The GEO Quarterly

Group for Earth Observation

The Independent Amateur Quarterly Publication for Earth Observation and Weather Satellite Enthusiasts

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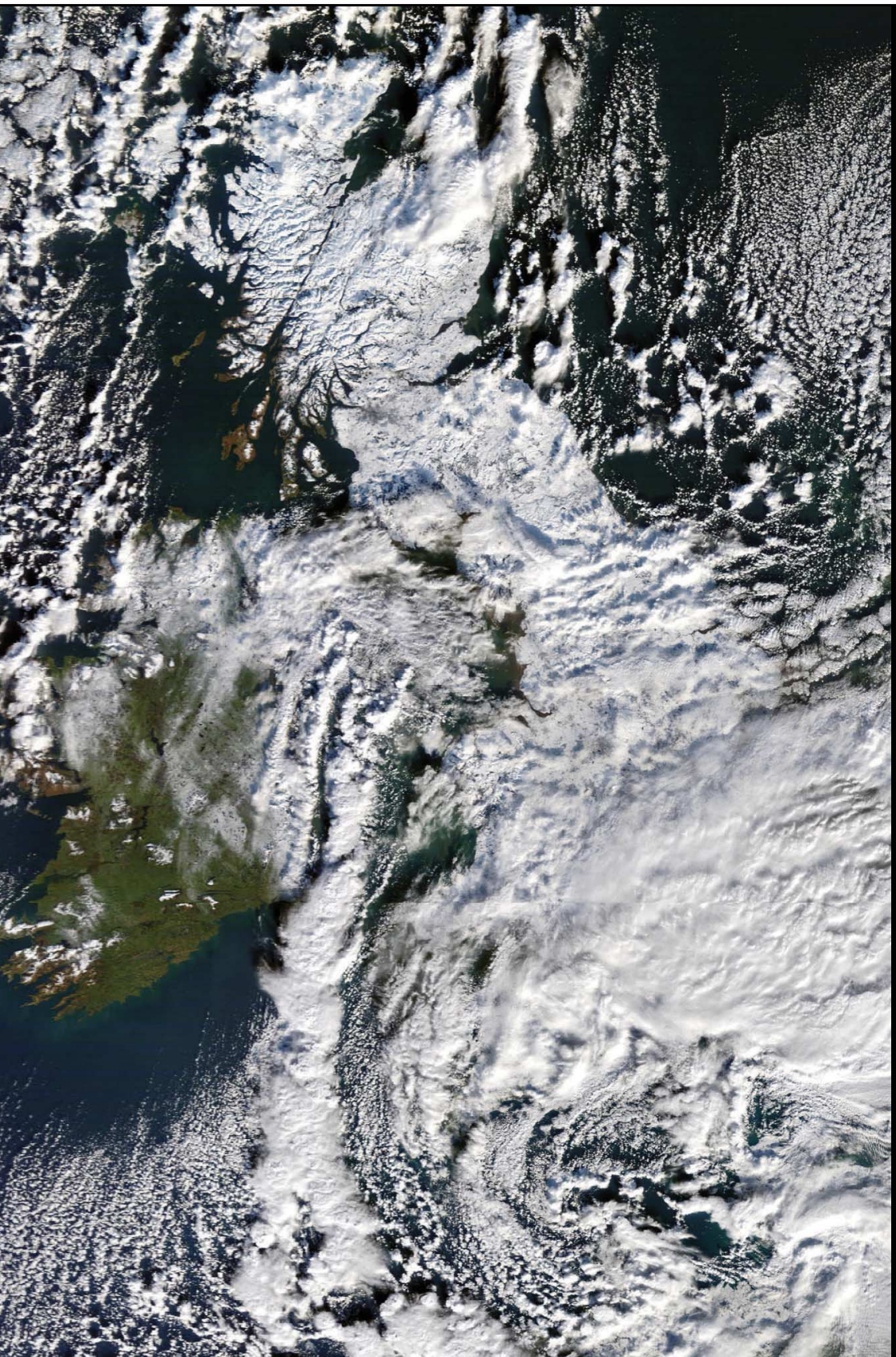
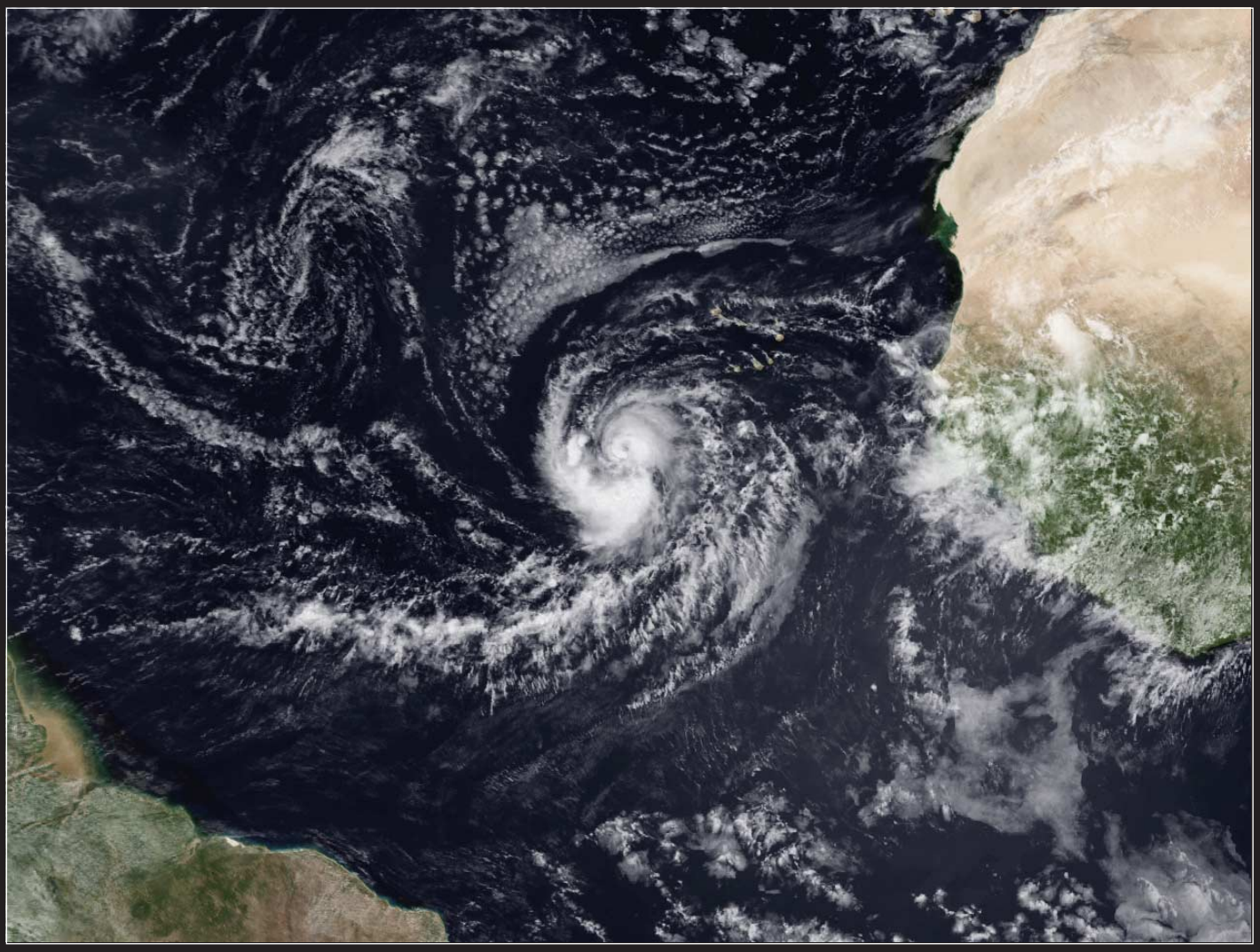
March 2010



Inside this issue . . .



Category-3 hurricane *Fred*, imaged 1000 kilometres west of the Cape Verde islands by GOES-W on September 8, 2009, was the strongest tropical cyclone yet recorded so far south and east in the Atlantic, and only the third major hurricane on record east of 35°W.

Located in the South Atlantic Ocean, the South Sandwich Islands **are a remote and inhospitable place with no native population. This MODIS image from NASA's Aqua satellite, captured on November 4, 2009, shows some unique cloud patterns to the south of this island chain.**

The band-patterns are called 'ship-wave-shaped clouds', so called because they resemble ship waves (or 'Kelvin ship waves'), which are the V-shaped wakes left on water by moving objects such as ships or even ducks.Ship-wave-shaped clouds are caused when wind flows past an obstacle like an island. The air is swept around and over it, leaving a wake similar to that of a ship. The ship-wave-shaped cloud patterns form as the air alternately cools and warms on the wave peaks and troughs, causing clouds to form on the peaks, but disperse in the troughs.

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The GEO Quarterly

March 2010

Editorial: Peter Green

Welcome to GEO Q25, I hope you enjoy my first issue as editor. I would like to thank Les Hamilton for his invaluable help in producing this Quarterly. Over the last year he has gone out of his way to write me tutorials on how to produce the magazine and over the last few weeks has been my constant fountain of knowledge to get to the publication day.

The Quarterly is your magazine, the flagship of GEO and should reflect your interest; however it will be nothing if you don't submit your articles and images. Please don't just send me an image or a web link 'saying this would make a good article'. I haven't got the time to write the articles and that's not the editor's job. I would like to use more of members images throughout the Quarterly so please send them in, to aid the finished printing please submit them in the highest quality format you can.

Whilst we in Europe were shivering in the one of the coldest winters for years (as seen in our cover image) and the UK came to a standstill with a few inches of snow Steve Ross in Potomac Falls had a few inches more read about it on page 38

In a warmer area, the Caspian Sea is effectively the largest lake on Earth. Les Hamilton has prepared an illustrated article describing this intriguing body of water.

The Envi-ham Project has launched with some images producing results down to 300 meters, Francis Bell reports on the start of this project.

APT is still the most popular area of our hobby with many people getting great images and pleasure from receiving directly from the satellite. Mike Donnachie has improved his reception with a Cubical Quad antenna for APT and tells you how to do it in this issue.

Contents

The GEO Report

Francis Bell

There is the prospect of an exciting year ahead for those members who are prepared or able to take advantage of the new dissemination service being offered by ESA via their new *Envi-Ham* project.

I have written an article about my introduction to this project. It is partly a diary of events but I hope it contains enough technical information to allow a competent individual to start receiving this stunning new service. No doubt over the coming year we will be able the share experiences, allowing many more of us to achieve successful home, school, or other institution reception of the *Envisat* images. Although I am receiving high definition images from Envisat, I still consider myself a beginner and am still learning to display them to best effect.

I wish to record my thanks to Stefano Badessi and others at *ESA-ESRIN Frascati* for the help and guidance enabling me to successfully receive their new service. If I understand their hierarchy correctly, Stefano Badessi is the Principle Investigator of the *Envi-Ham* project, but this is in addition to other duties he has within ESRIN.

Editor

GEO now has a new editor for our Quarterly and in anticipation of looking after us for the near future a big 'thank you' to Peter Green. A cautionary word here to the membership that the life blood of the Quarterly relies on your contributions.

It is not the role of the editor to create the copy but to edit other contributions. Please submit to the editor anything that you think would be of interest. Material could be anything from personal anecdotal experiences to highly technical articles. However, the warning is that without such input there will be nothing for the editor to edit and hence no Quarterly publication. Please be supportive of our new editor.

