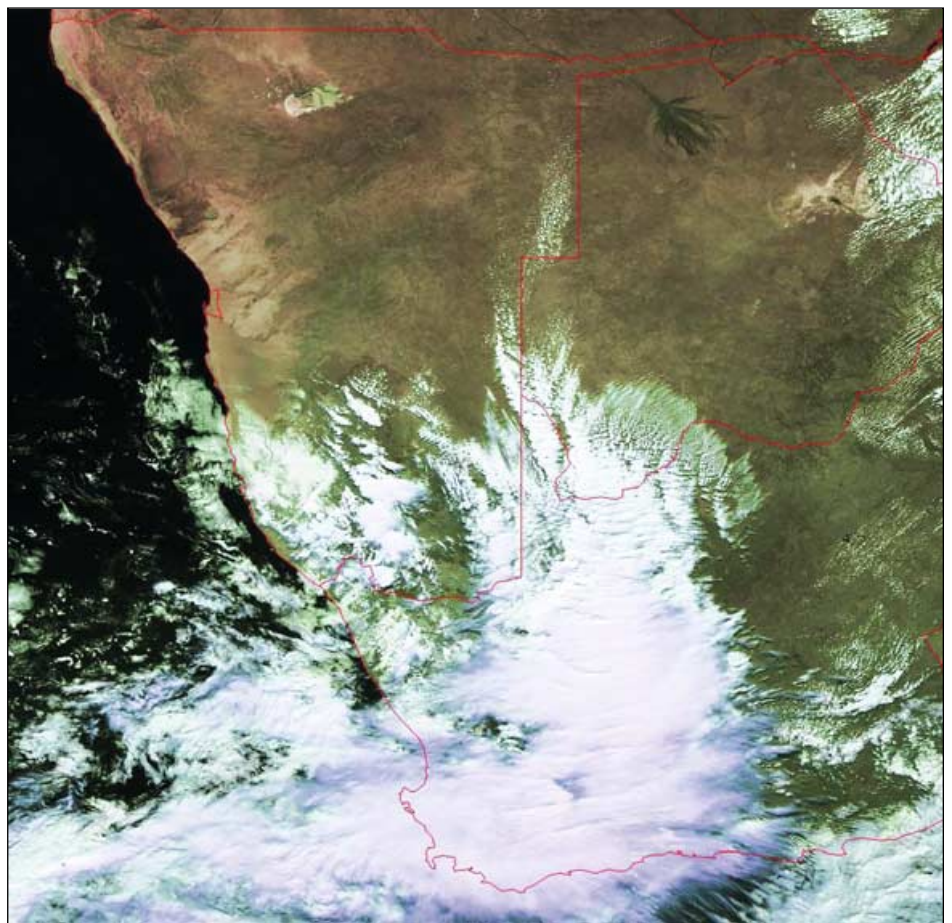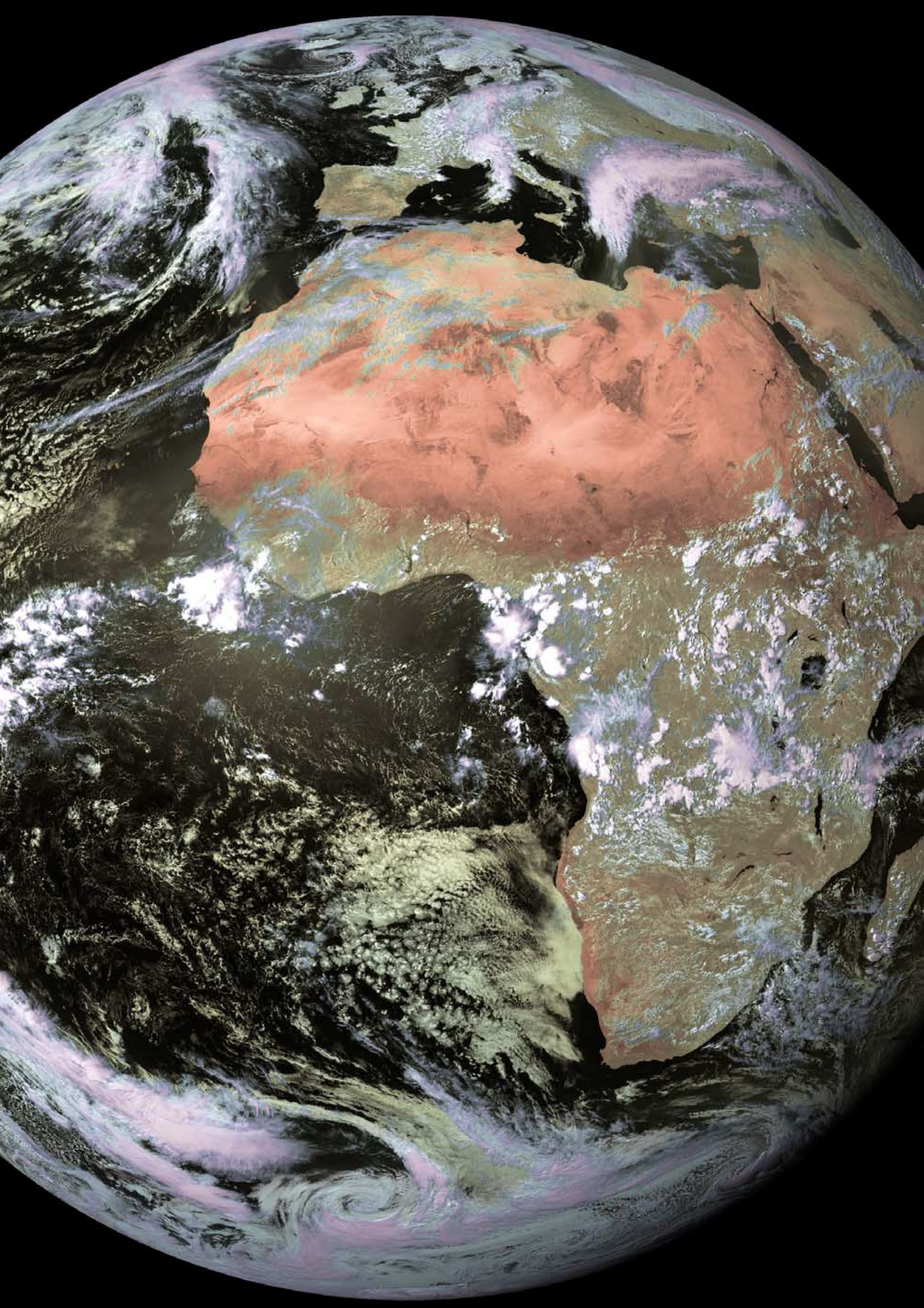*Image © EUMETSAT 2008*