To just say 'thank you' to our retiring editor seems inadequate. Our Quarterly has been our group's flagship since the 'Launch Issue' in 2004 and its quality has been attributable to our editor who not only has edited the content with meticulous accuracy but also composed it page by page ready for the printer. I know Les wishes to spend more of his time on his other interests but for the legacy he has left and the standards he achieved on our behalf, I can only say 'thank you'.

International Liaison

As Pete has taken over the job as Editor he has relinquished the role of International Liaison for GEO. This is a great opportunity for one of our members to support GEO and help develop its International membership. It you are interested in this opportunity or any other role please contact me.

Posting and Distribution.

A further 'thank you' must go to Peter Wakelin, who has looked after the distribution of the quarterly since the Launch Issue. I think, over the years, Peter must have mailed about 14,000 copies of *GEO Quarterly* to our members in the UK and abroad. He was always prompt with his service and kept the management team up-to-date with mailing costs and current membership numbers.

This position is now vacant and any member who may be willing to undertake this role should contact me for details.

Please do not ignore this request if you think you may be able to help. Please contact me at

francis@geo-web.org.uk

GEO Shop

The shop is another jewel in our crown because it makes available to our membership equipment which would otherwise be impossible to buy elsewhere. A 'thank you' to Clive and Carol Finnis who have run the shop for five years, and sourced receivers and other equipment from abroad.

Thanks also to David Simmons who now looks after the initial processing of orders and the technical side of shop enquiries.

Events for 2010

Our friends in The Netherlands are holding their regular meetings on the following dates in 2010:

Saturday March 20

Saturday May 8

Saturday September 11

Saturday November13

The venue for their meetings is the *Nimeto*, Utrecht in The Netherlands. I feel sure GEO members would be welcome at their meeting but check first for details on their website at

http://www.kunstmanen.net/

UK Space Conference

GEO will be represented at the UK Space Conference in Godalming, Surrey between March 24-28, demonstrating live APT reception together with a stand of informative posters and literature. It's just possible that we may also be able to demonstrate *Envisat* reception too. This is a major four-day conference and details can be found at

www.ukspaceconference.org

AMSAT-UK are holding their annual colloquium at the Holiday Inn Guildford. The dates are:

Saturday 31st July and Sunday 1st August

To keep in touch with the programme and accommodation for this event visit the AMSAT-UK web site at

www.uk.amsat.org

Plans still have to be agreed but I would like GEO to be represented at this meeting to demonstrate reception of the new *Envi-Ham* project.

GEO attended the RSGB / Lincoln Short Wave Club National Hamfest last year. Our stand was busy for two days and we hope to be there again in 2010 perhaps demonstrating *Envi-Ham* reception but more certainly live weather satellite reception. The dates are Friday 1st October and Saturday 2nd October

I judged this to be a very worthwhile event last year: hopefully it will be again in 2010.

The Royal Meteorological Society are holding a special weather satellite conference in early September at a location on Reading University campus. GEO have been asked to take part in this event and at the moment we anticipate giving presentations, workshops and live weather satellite reception. It could be a major event for us, perhaps offering the opportunity to hold our own AGM. Details still have to be confirmed so please watch the GEO website for the latest news relating to this event.

A venue for our own annual symposium has not been chosen yet although it is being actively researched. Again, watch our web site for the latest news. I must note here that, in spite having a stunning programme of speakers at our 2009 symposium, attendance by UK members was very disappointing and provided no real stimulus to run a similar event in 2010.

The Quarterly Question

Readers of our last Quarterly may have read the question which related to the number of member states in EUMETSAT. The question was prompted by something said by Gordon Bridge in his presentation at our 2009 symposium.

He slipped in the comment that, with two new member states, EUMETSAT was not short of money. Wow! There cannot be many organisations who can say this but, with two new members, I guess this eases their finances. Gordon showed us a list of member states and cooperating states. At that time the number of member states was 24 and this was the number I was looking for as an answer. To confirm this number read a recent EUMETSAT publication which usually lists the member states or visit their web site at

www.eumetsat.int

My thanks to the relatively small number of members who emailed me with the correct number 24. Subsequently two other countries have joined so the current number is 26.

This Quarterly Question has been synthesised from my recent experiences in South America, where I managed to obtain some APT images of the River Plate estuary; the emailed New Year greeting I received from Carlos Cotlier of the Remote Sensing Centre, Rosario, Argentina; and the *Envisat* images I downloaded from ESA of the River Plate estuary, one of which appears on page 13. The *Envisat* image of the River Plate clearly shows Montivideo and Buenos Aires but the question is this:

Can Rosario been seen on this same image?

If your answer is yes, give me an indication of its location. For example, using 10 units for the width of the images and 10 units for height what would be the x,y coordinates of Rosario, if it's shown?

The greeting card from Carlos Cotlier (page 44) may or may not help you.

Answers to me by email at

francis@geo-web.org.uk

before the publication deadline for GEOQ 26.

EUMETSAT Announces EO Portal

We have received the following announcement from EUMETSAT:

'EUMETSAT is pleased to announce the launch of the Earth Observation Portal (EO Portal) which will allow you to manage on-line your subscriptions to the data, products and services provided by EUMETSAT. As of January 28, 2010, you will be able to login to the EO Portal at

http://eoportal.eumetsat.int/userMgmt

with a temporary user ID and password.

After logging in using your new user ID and password, you will have the possibility to view and modify your user profile, service subscriptions and licence arrangements.

Please note that the information you will find is based on your previous registration details. Should you require any further assistance, please contact the User helpdesk by visiting

http://www.eumetsat.int/

and following these three steps.

- Select 'Access to Data' from the menubar
- Select 'User support' from the page menu
- Select 'Helpdesk service' from this menu

We hope you will enjoy using the new EO Portal'

Cover and Full Page Images

Front Cover

This Modis image from NASA's Terra satellite captures the scene on January 6, 2010 as Scotland shivers under a layer of snow and ice. Further south, England is under siege as snowfalls in the southern counties approach half a metre in depth.

Image: NOAA

Back Cover

Arne van Belle captured this corrected Envisat image on January 30th 10:51 UTC showing snow inclination for the Uk. Image received over the Envi-Sat Project

Copyright ESA

Inside Back Cover

Douglas Deans shows the result of using Google Earth to display Eumetcast Multi-sensor Precipitation Estimate data (MPE) for the 0 degree and IODC data

Image:Google/Eumetsat

Page 41

George Newport alerted us to this fine image of Typhoon Nida, imaged by Metop-A on November 27, 2009. At that time, mean windspeed was 165 mph, gusting to 200 mph.

Image: NOAA CLASS Archive

Caspian

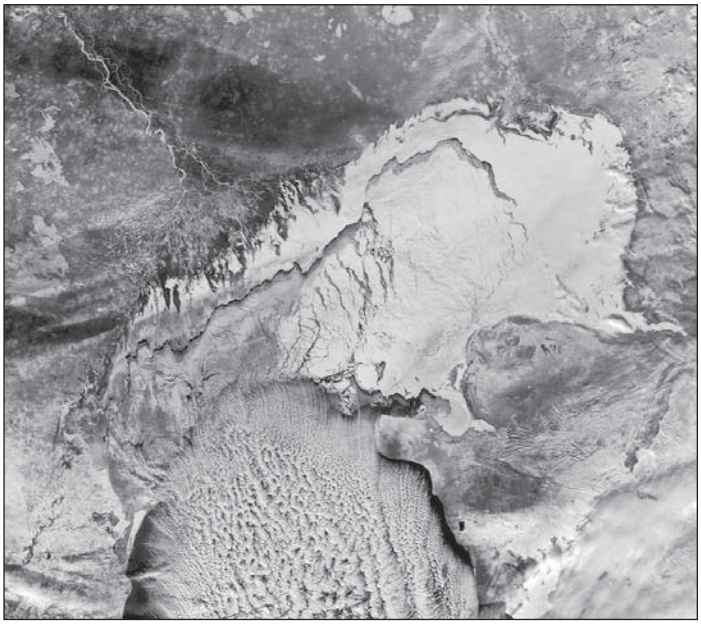
Les Hamilton

South and east of the Urals lies a vast, low-lying inland basin comprising much of Kazakhstan, Uzbekistan and Turkmenistan. In former times, during the mountain building era that raised many of the surrounding ranges some 50 million years ago, this basin contained the shallow Paratethys Sea (an ancient northern gulf of the Tethys Ocean, which linked the Pacific and Atlantic oceans before North and South America drifted together); the Paratethys stretched from north of the Alps, east as far as the present-day Aral Sea. Now long gone, the Paratethys has left behind an inland basin which, since becoming landlocked about 5.5 million years ago, has pooled water from more than 130 rivers (80% of it from the Volga) at its lowest point to form the Caspian Sea.

The Caspian Sea, the largest lake on Earth with a surface area 50% greater than all five North American Great Lakes combined, is divided into three regions of roughly similar area. The northern part is the shallowest, with a mean depth of just 7 metres and rarely exceeding 10 metres in depth. It contains less than one percent of the Caspian's total water volume. The middle region holds approximately 35 percent of the lake's volume and has an average depth of 174 metres while the southern Caspian, holding 64% of its water, plunges to 1025 metres at its deepest.

Occupying a large depression north of the Elburz Mountains, the Caspian is an endorheic (terminal) lake, which means that its water never reaches the oceans. Because of this, evaporation has resulted in minerals building up in the water and rendering the lake saline, with a salt content around one third of that found in the oceans: consequently, it is generally referred to as a sea. The salinity does, however, vary considerably within the Caspian, particularly in the shallow northern region where inflow from the Volga lowers salinity to freshwater levels. The Caspian measures approximately 1,030 kilometres from north to south with a width ranging between 196 and 435 km; it boasts a total coastline of over 7000 km, a surface area of 386,400 km^2 and contains some 78,000 km^3 of water. To the east of the Caspian lies the prominent Kara-Bogaz-Gol, a shallow gulf with just 3% of the area of the main Sea. Its surface lies several metres lower than the level of the Caspian itself, and water that constantly drains into it quickly evaporates, rendering its salinity between ten and twenty times that of its larger neighbour. The region surrounding this gulf is largely uninhabited because of the salinity, and vegetation consists only of salt tolerant plants.

The level of the Caspian has had a history of both short- and long-term variations in level and has fallen and risen, often quite rapidly, many times in the past: currently it stands at 26.5 m below mean sea level. Over the centuries, Caspian Sea levels have changed in synchronicity with the estimated discharge of the Volga, which in turn depends on rainfall levels in its vast catchment basin. Precipitation is related to variations in the number of North Atlantic depressions that reach the interior of the continent, and these in turn are affected by cycles of the North Atlantic Oscillation. Thus levels in the Caspian sea relate to atmospheric conditions in the North Atlantic thousands of miles to the north and west.



Ice up to two metres in depth covers the northern reaches of the Caspian Sea in this Terra MODIS image dating from December 16, 2002
Image: MODIS Rapid Response Teamat NASA GSFC

Between 1930 and 1957, prolonged drought in its hinterland, coupled with the construction of large hydro-mechanical irrigation projects on the Volga and Kura rivers, reduced the surface area of the Caspian from 430,000 to 382,000 km^2, at the same time lowering its surface to -28 metres and turning much of its shallow northeastern region into dry land or marsh. Between 1977 and 1995 the level rose by 3 metres, in part as a result of opening sluices in river dams during 1991. Since 1995, smaller oscillations have continued to take place.