Figure 6
Severe weather in South Africa at 12:00 UT on June 18, 2008
Some areas experienced 350 mm of rainfall
*Image © EUMETSAT 2008*

Wintertime Disintegration of the Wilkins Ice Shelf

A NASA Earth Observatory Report

Starting late May 2008, the Wilkins Ice Shelf on the Antarctic Peninsula started to break up. The image immediately below was captured by the Advanced Synthetic Aperture Radar (ASAR) aboard the ESA's *Envisat* satellite on May 30 and shows the ice shelf at the beginning of the disintegration event. At lower right in this image is what glaciologists describe as mélange—a mass of ice blocks welded together in a matrix of sea ice. This portion of the shelf actually disintegrated in 1998 but the fragments have remained frozen in place ever since. An ice bridge connecting to Charcot Island stabilises the ice shelf. To the north is a mixture of very thin sea ice, ice blocks from earlier rifting, and open water.

In the image at bottom right, acquired on July 17, the breakup of the ice shelf continues apace. The ice mélange is much darker and large blocks of ice can be seen drifting northward, some separated by areas of open water.

These images focus on events in the eastern portion of the Wilkins Ice Shelf, the western portion of the shelf having already suffered rapid disintegration between February 28 and March 6, 2008. That event had occurred during the southern hemisphere summer, when summertime warmth and sunshine drive surface melt processes. In contrast, the events shown in these images took place during the southern hemisphere winter. As of mid-July 2008, the exact mechanism of the winter breakup was uncertain, but warm ocean waters appear to have played a role.
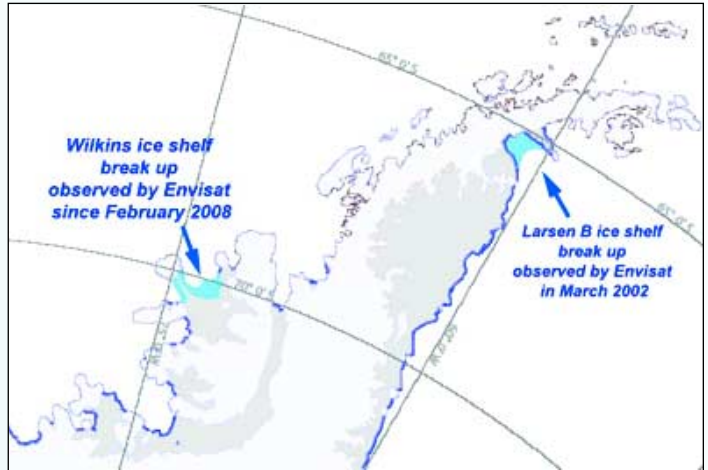
Map of the Antarctic Peninsula, showing the location of the Wilkins Ice Shelf
Image: ESA

Previous studies of this area had mapped warm ocean waters at depths of about 400 meters beneath the ice shelf. If this warmer water were somehow mixing with the upper waters, and coming into contact with the underside of the ice shelf, the warmer water may have caused basal melting of the ice.
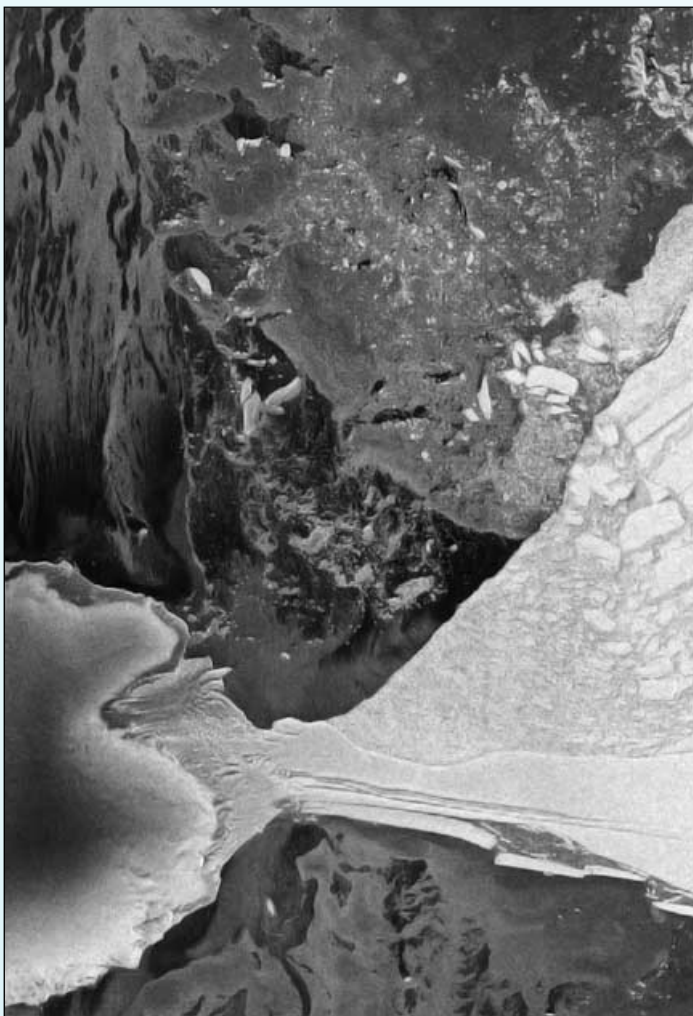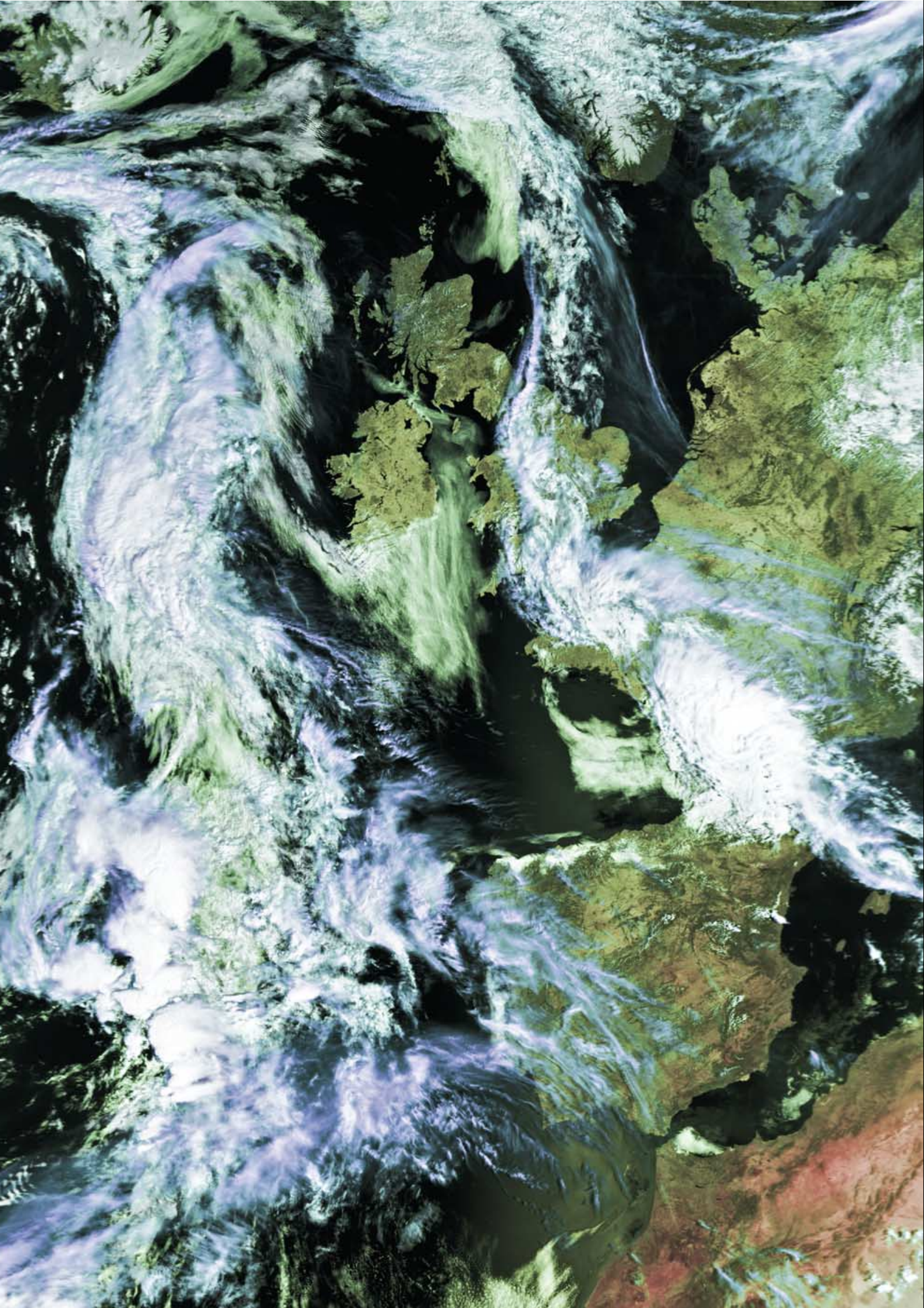
CSDSC   *... continued from page 34*

You now have to tick and confirm the order and click the 'Submit' button (figure 8). If you are asked 'Submit this form right now?', click 'OK'. A final confirmation screen appears with details of the file(s) you ordered.

It generally takes two or three minutes to confirm the order, after which you receive an email with a clickable ftp link from which to download the file. Following confirmation, you have 72 hours to effect your download.

Downloading Using a Web Browser

You can also download using your web browser. Wait about 5 minutes, just to be sure that the order has been processed, then click on 'My Orders' on the side menu. You will be taken to the order status screen, a section of which is illustrated in figure 9.

If the 'Prepare Status' column states 'Processing' this means your order is not yet ready for download. Once the 'Prepare Status' column states 'Finished' (which takes just a few minutes) your file is available for download and a clickable link will be shown in the 'FTP Path' column. Clicking this link leads to the actual download link to your specific HDF file (figure 10).

Clicking this link will start the download process, which normally takes between one-and-a-half and two hours (each FY HDF file weighs in at 215 MB). But you can easily speed up this process using a download manager program. I use *GetRight* [3], which allows me to download using four simultaneous ftp connections, thus reducing the download time to 20-25 minutes.

Using GetRight

GetRight establishes itself as an icon in your computer's System Tray. Before your first download you must configure this program. Right-click your mouse on the *GetRight* icon and select 'GetRight Configuration', followed by 'Downloads/Automatic Mode' from the sidebar. Set the relevant 'Automatic Downloading Limits' fields to 4 connections at the same time.

To effect a download from CSDSC, click on the provided link using the **right** mouse button, as illustrated in figure 10, and select 'Copy link address' from the menu that appears. Next, open *GetRight* (again with the **right** hand mouse button) and select 'Enter New URL to Download'. You will find that the required address <u>has already been entered into its field</u> for you, so all that remains is to click 'OK' and save the HDF file to a folder of your choice. On a good day, this will take around 20 minutes.
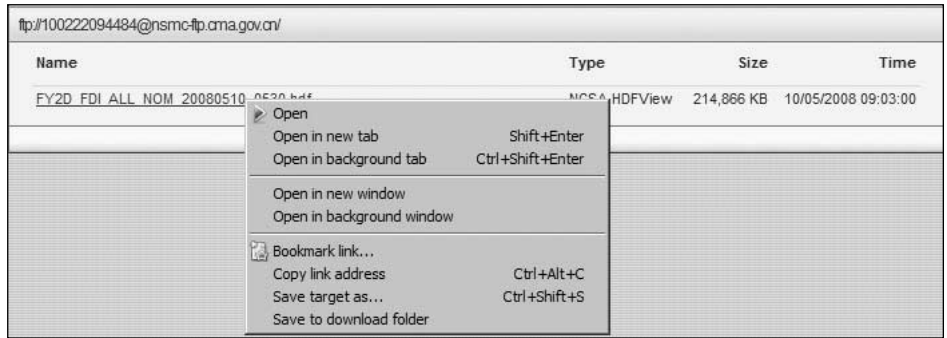

Figure 10 - The HDF file download link

Download speeds do tend to vary during the download, sometimes dropping out completely. With this in mind, it is a good idea to set *GetRight's* download *Timeout Retry* interval to a low value like 5 seconds. Figure 11 clearly shows these fluctuations in the status bar at the foot of the window.