Climate

During winter, mean temperatures throughout the Caspian basin are around the –10°C mark and the shallow northern part of the Sea freezes from November to March, the ice often attaining a thickness of two metres. During the summer months the waters can rival those of the Mediterranean, with surface temperatures of 24°C to 26°C in the north, rising to 29°C in the south. Rainfall over the Caspian Basin averages about 200 mm per annum, significantly less than the annual evaporation of 1000 mm per year.

Opposite Page

A true colour *Aqua* MODIS image of the Caspian Sea acquired on January 15, 2008.
Image: MODIS Rapid Response Teamat NASA GSFC

Eurasia Canal Project

It has been proposed that a canal be created joining the Caspian Sea with the Black Sea to foster trade between Asia and Europe. If it comes to fruition, the Eurasia Canal, will stretch for 650 kilometres through the northern Caucasus to link the two seas. It is estimated that construction of the canal would take take five years and cost $6 billion. If built, the canal would be four times longer than the Suez link between the Mediterranean and Red seas and eight times the length of the Panama canal connecting the Pacific and Atlantic oceans. It would turn Kazakhstan into a sea power and bring benefits to other countries in Central Asia which are rich in oil, gas and mineral resources but lack transport links to world markets. Such a canal would cut some 1000 km from the current waterway where ships must travel from the Caspian to the Black Sea via the Volga river, the Volga-Don Canal, the River Don and the Sea of Azov.

Oil

Huge oil fields are now known to lie beneath the Caspian Sea. Oil exploration in this part of the world began as long ago as the mid-1870s, in the Baku region of Azerbaijan, and by the start of the twentieth century, these represented an estimated 10% of the world's total supply. Kazakhstan began exploiting a major oil reserve along the Caspian in 1979 and oil and gas extraction, along with transportation and industrial production, have been the source of severe air, water, and soil pollution in the region. Currently, Azerbaijan and Kazahkstan have seen the biggest increase in oil production—some 70% since 1992—with a total production of 1.6 million barrels per day, a figure that is expected to triple by the end of this year.

References

1 The Caspian Sea (Lake Basin Management Initiative Thematic Paper) - Nicolai Aladin and Igor Plotnikov – June 28, 2004.
http://www.worldlakes.org/uploads/Caspian Sea 28jun04.pdf

Mobile Internet for your Weather Station

Rob Denton G4YRZ rob@wxsat.org

Whose idea was it to move back to UK? Just when I got settled in my Beautiful Bulgaria I find I'm heading back "home" to Robin Hood Country. I sure will miss the beauty and tranquillity of that place but, been there, got the t-shirt and now it's time to move on again

On arrival back in UK it's time to find a new place to live, being an old weather satellite enthusiast I thought carefully and decided to settle somewhere in the country where I got the least possible interference to my APT imaging.

Wrong!

I made a big mistake there. No internet to publish my weather satellite images automatically to the web, at least none without it costing me fortune for the extra "boost" required for the land line signal. That's when I decided to search for alternatives. It's not that I'm tight with my money, simply the fact that I don't have any!

After some thought and 4 or 5 hours searching the net I found the answer. Yes, the light bulb came on in those old grey cells. Mobile Internet!

For those of you who are thinking Mobile Broadband is just for laptops and vehicles, think again! There is absolutely no reason you cannot run it on a desktop PC as long as precautions are taken, in fact it can save you a small fortune as the market is more competitive. I don't know how it is in all the countries but just think, for our UK members that means no £120 line connection or £11 a month line rental. Has that got you thinking yet? Yes, all those extras, including one off payments soon add up.

When I'm talking about precautions I mean this – Your desktop can emit a lot of RF (interference) which can affect the performance of your USB dongle (the thing that plugs into your PC) so we need to get it as far away from the PC as possible. I use a 1 meter extension cable with a stand on one

end which lifts the dongle into the clear for trouble free reception (remember your internet arrives via radio waves so the stronger the signal, the faster the connection) but be careful when looking for extension cables, those Pound Shop specials can be very lossy so seek a good quality one. There are some nice usb extension cables on Ebay for a few pounds, euros or whatever currency you trade in (I know GEO has international members)

Don't be afraid to experiment, trying your dongle in different parts of the room, vertical as well as horizontal, try it near the window, it's amazing how much the signal can be attenuated by a brick wall etc. I even placed my dongle on a metal tray which acted as a groundplane, it DOES work! Most internet providers include a signal meter in the software so you can see the results, but give it time to update, move it slowly when seeking the best location.

There are some excellent external (outside) antennas which can be plugged into your dongle and these are really effective, but again, for best results go for the ones with higher gain, at least 11dBi. I am currently in the process of experimenting with one. Please note: In most cases these external outside patch antennas are not necessary, it's just that I'm in an area with very poor to no reception, most towns and cities have sufficient signal for just the dongle alone to suffice.

Anyway, to sum up, think about what you are paying for your internet and see if this will save you a shilling or two, it's certainly great fun and inexpensive compared to fixed broadband.

I have cut my internet bill in half, just by going mobile broadband instead of a fixed landline and I can even go portable with it now just take it with me when I try receiving from a remote location, which can also send straight up on the website!!!
Enjoy the hobby.

Cubical Quad for APT Reception (The EFJ Beam)

Mike Donnachie MM0EFJ

I read with interest the recent article in the December 2009 edition of GEO entitled "Which is the Best Antenna for APT Reception?" I thought I would participate in the ensuing discussion and put forward my own findings.

Having purchased a RX2 some time ago complete with preamp and home made QFH antenna I set up the system and was disappointed with the significant amount of pager interference I was encountering.

I did a bit of research on various homemade antennas including turnstiles etc to look for an alternative.

At the time I had been doing a bit of experimentation and construction of multi element cubical quads for 2 metre (144 MHz) operation.

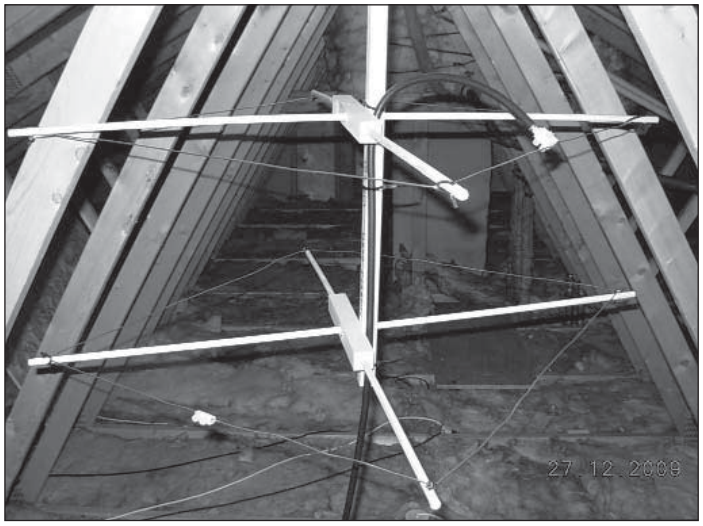
At this point, since not all Weather Sat enthusiasts are radio hams, perhaps I should digress and explain what a cubical quad antenna is. In simple terms it is a directional antenna made up of one radiating element, one reflector element and optional director elements which concentrate the directivity of the antenna, generally the more elements the more directivity. Each element is composed of a 4 sided square, hence the term quad. Construction details including sizes etc can be found at *http://www.softcom.net/users/kd6dks/quad.html* which gives a very good calculator for element lengths. This however is only a guide and each antenna will require a bit of experimentation with minor variations to element lengths to tune to the correct frequency. For those of you wishing to construct a quad antenna I would advise you to beg borrow or steal an Antenna Analyser such as a MFJ 259 or 269 which makes quick work of the tuning. I constructed my Quads using copper wire (2.5 sq mm cross section) with spreaders made from 6mm wooden dowels and boom of 25mm square timber. No balun is required and the driven element of the antenna can be connected direct to the coax

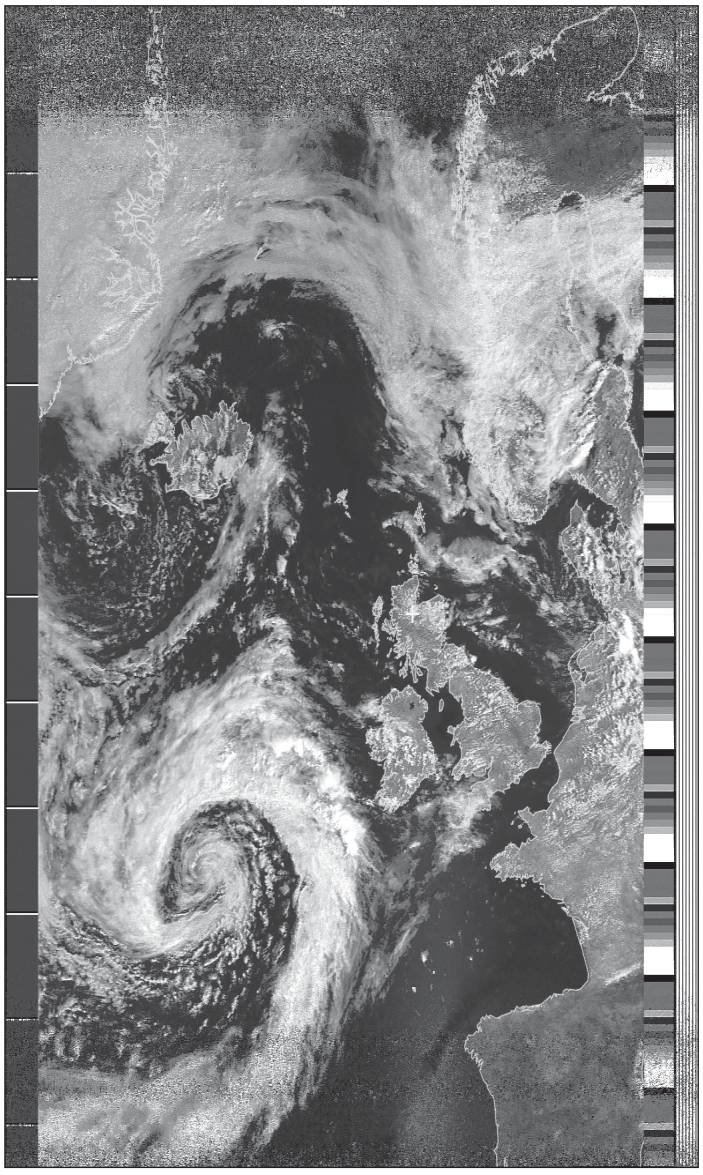
Anyway like many of my efforts on Ham Radio projects things did not go entirely as planned. I had adjusted the driven element size for lowest SWR and the antennae seemed to work well. I should point out that all my antennae are in the loft of the house and none visible to neighbours !
I noticed however that I was receiving, and transmitting, strong signals off the side of the beams, for example I found I could get an APRS signal easily into ISS when it was South of me and my beam pointing East !!

It then occurred to me that, if this was the case, a Cubical Quad tuned to 137 MHz, and pointing straight up and down might work on the APT weather sats.
I set about construction, and in order to further reduce the directional gain I only made a 2 element unit.

I set this up and, would you believe it, excellent signals with the antenna in the loft and pager noise virtually eliminated !

My location has a steep hill to the south which blocks off the signals a little so I am unable to receive a signal further than the south of Spain on a good pass but can get pretty far to the north.
Some of my images now show the eastern seaboard of Canada which was the subject of Quarterly Question No 23 which I was too late to submit at the time.





ENVISat Images huge North Atlantic Depression

John Tellick

This Envisat image dating from November 2, 2009 captures a depression covering most of the North Sea. Depressions are storms that rotate around a central area of extreme low pressure, pulling in air from the surrounding regions. Winds begin rushing inwards and upwards around this low-pressure zone and, as this air rises, it cools to form clouds and precipitation.

The area of low pressure developed overnight to the southwest of Britain and heavy rains spread through England (visible), Wales (partly visible), Northern Ireland and Scotland (partly visible) on the following morning.

Scotland was one of the worst hit areas, with 13 flood warnings issued. According to the UK Met Office, 53 mm of rain fell in the Scottish city of Aberdeen in just twelve hours, nearly three-quarters of the mean total rainfall for the entire month.

The various colours of green visible in the sea around the River Thames in England are due to sediments being transported in the water.

Envisat's Medium Resolution Imaging Spectrometer (MERIS) optical instrument acquired this image working in Full Resolution mode to provide a spatial resolution of 300 m.

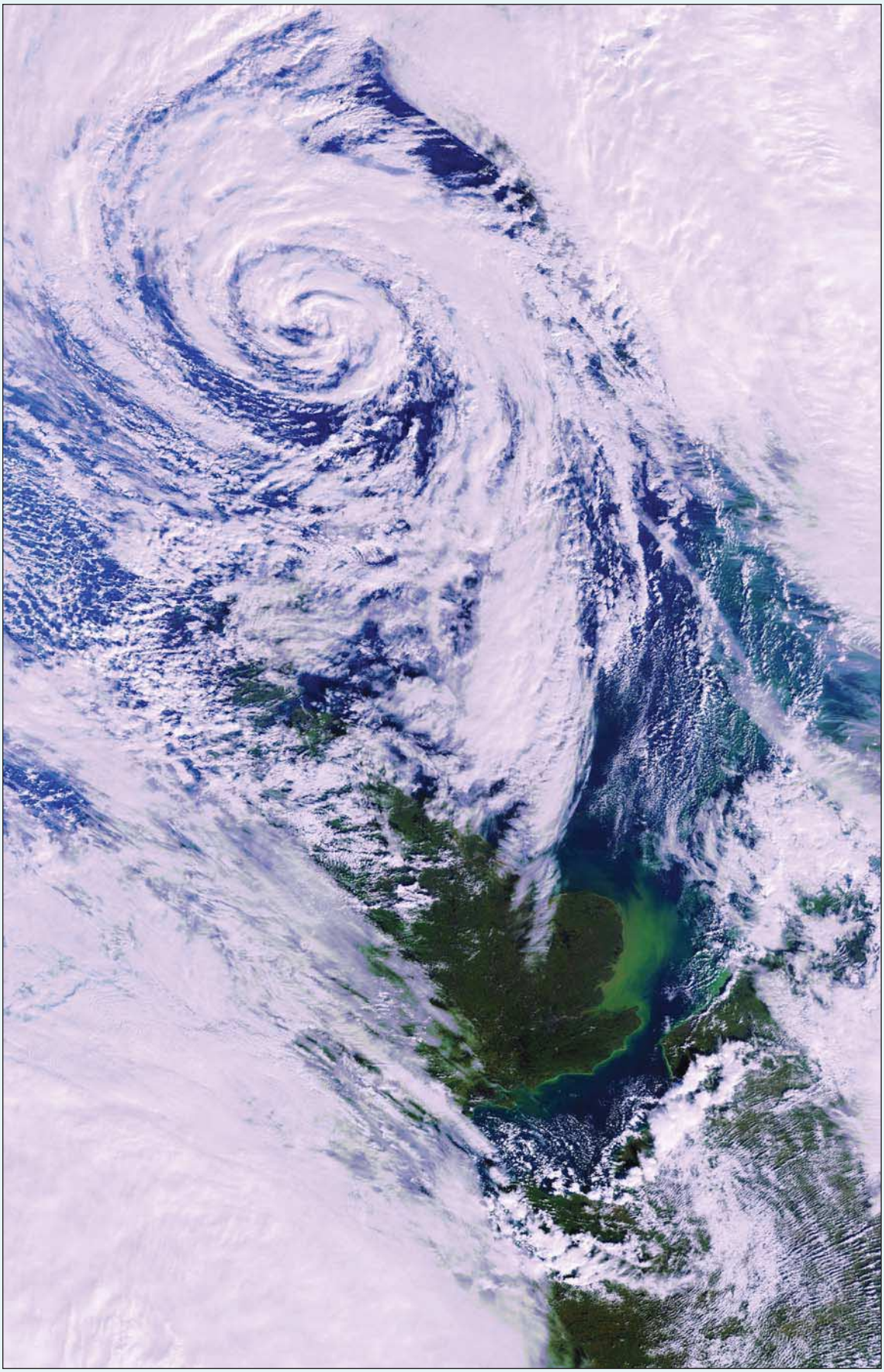
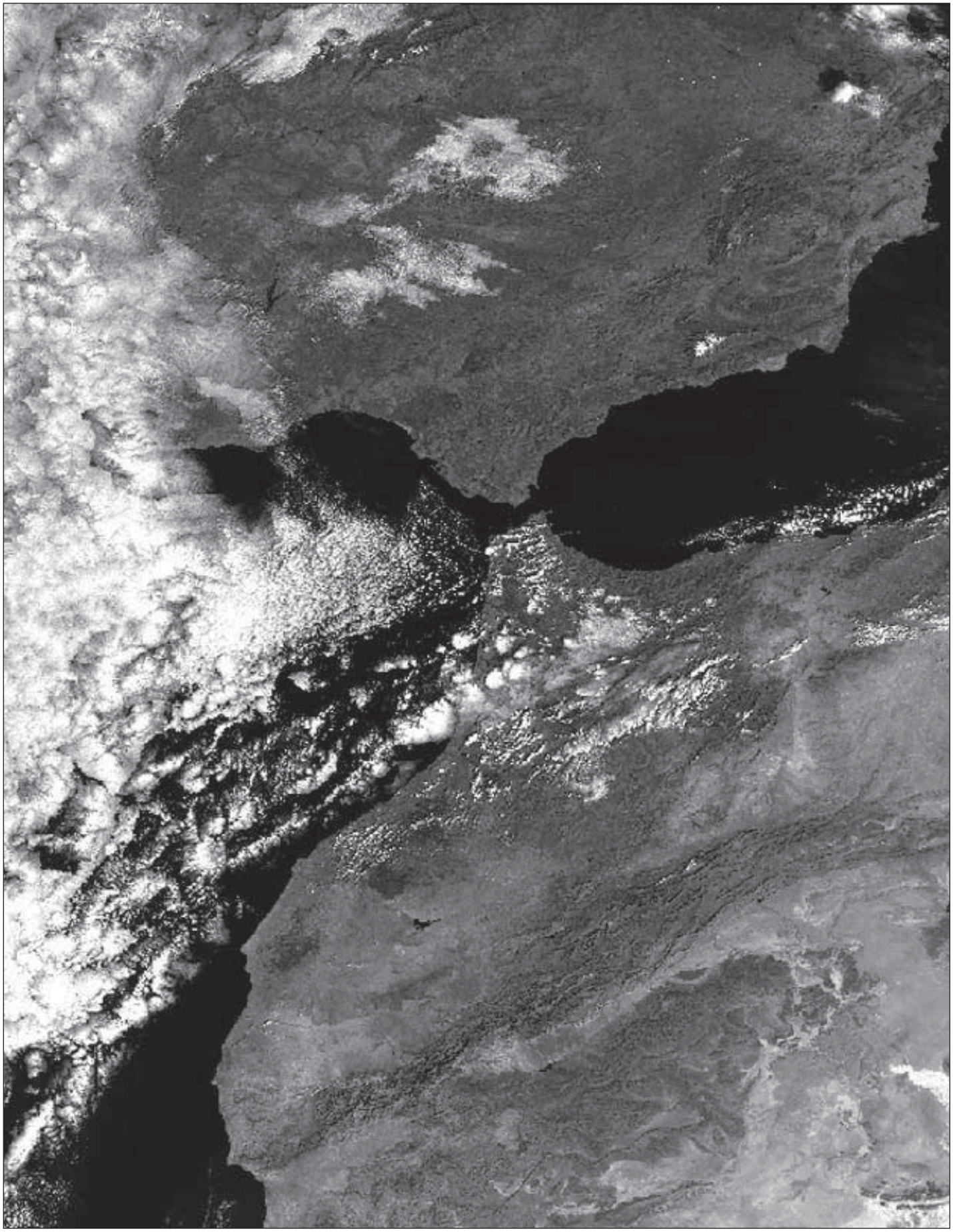


Image: © 2009 - European Space Agency.



This Envisat MER_FRS image showing the Strait of Gibraltar was received by Francis Bell's ground station on 4th February 2010. It is a raw unprocessed image using channel 12 data. The full data set offers great scope for further processing, enhancement and colouration according to preferred objectives. See back cover for an example.

Image courtesy ESA

Reminiscences from the Early Days of Weather Satellite Reception in Dundee

Francis Breame - vf1012@btinternet.com

Dundee: January 28, 1975. It was wet and very cold. I was standing on the edge of a roof pulling on a rope, but thoroughly enjoying it. This memory was brought back to me recently when I discovered some old photographs.

Many of you will know of the Dundee University weather satellite receiving station and archive at ***www.sat.dundee.ac.uk***. Although they have been running a continuous archive since 1978, the station had actually been in operation for some time before that. I first encountered it in 1975 when I was a final-year electrical engineering student at Dundee. I managed to get allocated a final-year project on the station and this was when my interest in meteorological satellite reception first started. It has continued, with lapses, ever since.

Up until then the station had been operating on 137 MHz APT only, using a large helical antenna, usually tracked by hand (figure 1). Dundee had recently supplied a 'home-made' APT system to the Met Office (the 'Met Box' as it was known), and the local station was very similar to this. When I was there, much of the drive was to equip the station for high-resolution HRPT reception from the VHRR instrument on the new NOAA 4 satellite, launched in November 1974.

Figure 1 - The HRPT and APT antennae

The station was entirely hardware based; there was no idea of using software for running the station or processing the images. Indeed, the only computer involvement was an occasional batch run to generate satellite predictions. If you wanted to adjust how the images looked, you had to provide hardware to do it. Nearly all the actual image chain was analogue, although digital electronics were creeping in: for instance, in sync pulse detection and clock generation. The only image processing which used digital techniques was the lineariser, which removed the distortion caused by the curvature of the Earth, such as is now done by the '*Save with correction*' function of David Taylor's HRPT Reader. This employed a 1024-byte shift register (a lot of storage in those days) read-out at a variable clock rate held in a PROM (forgive me for going on about this bit but my project was in this area).