What You Get

Each HDF file contains 5 images, a visible, a water vapour and three infrared channels, all at a resolution of 4 km/pixel. In addition, there is a visible image at the full 1 km/pixel resolution of the S/VISSR instrument

Displaying the Feng Yun Images

Images from HDF files of Feng Yun-2C, Feng Yun-2D and MTSAT-1R downloaded from CSDSC can be displayed using a registered copy of version 7 of David Taylor's *GeoSatSignal* [4] program (use the 'File/Open one' option). Individual water vapour, visible and thermal channels can all be displayed as well as false-colour and remapped images.

If you are not a registered user of this software, I have produced a free HDF Reader program [5] which decodes all five individual images and produces false-colour composite images through the application of colour palettes. There are only limited processing options, and you would normally use additional software such as *PaintShop Pro* or *Photoshop* for final touching up.

Caveat

There are occasions when connections with CSDSC are extremely slow, particularly during weekends. Also, they seem to go completely off-line at times (for an entire week at one point last May). But generally, during weekdays, download times as described in this article are perfectly achievable.

References

1   http://nsof.class.noaa.gov/
2   It's a CLASS Act - GEOQ 16, page 6
3   Get Right
      http://www.getright.com/
4   GeoSatSignal
      http://www.satsignal.eu/
5   HDF Reader
      http://www.myweb.tiscali.co.uk/
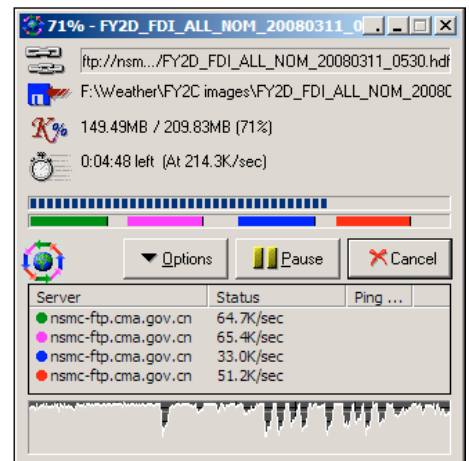   wxsatellite/software.htm

Figure 11 - Downloading an HDF file in *GetRight*

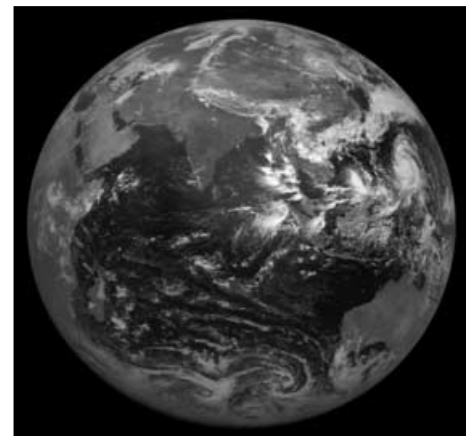

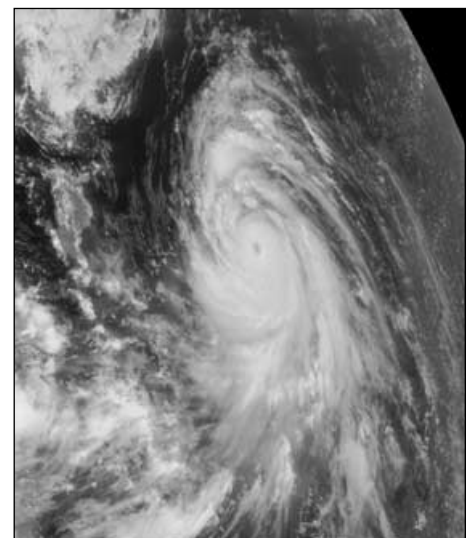Figure 12 - FY2D visible image - May 10, 2008
Image: CSDSC

Figure 13 - Detail from the 1 km visible image
Image: CSDSC

FeedBack

New Systems as a Challenge

Having just received the latest edition of the *GEO Quarterly* I just had to put key to type. Firstly, as usual, it is excellent, albeit with some professional pictures included; the mix is just right to add to the general articles included.

And having read Laurence Holderness' article I am afraid I tend to agree with a lot of his comments, but unfortunately it's (dare I say it) progress. The weather community within the EUMETSAT structure required a satellite that would produce pictures and information that would keep them ahead of the crowd in general forecasting and nowcasting for the European and African communities. Given the general opinion that *Global Warming* is happening, it was essential that a new class of satellite was produced and placed into orbit to keep communities informed of approaching storms and varied weather patterns: so we have Meteosats 8 and 9.

The main problem is, as Laurence suggests, that it is very daunting to come to terms with everything that is required to obtain the information from these satellites. Many members will be put off by the technical requirement as well as the cost to set the system up; many may just give up and walk away, especially in the current economic climate.

I am one of those members who considers it quite differently. If you have an interest in a specific hobby then you go into it with enthusiasm and accept all new systems as a challenge. How else do we advance unless we experiment and try new ways to receive the information and pictures that are on offer? We are also lucky to have David Taylor who produces all the main software we require to receive the data from *EUMETCast*. Without that it would be near impossible.

So, new members, please do not be put off! There is a wealth of information available to everyone through the Group. Yes, it is difficult and technical—but it is possible with perseverance and determination. You can do it. I did.

Laurence may have started something here with his article and surely it is possible, with all the experts we have within GEO, that something could be devised to

make the hobby more attractive to new members—but not too technical, as that can also be a problem with some beginners.

Kind Regards,
Mike Stevens (G4CFZ), Portland.

The Hub of our Hobby

I wish to endorse Laurence Holderness' article. I agree with all that he said, in that little attention is paid to simple 137 MHz APT, with disproportionate coverage of the latest high tech, PC Vista programs, image manipulation and interfaces. All very necessary of course, but most readers and prospective new members are looking for simple off-the-shelf receivers, antennas and software. APT might be 'old hat' to the software writers and PC buffs, but though being phased out, it still remains the basis and hub of our hobby and interest.