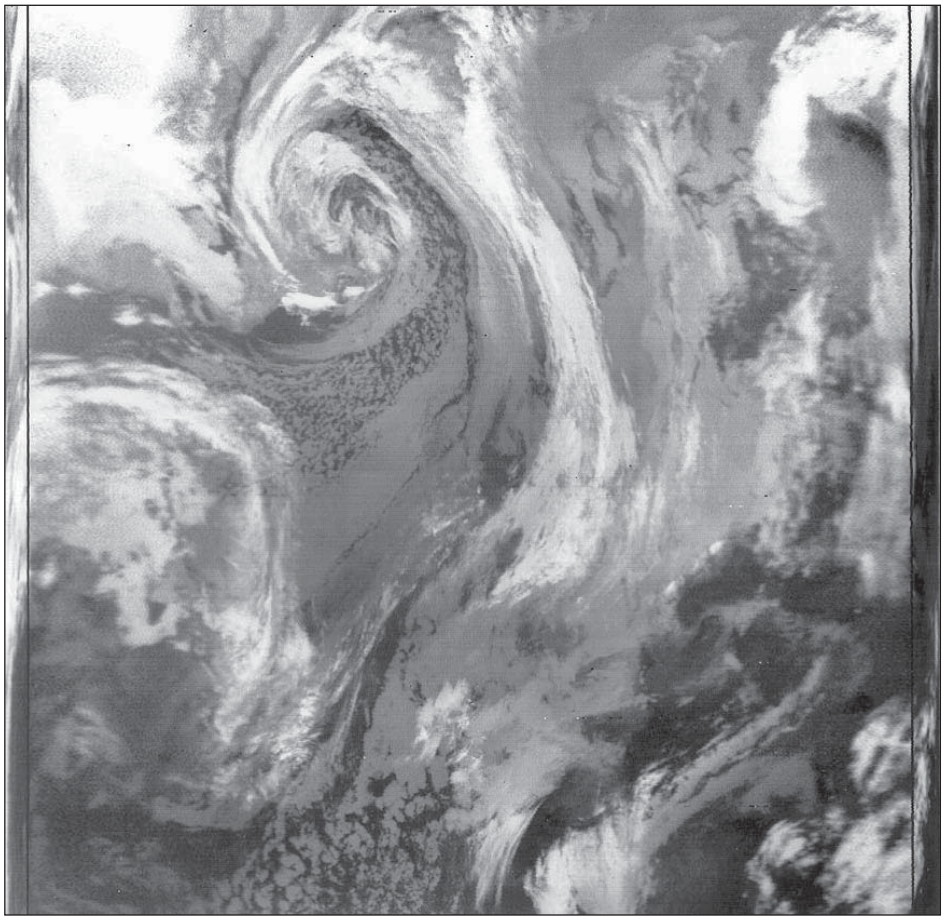


Figure 2 - An infrared NOAA-3 APT image from a pass at 10:45 UT on October 24, 1974

Figure 2 shows an APT infrared image from NOAA-3 dating from 1974. A depression as usual, but at least it shows that my project worked, as the scan is linearised between the black lines.

No commercial equipment was available. The station may have been professional, but virtually everything was hand-made in the lab, providing a good source of student projects. The only storage possible was to record the analogue baseband signal. A good-quality domestic tape recorder sufficed for APT; however, HRPT required a high-speed instrumentation recorder scrounged from somewhere.

The only means of output, since no TV-scan displays existed, was an ex-newspaper wire-photo machine about the size of a small upright piano. This started life with, I think, the Daily Record newspaper in Glasgow. Because of its origins, it had very high resolution, and produced excellent results. However, to use it required a light-tight cassette to be loaded with photographic paper in the darkroom, followed by a return trip to develop it before you could see the results of a pass. There was no looking at the image as it was coming in and tweaking it. Because of this, we depended a good deal on tape playback to get things set up properly.

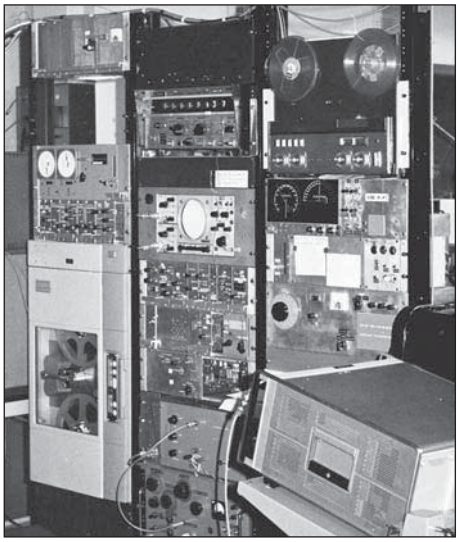


Figure 3 - The main station hardware

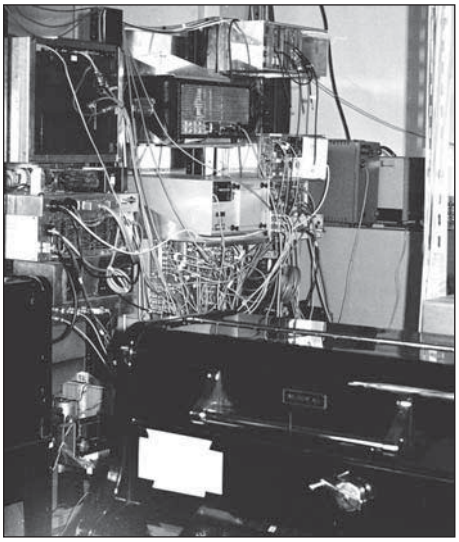


Figure 4 - The wire-photo machine

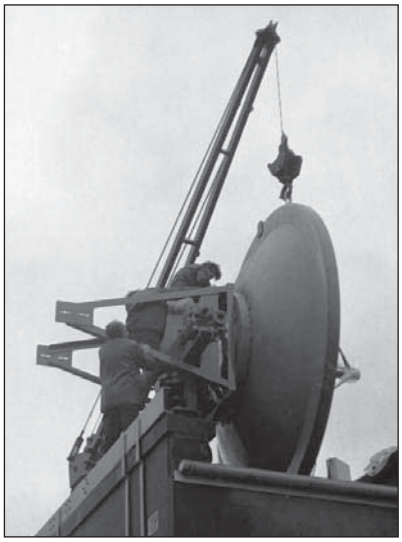


Figure 6 - Lifting HRPT antenna dish

Figure 3 shows the main station equipment: the APT receiver, antenna controls, and recorder are in the right hand rack with the processing electronics in the centre rack. The left hand rack contains the HRPT equipment. Figure 4 features the wire-photo machine (in the foreground) with a rats-nest of rear rack cabling behind.

Today, anyone can put up an 80 cm Ku-band dish for *EUMETCast* reception for a few pounds, or your local satellite TV installer will quickly do it for you. Things weren't quite so simple then. It was deemed necessary to use something like a 10 to 12 foot S-band dish for HRPT. A second hand one duly arrived from somewhere (perhaps a donation from the oil industry) and had to be mounted on the roof of the Electrical Engineering Department. Fortunately, this has a tower-like lift motor room on top, which, when reinforced, acted as a good mounting base.

It looks from Dundee's web site as though this dish is still in place, although now surrounded by many more.

January 1975 was cold and wet in Dundee. The crane arrived first to place the dish mount (figure 5) engineered by the Mechanical Engineering Department, followed by the dish itself (figure 6).

At some point it was decided that temporary counterweights were needed. Fortunately, these were readily available in the form of students, including myself, on the ends of ropes. So what if a few went over the edge—plenty more where they came from. No health and safety to worry about then (figure 7).

My main memory of that day is being frozen solid but very pleased to be involved. Even Grampian TV arrived to record the event. Finally, everything was in place. HRPT reception started very successfully and has continued ever since.

Not long after I left Dundee, I set up an APT station at home, cribbing some of the circuits. It shows the rate of change in digital electronics in the 70s and 80s that this was based on a pair of *Motorola 6800* 8-bit microprocessors and relied on software (written in assembler code) for most of the signal processing. Now, of course, we only have to plug a few bits of electronics into a PC, install a lot of software, and we have a constant flood of meteorological data. Not really as much fun as pulling ropes with frozen hands, though!

Do you have any recollections from the early days of weather satellite reception? If so, I'm sure that the editor would like to hear from you.

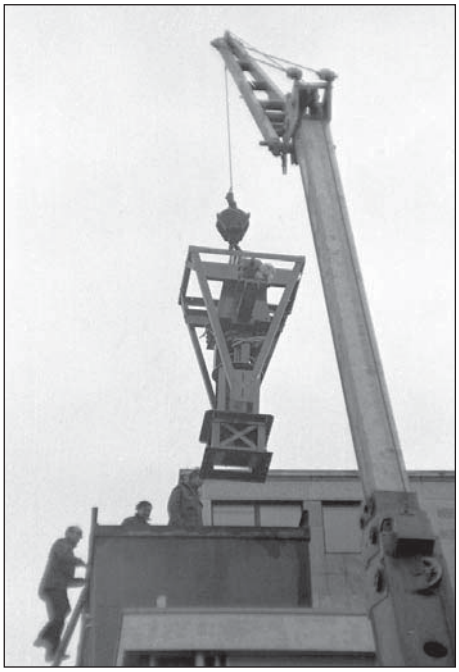


Figure 5 - Lifting the HRPT antenna base

Figure 7 - What health-&-safety officer? (River Tay in background)

Envi-Ham Project

Francis Bell

The following text briefly relates my first encounter with ESA / ESRIN's Envi-Ham project for the live reception of images from the largest earth observation satellite ever launched, Envisat. I hope this text includes enough information and guidance for others who may wish to participate in this project.

I was initially surprised and ultimately delighted to receive a telephone call in mid October 2009 from Stefano Badessi. Stefano was calling from Frascati, Italy.
I know that the European Space Agency (ESA) have a centre at Frascati which is located a few miles south east of Rome but I was not expecting a personal telephone call from them. I had not spoken to Stefano before and I knew nothing about the project he was about to explain. He first told me that he had obtained my telephone number from the GEO web site. About two minutes into our conversation I became quite excited because Stefano was explaining to me a new ESA project which would allow interested users to directly access images from the dedicated earth observation satellite Envisat.
The data / images would not originate from the weather satellites I am used to dealing with but from a dedicated earth observation satellite carrying multi-spectral imagers giving a potential ground resolution of 300m instead of the 2-3 km resolution generated by weather satellites. In other words images with about ten times more ground detail than weather satellites.At present we can only receive a small selection of Envisat data in the high 300m resolution. Of course I was interested in what Stefano was telling me and I quickly said so.

I did know something of ESA's Envisat satellite because I attended a lecture given by Mark Doherty who is based in Frascati. His lecture was part of the British Science Festival last September and the venue was University of Surrey. I didn't know at that time I may be able to receive images from the satellite Mark Doherty was describing.

Stefano quickly explained to me that a subset of the imaging satellite's data was being relayed to user stations in a similar way to the EUMETCast system.

That is, live Envisat satellite data which is received at the Frascati ground station Italy or their ground station in Kiruna Sweden is quickly processed and then a subset being disseminated via a commercial communication satellite. Strictly speaking the data is not live but may be just a few minutes old just like we are used to with EUMETCast.

Stefano told me the project Envi-Ham had been initiated to make satellite data more readily available to interested competent individuals, technical user groups and those with education interests. A decision had been made by ESA to issue 100 licences in the first instance: 42 licenses had already been issued but that still left scope for others to participate in the project. I was told that provided I complied with their user conditions and had a suitable ground station I was welcome to join the Envi-Ham project completely free of charge.

Before our conversation ended I gave Stefano my email address which he successfully tested with some brief messages even before we had finished our conversation. Having established the email, link he promised to send me background literature and technical details relating the Envi-Ham project. Within 24 hours I had this information which I printed thus creating my new Envi-Ham user file.

The papers not only contained technical details of the Envi-Ham project but also contained questionnaires relating to the ground-station I would use. Very importantly there was a document which I had to sign agreeing to the conditions attached to the project. The form was 'Specific Terms and Conditions' Ref TIA-ESRIN-0906-007.

These condition were very straightforward - use the data only for scientific, technical, self training or education use and don't sell the images for commercial gain. I printed a paper copy of this form signed it and then posted it to Stefano in Frascati.