Regards
Peter Edwards GW8ARR

That 'Hands On' Experience

I have only just returned from holiday last weekend so a delay in getting around to reading *GEO Quarterly* No 18. Again congratulations on producing another first class edition.

After reading the article by Laurence Holderness, I feel perhaps that some of my own personal views would not go amiss.

First of all I fully endorse the views expressed by Laurence. I feel that, somewhere along the line, we have all tended to 'go with the flow' regarding our weather satellite activities and have lost that 'hands on' experience that we enjoyed before the advent of MSG-*EUMETCast*. Yes, I do have a modest computer system running MSG—and I enjoy downloading the wonderful images when the mood takes me. Getting the system up and running was a very rewarding experience and I will never forget those first complete images.

Of late I have compared the quality of my MSG downloaded images with similar ones in *GEO Quarterly* and don't see much difference. The reason is of course that we are all using virtually the same satellite receiving equipment irrespective of how up-market our PCs are. No difference to receiving satellite TV! Another point is that these images, and many more,

can be downloaded from the Internet for nothing!

For the record, my own system cost me around £350 including the licence! This does not of course include the cost of the requisite software. It is possible to assemble a budget system as I have done, giving me all the images I need: HRIT, LRIT and the World-FSD.

In my own case, I get most of my enjoyment from my APT system, mainly because it lends itself more to my experimental nature (I have been a licensed Radio Amateur for some sixty odd years). Over these years I have built a number of receivers and experimented with many types of VHF antenna, gaining knowledge that has helped me in the development of my own APT equipment. The development is an ongoing thing and I get a great deal of pleasure from it as there's always room for improvement.

I would say that there is still an interest in articles covering all aspects of our hobby but, sad to say, the trend of late has been a strong bias in favour of all things MSG, irrespective of our general interests in weather satellites. I do hope that, in the short term, the Group can broaden its horizons a little.

Just for the record, I am eighty one years of age and still construct most of my own equipment. I make my own printed circuit boards and am in the process of learning how to program microprocessors for one of my current projects.

Philip H Cardwell GW3FXI

Pushing the Boundaries

I did enjoy Laurence's article about the current weather satellite scene and will use the Initials WSS to refer to the topic header.

I must consider myself as an 'Old Timer' in the WSS. My interest was stimulated many years ago by John Tuke, with his articles in the *BARTG* newsletters and by meeting him and purchasing a *Barr and Stroud* facsimile receiver coupled to the laughingly described portable electronics (only if one owned a mule). I was at that time pushing the limits of my knowledge far beyond my capabilities, but I got there with the help of many friends and colleagues and an endless supply of 'midnight oil'.

We are all pushing the boundaries even now but there must be fewer

of us doing it because of the complexity of the WSS. Couple it to the black art also known as programming, and the considerable infrastructure costs, and I am surprised that so many people are still interested.

A low cost method on the old *YU3* framestore concept is needed, as Laurence has so ably stated in his challenge. Modern end-user units are now available which display HD entertainment images on an LCD screen. If you need to see how, put 'Popcorn Hour' into your *Google* browser and see how you can display full HD movies without a DVD player and a computer via a unit the size of a hard-back book. To my eye, it is not a world away from picking up a direct feed from a dish and receiver and displaying it on a TV screen.

This would be a worthwhile project—standalone, utilising a dish, receiver, framestore and a display unit perhaps, with a USB printer output. It would also fit the bill for a low-cost self-contained unit, useable anywhere in the world that had 12 volt dc and could actually earn recognition and maybe even money for whoever could design, build or market it.

There must be someone in Bill Gates territory who could take up the challenge and cobble together various 'separates' as a design project, and come up with an integrated all-in-one unit. We all recognise the concept: who would have believed 40 years ago, standing in front of a mechanical fax machine with the smell of photographic chemical in your nose, that we would be doing what we are now.

Laurence is spot-on with his punch line that such innovation would attract newcomers as never before but in my mind would also allow emergent nations—who need an eye on the world to monitor the approach of violent destructive weather systems—a low-cost, easy to use unit that could help to save lives.

Pete

EUMETCast Defeats Me

I read with interest and agreement the comments regarding *EUMETCast* reception in the June issue of *GEO Quarterly*. Some time ago, I did obtain the receiver, dish, licence and key, but to date have only managed to obtain brilliant television pictures from Hot Bird—alas *EUMETCast*

defeats me. But at least this proves the hardware is working. So yes! I would be delighted to have a simple program on the lines suggested and be more than happy to pay for same. If there be enough like-minded persons i'm sure there is someone willing to write such a program for the ongoing remuneration! I wish I had the knowledge.

Kind regards,
Steve Hicks G0USH, Torbay.

Symposium

A note of thanks for organising a splendid symposium. It was good to see old friends again, especially those I got to know in Darmstadt. I often remember the quite fantastic time we all had there.

The lectures and workshops were most thought-provoking, interesting and quite likely to prove expensive to me—I have a feeling that I may have to buy an up-to-date computer!

Thank you very much again.

Kind Regards
Tim Holdsworth

It's been a few years since I attended my last symposium, but I did manage to attend this year at last. Can I say that, though I really knew nobody else who attended, I thoroughly enjoyed the experience and wish to congratulate the organisers on making it such a success.

I was particularly interested in the discussion at the AGM about the magazine and the Editor's problems finding articles to publish. I edit, print and distribute a magazine for my own club, Buxton Radio Amateurs, and due to the paucity of contributions from our membership threaten quite often to pack it in, but usually end up writing much of the material myself. The truth is, I enjoy the job of producing the thing and refuse to let it die.

One of the suggestions which came at the meeting was for more items for beginners, introducing topics. I must admit that I personally struggle with some of this technology, even though I was a scientist before retiring, so agree with this sentiment, although I do manage to receive passable images in APT and from MSG. In particular though, I know virtually nothing about receiving HRPT, except that the equipment, software and setup seems to be extremely complex and expensive. It would be interesting to have someone write a step by step guide to this topic, possibly including the cheapest route to take. Things like minimum size of dishes required, software used etc. would be helpful. Living where I do, I don't even have any idea

whether I see enough of open sky anyway to run a system as I have no idea of minimum acceptable angles of elevation to get workable images.