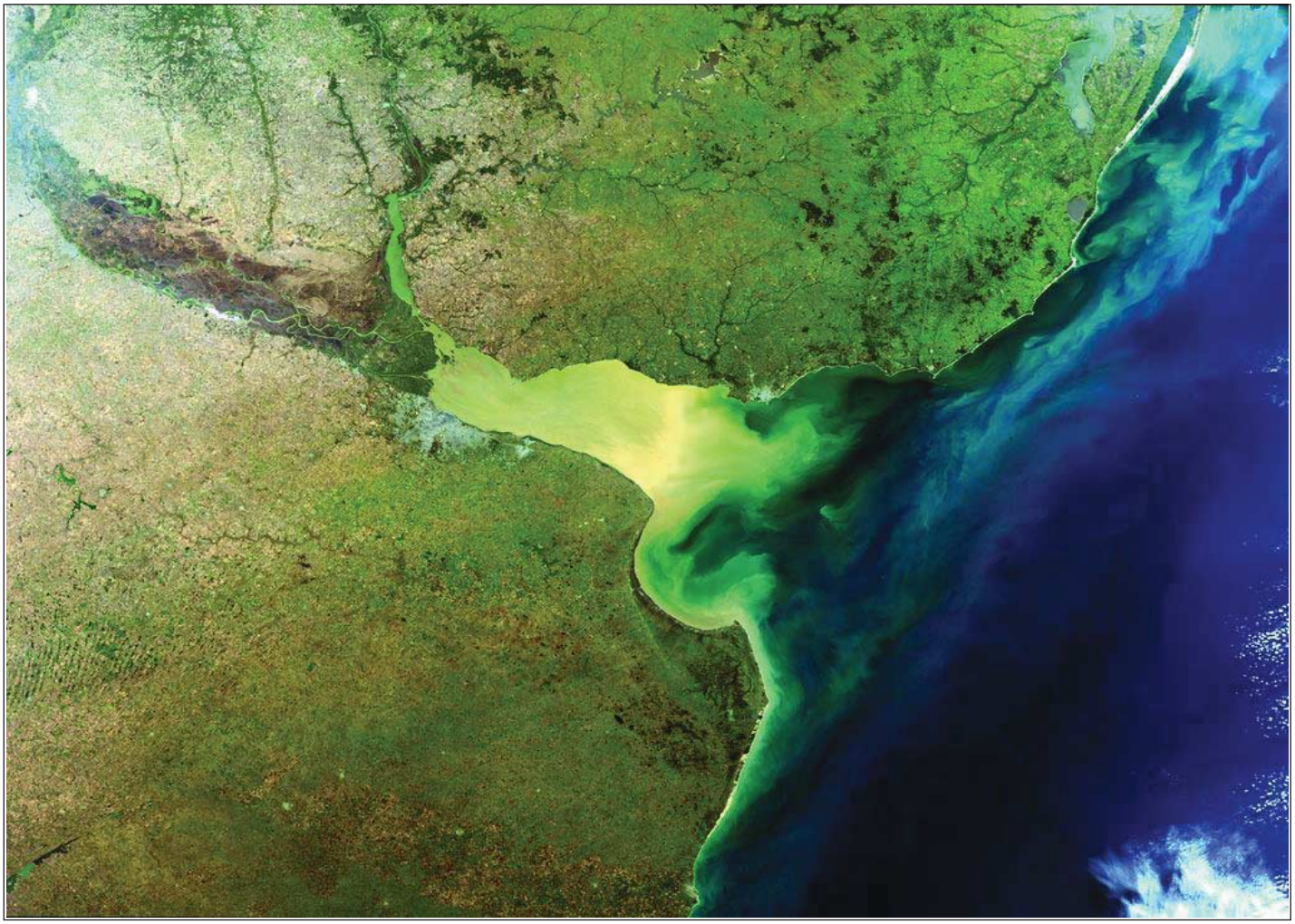
However, to expedite my participation in the new user group I also scanned this and other forms and when completed I emailed them to Frascati.

A brief note here about references to a user station Internet connection to which the technical papers referred. Within the project there is a facility to request retransmission of missed packets of data. I understand why this might be important for research establishments following critical image patterns but for myself it represented an unnecessary complication. Subsequent enquiry to Frascati revealed that the Internet link is not necessary for the passive reception which I anticipated using. Just to confirm this issue you do NOT need an Internet connection to passively receive Envi-Ham data.

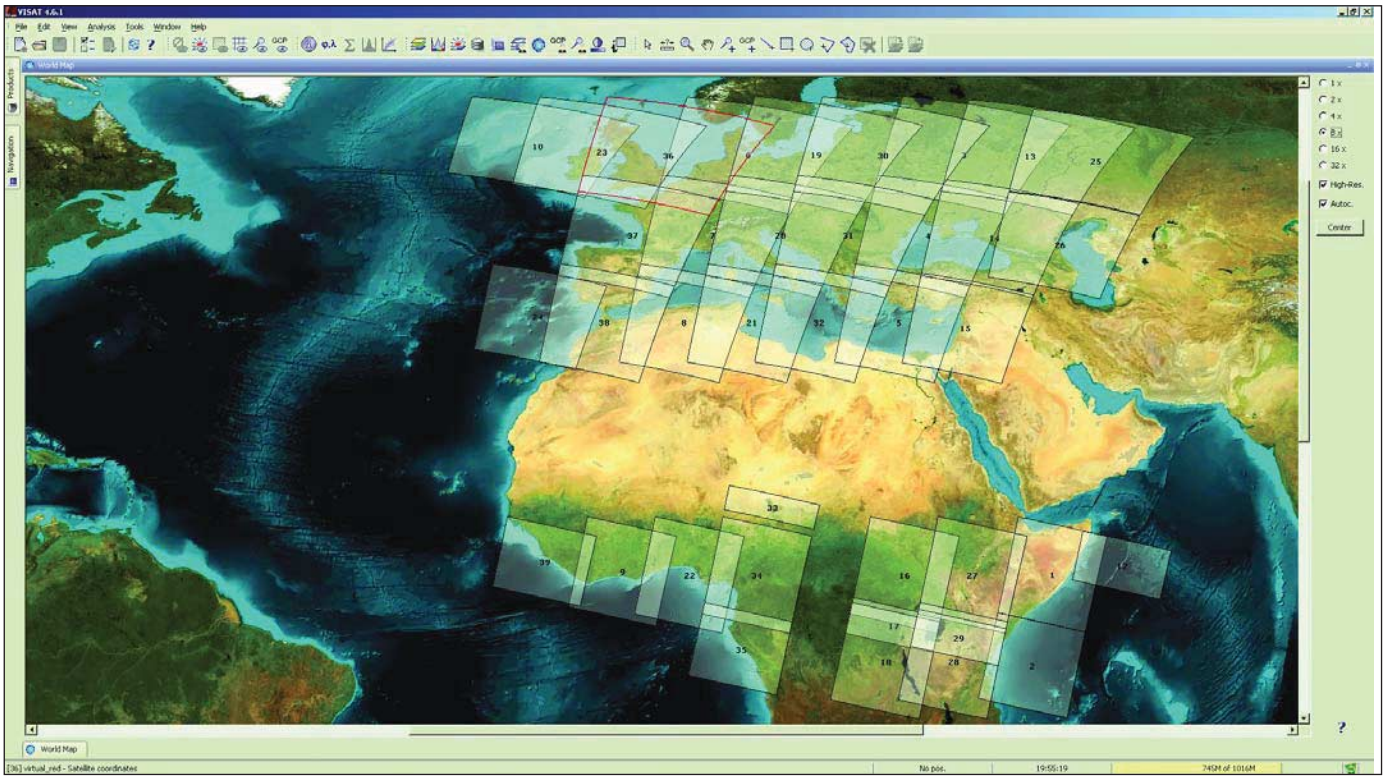
Within a few days of my conversation with Stefano I was issued license number 43 together with the necessary software to receive the Envi-Ham data. I decided to use a computer which I had previously used for EUMETCast reception and dedicate it Envi-Ham data. I had already installed and used successfully the DVB World receiver and its software on this computer. I installed the new software into a DDS folder which the software created for me. DDS is the abbreviation for ESA / ESRIN's 'Data Dissemination System' for this Envi-Ham project

As with much of this project I was on a learning curve and in this particular case it related to the MAC address which my DVB World receiver used to communicate with the computer. The MAC address is a 12 digit hex number and is displayed on the menu screen of the DVB World software. This number had been transparent to me before but apparently the first six digits relate to the external device and the second six relate to the computer address. Whatever the detail, I was asked by ESA to provided this unique address.

This was a security measure so that the licenses they issue together with their



This is an Envisat MER-FRS image of the River Plate estuary. It shows the potential for processing the raw data received in the Envi-Ham project into a high resolution colour image. This image is also part of the Quarterly Question by trying to identify the town of Rosario, Argentina. *Image courtesy ESA*



Screenshot showing with the smaller swath width of Envisat certain locations can only be captured once every 3 days.BEAM-Visat-worldmap-20091113+14+15

software can only be used on the licensee's computer.

This measure is understandable thus preventing the uncontrolled distribution of the Envi-Ham's materials. I duly sent Stefano the MAC address used by my system and promptly received an email file with my MAC key which I copied into my DDS folder. The 'DDS.key' file which ESA sent to me encoded my MAC address and it was necessary to locate this file in the same folder as the 'Site.key' which was part of the software package which I had already received. At this point my system was ready to receive Envi-Ham data via the communications satellite they were using

The details of the satellite used by the Envi-Ham project are give in their literature.
Satellite name. Eutelsat W2A:- Note this is a new satellite for the Envi-Ham project not W1B
Position 10 degrees East
Transponder F3
Frequency 12.621 GHz
Polarisation Horizontal
Symbol rate 5732 k Sym/s
FEC 5/6
PID 230 and 231 decimal

These details need to be entered into the DVB World software. It should be noted that the pattern of data entry is identical to EUMETCast reception from Eurobird 9 at 9 deg E only the value of the specific parameters are different.

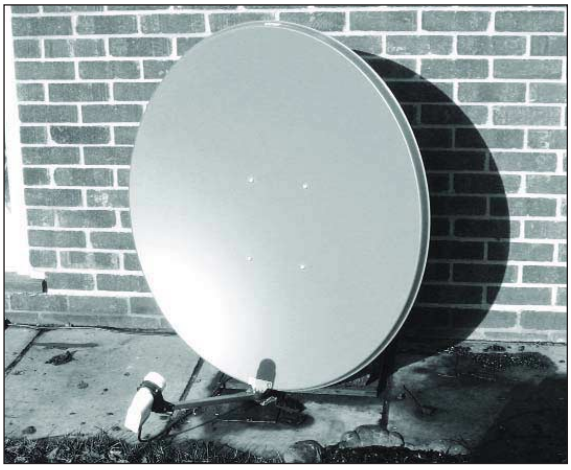
The computer

The Envi-Ham project do give guidance for minimum specification for a computer. I think the specification is quite modest. They suggest:-
Pentium IV 1.8 GHz or better
RAM 512
Lots of memory and disc space
Operating system - Windows 2000 Professional Server, XP Home Professional or Vista.
I expect Windows 7 will be compatible.

The Dish!

There are statements in the Envi-Ham literature that a 1m or 1.2m diameter dish will be needed for satisfactory signal reception and they also recommend a short cable run from the dish to the computer. I have noted in the past that EUMETSAT recommend a dish size of 80 / 85 cm for EUMETCast reception from Eurobird 9 but I have consistently managed perfect reception on much smaller dishes.