Tony Briggs, Buxton, Derbyshire

Newcomer

I am a newcomer who first came across GEO when searching the Internet for a WEFAX program that could handle noise and loss of signal: so new that the *R2ZX* I bought has yet to see its first volt and the aerial is still in the packet it arrived in. I am thus qualified, perhaps, to comment on accessibility for newcomers.

Even with my background (half a century in electronics), and although I can understand the individual articles, I am failing to place each in an overall picture and hence grade the relevance of each article to my central interest. Is there a simplified block diagram that can show what is available and what it can or can't do for you, so that the newcomer can pick a starting point and then expand from there with experience and familiarity?

There is a large amount of information covered in acronyms in the quarterly which, I imagine, is daunting to someone who is less versed in technology. How about a dictionary of the acronyms or a pointer to a web page to one that already exists?

Other than that I think the Quarterly hits the mark. It is varied and interesting.

Regards,
Graeme Younger

[There is an extensive list of acronyms on the GEO website at www.geo-web.org.uk - Ed]

Spreading the Word

Since my last letter, my wife and I have been able to move back to our house at Vallentuna, so now I am back to my old APT equipment. Although I have been able to receive very high quality images from the CLASS archive; it is more thrilling to see the APT images develop live even if they are of lower quality.

There were some very interesting notes in GEO Q18; not least from Laurence Holderness, especially about the immense flow of data that you can get with the EUMETCast system. I myself would also prefer to take a nice picture a couple of times a day (which of course is possible to pick out from the EUMETCast system).

I order to increase the interest in satellite imaging in Sweden; I have produced two articles; one was a translation of an article 'Receiving weather satellite

images' on the homepage of Julian Moss (G4ILO) (published with his kind permission) in *EterAktuellt*, the magazine for the Swedish DX Association, issued 10 times a year.

In the other article I have taken much from 'about GEO' on GEO's homepage. I strongly propagate for membership in GEO. It is published in the quarterly magazine *Väderbiten* (maybe translatable to something like "Weather stricken"). This is a membership magazine for an association of people gathering weather data in Sweden. It has a little more than 400 members. I must admit, that I don't have much hope of getting more people interested, but it may be worth an attempt.

But, indeed, your articles on environmental issues are really interesting; for instance the articles on the Aral Sea, that on the sandstorm , Arctic meltdown and other similar articles are very interesting to read.

Anyhow I hope for a good future for GEO and send my best wishes.

Anders Höök,
Stockholm, Sweden.

MODIS

Just received the magazine and read your article on MODIS. This has made my day, logging on to the *Rapidfire* site and seeing all the images that are available. I'm sure many will benefit from seeing and reading about this availability.

Like many, I run a single PC taking in MSG/AVHRR/Metop, as well as using the computer for all personal use, including wideband radio communications via an *Icom PCR 1500* receiver working through the sound-card.

I enjoy, in retirement, this hobby of ours, but at times I find it hard to understand much that is written about in Group comments. Douglas Deans article re basics also is excellent and I believe this is what many of us want to see and read.

Thanks,
David Tyler

I really enjoyed the June 2008 issue of *GEO Quarterly*, especially the article on MODIS. The *SmoothMODIS* software and *CorrectGeometry* program were really useful to me! I have been looking at the *Terra* and *Aqua* satellite material for a few years now, since this is the best source of high-res images for the far north of Canada: with the help of the two programs, I am now able to really enjoy them that much more!

Keep up the good work! I am one

of the quiet majority who enjoys reading the magazine without voicing my opinion too much.

Best regards
Milan Konecny, Ontario, Canada.

Setting up a Help System

I would like to suggest that GEO sets up a list of volunteers, experienced in *EUMETCast* (or other) reception, willing to travel up to say 50 miles to help fellow members set up or resolve problems on site. They don't have to be 'experts' or long time radio amateurs but people like myself who have overcome problems and setbacks to establish a stable system. I often get requests for help via my website and it's obvious from the various technical Groups that there are many problems and people available to provide answers.

I note Laurence Holderness' comments and a desire for a simple system. I concur with your challenge.

I got into weather satellites in a roundabout way. .As an amateur astronomer, I successfully detected meteors by radio, using a scanner and dipole antenna. I then found it was possible to hear polar orbiting satellites as they passed overhead. These are often observed in the early evening when setting up ones telescope equipment.

I built a homebrew QFHA and could hear the satellite with the scanner but got no images. The next step was a major hill. As ready-built APT receivers were rather pricey, I took the bull by the horns and built an RX2 receiver. It worked first time. The next stage was easier though much more expensive—receiving MSG. A basic setup is essentially 'plug and play'; the main cost is the EUMETSAT EKU (dongle) and software plus two suites of David Taylor's software. There appears to be no way round paying 60 euros for the *Tellicast* software that is essential to the receipt of *EUMETCast*, even without the EKU.

My point in all this is that a *EUMETCast* system can be cheaper and much easier to set up than an APT system. For six hourly MSG images, it should be as easy to set up the hardware as setting up a dish to receive TV pictures. One PC will suffice. Rob Albas has a free software package. There is plenty of software out there to schedule jobs and produce final images. It may be that your challenge can quite easily be met with what's already around.

Cheers
Alan Banks

Early Summer for Northeast Europe

John Tellick

Although summer doesn't officially start till June 21, summer temperatures had already settled over much of northern Europe by early June this year. The upper image on the opposite page shows how the actual ground temperatures between June 2 and June 8, 2008 differed in comparison with average values for the same dates for the years 2000 through 2007. These land surface data, which are <u>not</u> the familiar air temperatures normally reported in the media, were acquired by the Moderate Resolution Imaging Spectroradiometer (MODIS)

aboard NASA's *Terra* satellite.

Areas that were warmer than average are shown as red while those that were cooler are blue. The heat that dominated northern Europe's weather in early June is evident from the dark red that covers Norway, Sweden, Denmark and parts of Germany and Poland. Southern Europe, by contrast, experienced cooler than average temperatures during this period.

The combination of intensely hot dry weather and unpredictable winds led to dangerous fire conditions in Scandinavia, and both Norway and Sweden experienced a rash of forest fires. One fire that burned for several days in Froland, southern Norway, was the largest in the country for over half a century. Before being brought under control by more than 150 fire-fighters, aided by 16 helicopters and much needed rain, this fire is estimated to have destroyed around 3000 hectares at a cost estimated to be at least sixty million kroner.

Source: NASA Earth Observatory

NASA image created by Jesse Allen, using data obtained from the Goddard Land Processes data archives.

GEO Reader W Ford from Bristol provided this NOAA-15 image showing sunglint on the ocean west of Portugal. The image was acquired from the 16:06 UT pass on April 8 this year using an R2FX receiver with turnstile antenna and decoded using Patrik Tast's *APTDecoder* software.

FeedBack

Anticipation

I read with interest the item by Laurence Holderness in the June edition of *GEO Quarterly* and was in agreement with much of what he said. At seventy-three I am one of the 'older school' who enjoys receiving pictures from the polar orbiting wx satellites. I use a *Proscan* receiver and a turnstile aerial, and APT pictures are processed using a registered copy of *WXtoImg,* and occasionally *WXSat*. Like Laurence, I find enjoyment in anticipating the passes of the satellites and the resulting pictures. I use *WXtrack* to keep up to date with the times of availability.

I feel I have achieved two things over the years with polar satellites: firstly, I've learnt a lot about the characteristics of satellites, orbit times, etc, all available in the Kepler elements available from the *Space-Track* website; secondly, I've become familiar with the various software programs used in processing satellite data and might be considered reasonably computer literate. I have followed the development of the MSG satellites with interest but felt that I couldn't cope with the extra outlay involved or with all the flood of data which requires two PCs and a lot of technical expertise.

As Laurence and yourself state, what is needed is a system which isn't too expensive, to purchase and is fairly easy to install and manage—and would provide images for a short selected period of time.