Arrogantly or optimistically I thought I would manage Envi-Ham reception using a dish smaller than recommended but this turned out not to be the case. The map showing the footprint of Eutelsat W2A indicates my location, 30 miles south west of London, is within the main footprint of the satellite with a signal strength of 48 dBW, I noted the signal strength is less for northern England and Scotland. I started to experiment with an 80 cm dish but the results were at best marginal or negative. My response was to buy 1m dish from a local supplier and was given / lent a 0.2 db LNB. I have the advantage of having access to my experimental dish close to my house front door on a small paved area at ground level also benefiting with a clear view of the southern sky. Only 10 m of coax was need to connect the LNB to my DVB World receiver. With much experimentation and help from friends with sophisticated signal meters a satisfactory signal was



Envi-Ham 1M dish with 0.2 LNB for Eutelsat W2A 10 degs East

established and my system is now receiving Envi-Ham data most of the time. The location of Eutelsat W2A carrying the Envi-Han signal is only one degree displaced from Eurobird 9 at 9 deg. E carrying the EUMETCast signals. This is both an advantage and a nuisance. The strong signal for Eurobird 9 can be used to initially align the dish to just one degree from Eutelsat W2A but also there may be some overlap of signals, which without a sensitive meter may make it difficult to identify the weaker Eutelsat W2A signal.
However, trial and error and much meter reading established Envi-Ham reception.

Computer software

Unlike the EUMETCast data packets I am used to receiving and see instantly displayed on the screen the Envi-Ham files are not instantly displayed on the computer monitor. They are stored as data files for later display and processing. Somebody clever at writing software may be able to generate instant image displays but for the time being I am using the very sophisticated display software supplied to me by ESA.

The display software is called Beam/VISat which is a 'Toolbox for Analysis and Processing Earth Observation Data' .The Beam display software has many facilities and I am on a sharp curve learning using its many sophisticated menus. For the most part I am just content to display certain segments of the transmitted images which I can recognise from coastal outlines or other visible geographical features. Of course I can resort to reading the latitude and longitude data but that seems like cheating or the last resort. The detail of some of the images I have received is stunning and I'm still learning.

If you want to participate in the Envi-Ham project please read the following carefully.

Please do not make a trivial request to be included in the project. Before you apply make sure you have a ground

Envi-Ham receiver available from the GEO shop

station which will be capable of receiving Envi-Ham signals from satellite Eutelsat W2A at 10 deg. E.
You will need a 1m dish or larger and a clear view of the southern sky. You should be able to demonstrate a commitment to the project, that is, don't clutter up ESA's administration with casual license requests.

You will need a suitable receiver either as a PCI card or a separate boxed receiver. I use a DVB World receiver. This receiver is available from our GEO shop at £55.00. Other receivers such as a TechniSat SkyStar 2 PCI card should be equally suitable. I expect there are others.

The computer needs to be reasonably up-to-date but need not be the latest highest spec computer. Say 2.0 GHz processor and enough memory to store and process the images.

If you decide you want to participate in the Envi-Ham project contact Stefano Badessi at ESA. Email Stefano at *Stefano.Badessi@esa.int* or the 'Envi-Ham Project *Coordinator' at tta@esa.int*

Postal address for your project conditions form is:-

Stefano Badessi
Application Engineer ERSIN Office and Labs
European Space Agency ESRIN
Via Galileo Galilei s.n.c.
1-00044 Frascati (RM)
Italy

Try to establish as much background to the Envi-Ham project by visiting their web site *www.dwlinkdvb.esrin.esa.it/DDS/* and *www.envisat.esa.int*

Please can I repeat; research as much information as possible about ESA, Frascati, Envisat and their DDS BEFORE making a license application.

I did say in conversation to Stefano Badessi that GEO would not overwhelm ESA with license applications so only apply if you feel committed to receiving the Envi-Ham data. However, I think there may be a trade off here where both the Envi-Ham licensees and ESA are both winners. I think ESA would like their data and the earth image products generated by the project to be more widely distributed and in the very best tradition of GEO and amateur involvement in cutting edge technology, ESA may welcome participation by a broadly based skilful, imaginative none commercial individuals or groups.

My thanks to the following people who helped me establish a working Envi-Ham ground station:-

Stefano Badessi, ESA-ESRIN Frascati - he was a great help in establishing my license and forwarding necessary software.
Arne Van Belle, The Netherlands for his advice.
David Simmons and John Tellick, Surrey, for the use of their signal meters, David Taylor, Scotland, for configuring my computer both manually and remotely from Edinburgh.

I will try to report in the next Quarterly the progress I have made with this exciting Envi-Ham project.

Francis Bell - Envi-Ham Licensee No. 43

I have extracted some notes from an ERSIN Overview, the Envi-Ham Project Abstract and the answers to the questions I asked Stefano Badessi in an email soon after I became involved in the Envi-Ham project. The notes should put into context the exciting Envi-Ham project run by ESA / ESRIN from Frascati.

ERSIN Overview

ERSIN is the European Space Agency establishment located in Frascati near Rome. The centre was created in 1966. One of its chief tasks is the utilisation of the data obtained through the earth observation missions performed by ESA's own satellites and those of other countries through the Earthnet programme. To carry out this task ERSIN operates ground infrastructures consisting of some 30 data reception stations scattered around the world. Received data is filed before it is processed and distributed to final users on a commercial or scientific basis. In the framework of the European earth observation programme, ERSIN is also responsible for the development and operations relating to the Envisat satellite's Payload Data System. This mission with its complex payload of advanced instruments transmits earthwards an enormous quantity of data which must be processed for various fields of application. Envisat was launched in 2002 and is the largest Earth Observation satellite ever built. It was designed to explore land surfaces, the earth's atmosphere, oceans and ice caps.

The Envi-Ham Project Abstract

Some categories of non-professional users such as Education, Radio Listening and Earth Observation Enthusiasts have shown interest in receiving in near real-time Envisat data via the Data Dissemination System (DDS).
The major objective of the Envi-Ham project shall be widen the knowledge of ESA's Earth Observation missions among non-professionals and retrieve possible observations done by users and to coordinate in a single non-commercial project a whole group of users.

The Envi-Ham project principal investigator is within ESA while others shall appear as co-investigators but will share the same obligations about the use of the data.

Envisat distributed data are from instruments which may easily generate a viewable image, with freeware software. At the moment ESA is disseminating the global Envisat data from the multi-spectral instruments Medium Resolution Imaging Spectrometer (MERIS RR, AATSR) and the MERIS full resolution (300m) sensed over the European Continent.
As a condition to participate every co-investigator must declare a competence to autonomously carry out the activity. The cost of the receiving ground station will be borne by the co-investigator.
ESA's undertaking is to provide the project with a limited number of free licenses for DDS reception, necessary software and an associated decryption key.

Stefano Badessi replies to the questions I asked in the early stage of my involvement with the Envi-Ham project. From my perspective the question were quite innocent I just wanted to learn about the project.

The background and the future of the Envi-Ham project.

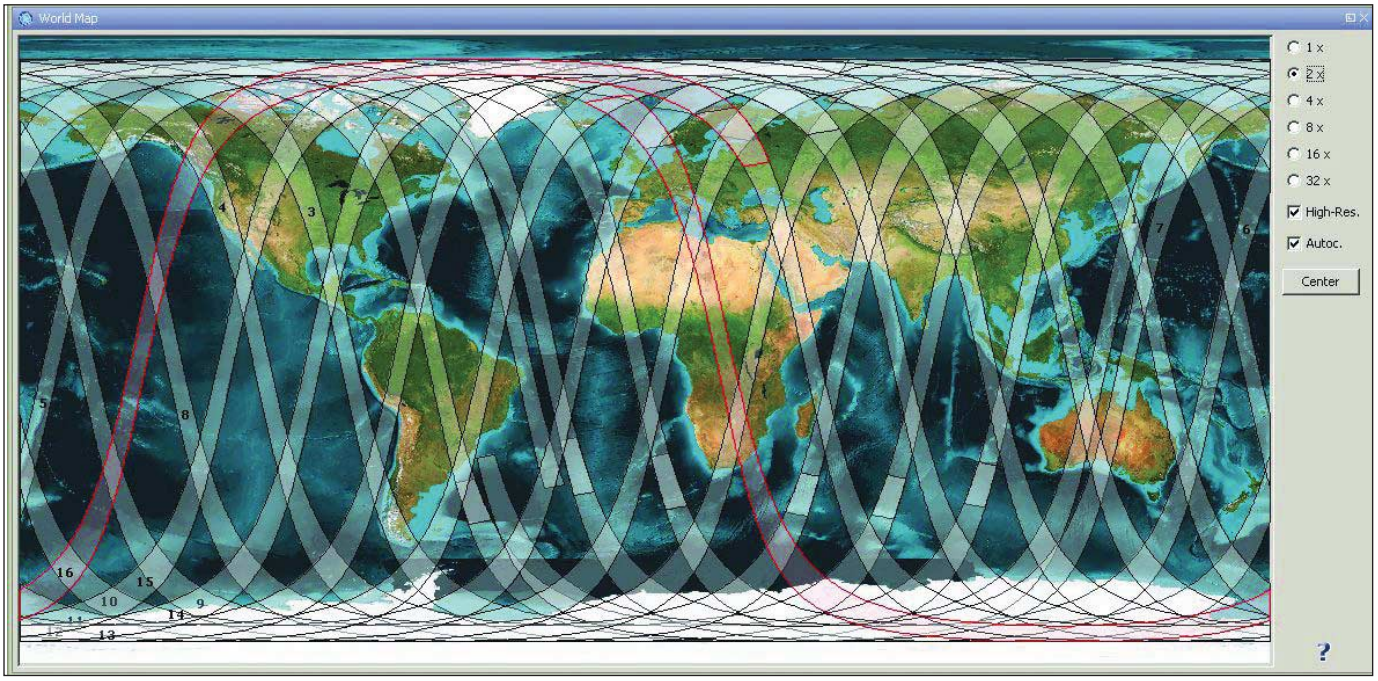
The following is the text of a email I received from **Stefano Badessi - Chief Investigator of the Envi-Ham project**. He has very kindly responded to all the questions I asked him.