Changing subject. I found the article on 'MODIS' of great interest and now pay regular visits to the *Rapidfire* site. Fascinating,
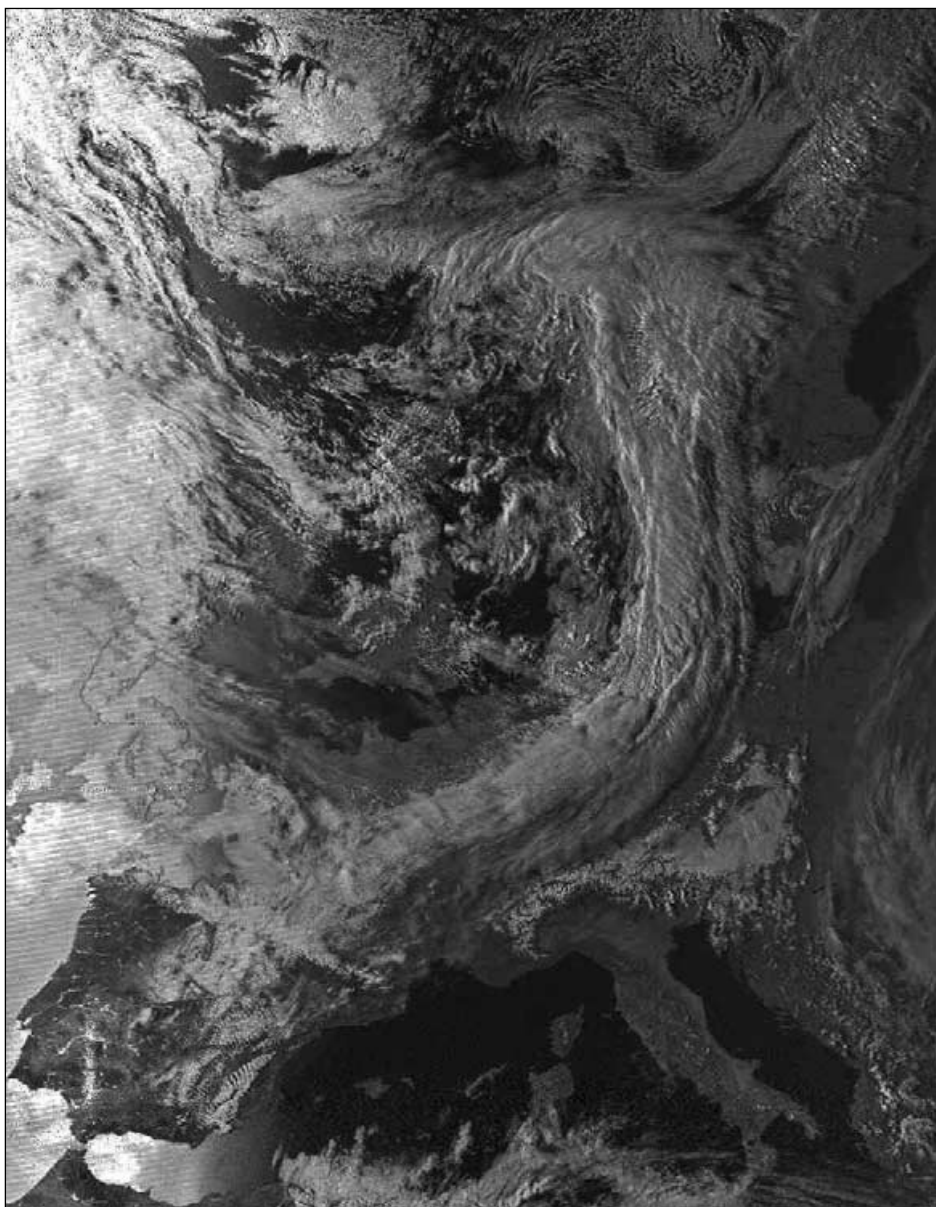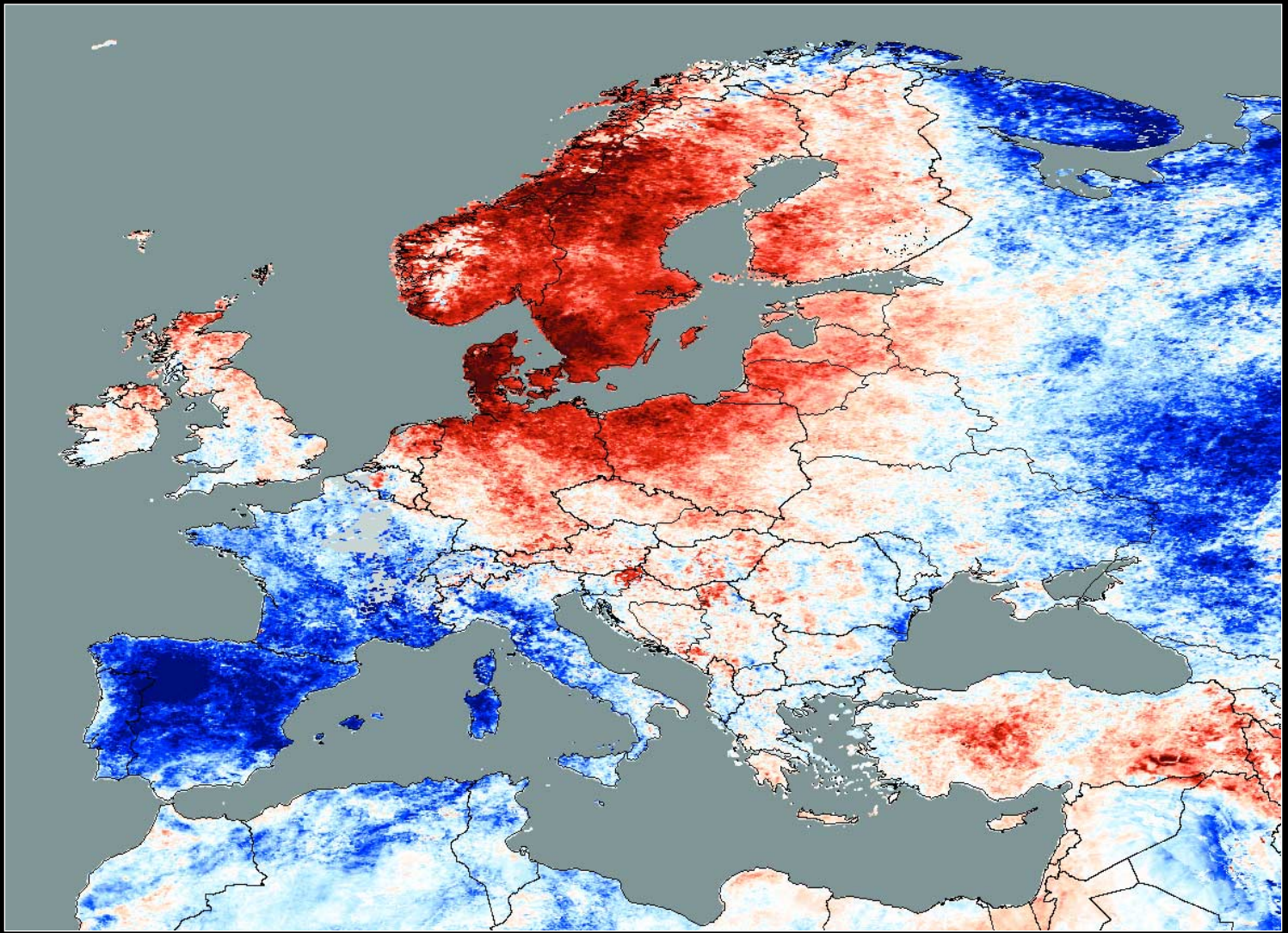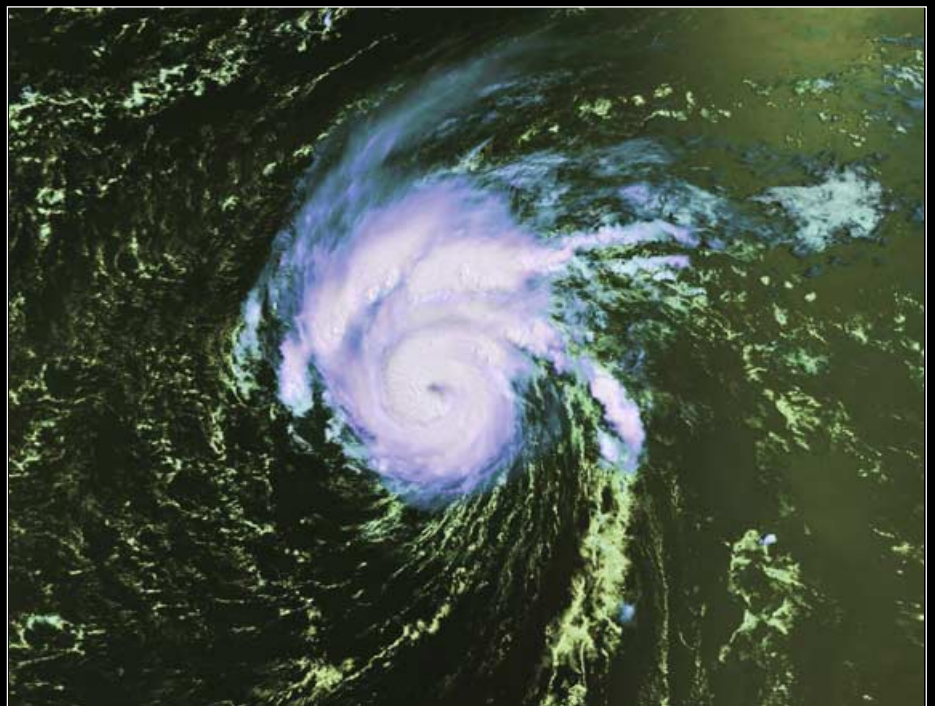
Regards
Mike Ennis

Dear Francis
Thank you for sending me the latest edition of GEO quarterly. It contains some great images of the dust storms. I hope that your annual meeting was a success.

Kind regards

Michael

Dr Michael Rose
Earth Observation Programme Manager
British National Space Centre (BNSC)

Land Surface Temperature Anomaly (°C)

-10   0   10

European land surface temperature anomalies for the period June 2-10, 2008

That ultra wet summer of 2008 encouraged a clematis to climbing up over the roof of his garage on to Les Hamilton's QFH antenna.

Mike Stevens imaged '*Bertha*' first hurricane of the current Atlantic Storm Season in this Metop-A segment dating from 13:26 UT on July 9, 2008.