Dear Francis,

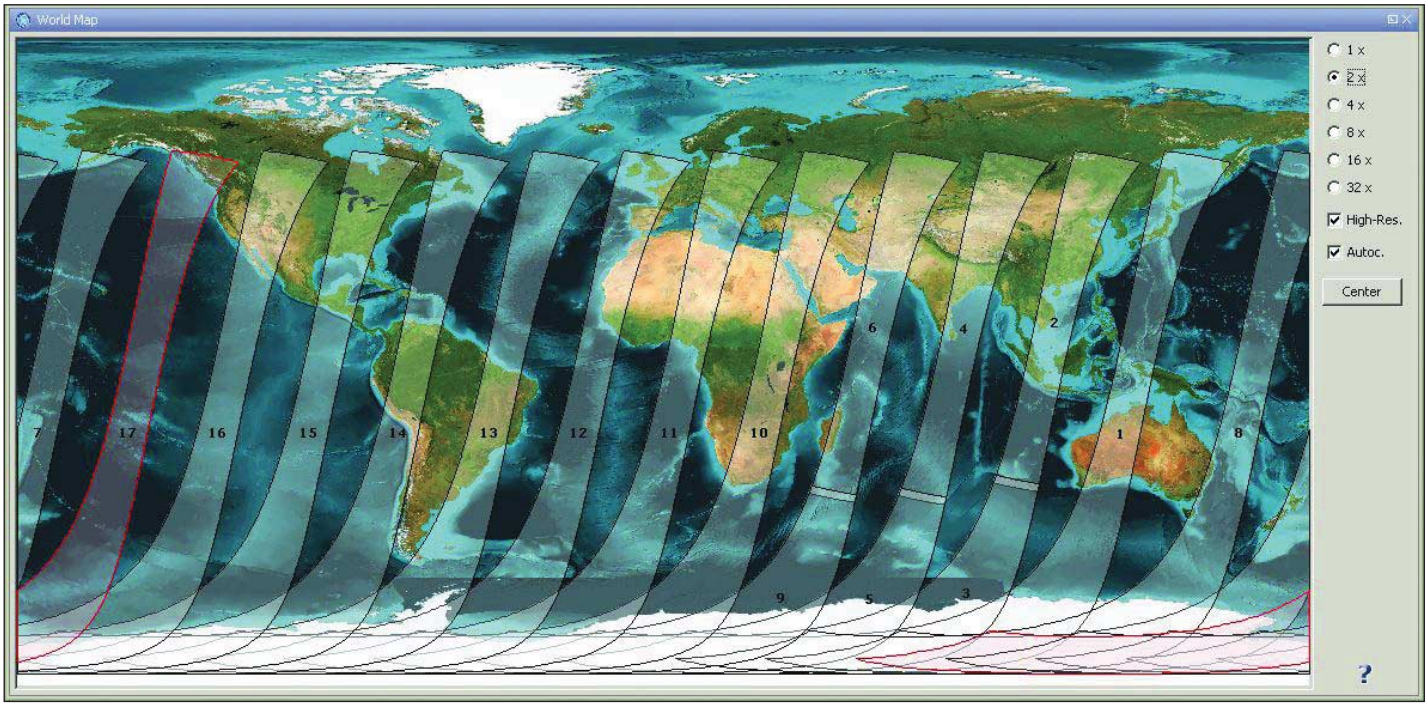
For a general introduction on Envi-Ham I suggest you look at what we have published on our website:

http://dwlinkdvb.esrin.esa.it/DDS/docs/Public_Docs/EnviHam_abstract.pdf

Envi-Ham project screenshots



The ATS_TOA data has world coverage day and night but has a very small swath width



This MER_RR data screenshot shows (reduced resolution) has wider swath compared to ATS

Below are answers to the particular questions you asked.

Who has used the data in the past?

The data distributed via the Envisat's Data Dissemination System (DDS) are the ones originating from the Envisat instruments. The system was implemented to respond a mission requirement relating to the fast data dissemination and has been active since the very first data was generated. I still remember with emotion in 2002 the night we received at ESRIN Frascati the first SAR data acquired at Kiruna.

Initially data was only circulated among the institutions involved in instrument Commissioning and Calibration-Validation (Cal-Val) activities.
http://www.esa.int/esaCP/ESA14LF18ZC_Italy_0.html After that initial phase, we have opened DDS dissemination via an alternative electronic
dissemination means for users, sending those systematic data which would be required by a sufficient number of users thus justifying the use of a satellite channel.

Why was the project Envi-Ham started?

The project started when I had the opportunity to talk with an Italian enthusiast Alessandro IK5EHI during an AMSAT-I meeting which was held at ESRIN in 2008. Up to that moment we had only sporadic cases of non-professionals receiving DDS data. Given the enthusiasm shown by Alessandro and the support received by Francesco
Fontana, we have elaborated a sustainable approach to support a new category of non-professional users, which has led to the Envi-Ham project.

What are the objectives of the project?

The major objective of the Envi-Ham project shall be to widen the knowledge of ESA's 7Earth Observation missions among non-professionals, to retrieve possible observations achieved by those users and to coordinate in a single non-commercial project a whole groups of users which otherwise would be applicant for individuals ESA-approved scientific (CAT-1) projects.

Dissemination via Eutelsat W2A

We started the dissemination on Eutelsat W1 located at 10 E which has been now replaced by Eutelsat W2A in the same location. The selection of the satellite was based on a compromise between satellite coverage extension and satellite power in order to use commercially available technology for the anticipated receiving ground stations.

What feedback would you like to receive?

The EnviHam project is one of the registered the CAT-1 project (Nr. 6837) as it can be seen from the ESA Principal Investigators web site http://eopi.esa.int/ and all projects are due to prepare periodical reports on the activity. I am acting myself as Principal Investigator, and all the other registered users are qualified as Co-Principal Investigators. At the time of writing this note, users are about to receive a request to provide feedbacks for the 2009 activities. Basically they will be asked to put together some global indicators about their activity indicated by the number of images received, the number of receptions which failed and the number of images successfully processed. Also we will be asking for the best images that users have elaborated so far. However, from the service point of view

I am constantly looking forward to receiving information about the quality of the service. I have to acknowledge the fact that we have been triggered by the early Envi-Ham users to investigate one subtle interference which was causing small periodic signal degradations of about 1 dB.

This was eventually identified and resolved by Eutelsat. I consider the Envi-Ham users as a kind of litmus test of the DDS echo environment.

Judging the success of the Project

Today, 2nd December 2009, we have 48 registered users which are mostly located in Italy, which is justified by the incidental entry points in the user community. I tend not to rate this figure in term of success, but I am rather looking at the quality and satisfaction of the user community compared with the sustainability of the project. I have to say that in fact the project, although useful in the development of the DDS system and supported by ESA, is carried out by me in the role of Principal Investigator on a completely voluntary basis. Consequently I have mixed feelings when I look at the target of the 100 users, I would extremely glad as it means that the project is well built and of interest, but I would be a bit concerned about the extra resources that we would need to invest in the project. However, I do not expect problems in extending the number of free licences beyond the current 100 limit.

How long will Envi-Ham project run?

I expect it will last as long as the DDS. DDS is today linked to Envisat instrument data distribution and the Envisat mission has been extended till 2013, but we are already planning the DDS extension for the future Sentinel satellites (DDS - Second Generation or DDS-SG). Also the system is inherently multi-mission capable, and I can not exclude the possibility that we may decide in the future to introduce in the stream other missions' instrument data.

(screenshots courtsey Arne van Belle continue on page 29 North Sea colour image page 32)

Envi-Ham Additional notes
Arne van Belle

I have read the draft of Francis Bell's article about Envi-Ham reception. I think this additional contribution may help beginners who wish to engage in this Envi-Ham project.

My recordings from passes over Europe show a delay between actual satellite pass and reception of Envi-Ham files to be about 1.5 to 2 hours minimum. So "may be just a few minutes old just like we are used to with EUMETCast." is a bit too optimistic. To prevent disappointments I think it should be mentioned that we only receive a small selection of Envisat data in the high 300m resolution also with the smaller swath width of Envisat a certain location can only be captured once every 3 days. This can be seen in screenshot BEAM-Visat-worldmap-20091113+14+15.jpg

I have experimented a lot with the complex BEAM-Visat software. Using a different approach I have been able to get more insight in the location of received data by using wildcards when opening data you can open all files received that day. When activating the world map function, all opened files are shown in a map and this takes away a lot of the guesswork! Using the number shown in the segment on the map I create a view from this file (see ENVI-HAM screenshots) At the time of writing, early February 2010, I have noticed considerable variations in the Envi-Ham signal strength to the point where I miss many segments of data. I believe experiments and changes are being undertaken by ESA at the data uplink stations in Frascati, Italy and Kiruna, Finland which they are using for this project.

Lightning and Surge Protection

Arne van Belle

This article is based on a Lecture that I gave at the GEO symposium at Guildford July 18 2009.

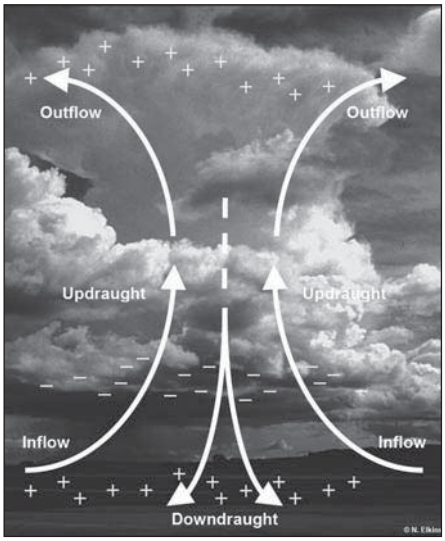
Lightning provides one of nature's most spectacular displays of energy. Though fascinating to observe, lightning can be dangerous, deadly and damage our equipment.

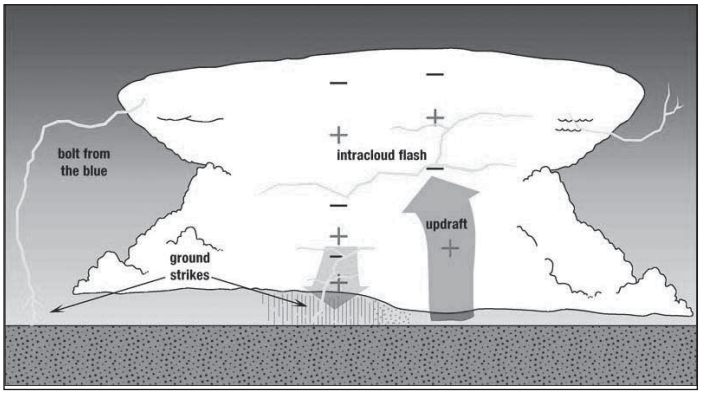
Lightning is formed in Cumulonimbus clouds. The upper portion of these clouds usually show the shape of a half anvil.

On average, an individual cumulonimbus cloud will take only one hour to take shape, grow and dissipate. The average thunderstorm is approximately 10 kilometres wide and travels at approximately 40 km/h and can be seen on satellite images. Using David Taylor's MSG Animator and Ton Lindemann's Colour table I have composed stunning animations of heavy thunderstorms over the Netherlands using Meteosat-9 HRIT data.

Not all cumulonimbus clouds bring thunderstorms; some bring heavy showers or hail.

The average thunderstorm has a very turbulent environment. Strong updrafts and downdrafts occur with regularity, even within small thunderstorms. The updrafts transport water droplets up into the cloud, while ice particles descend from the frozen upper regions of the cloud. As they do, they bump and collide with each other. Through this process, electrons shear off of the ascending water droplets and collect on the descending ice particles. This generates an electric field within the cloud, with the top having a positive charge, and the bottom having a negative charge. A thundercloud acts like a huge charged capacitor !
An electric field is also generated between the bottom of the cloud and the surface of the earth, though not nearly as strong as the field within the cloud. As a result, most lightning occurs within the cloud itself.





There are several types of lightning:

- Intra Cloud lightning (IC)
- Cloud to Cloud lightning (CC)
- Cloud to Ground lightning (CG, only accounts for 10 to 20% of all lightning)

From the CG strikes, 95% are of negative charge from the bottom of the cloud, less than 5% are positive charges from the top of the cloud, called "Bolt from the Blue".

A "Bolt from the Blue" is a cloud to ground lightning flash which typically comes out of the back side of the thunderstorm cloud, travels a relatively large distance in clear air away from the storm cloud, and then angles down and strikes the ground. These lightning flashes have been documented to travel up to 15 kilometres away from the thunderstorm cloud.
"Bolt from the Blue" lightning flashes are very dangerous, as they "appear" to come out of the clear sky and are more powerful than negative CG strikes.
This is why it is dangerous to be outside when thunderstorms are in the region, the lightning can, and does, strike many miles away from the thunderstorm cloud itself. It is a good idea to wait 30 minutes or more after the rain ends before resuming outdoor activities.

The lightning strike

In the world of electricity, opposites attract and insulators inhibit. In a developing storm cloud there is an electric attraction (i.e. electric field) between its top and bottom. As the charges separate within the cloud, the field strength grows. The greater the magnitude of separation, the stronger the field, and the stronger the attraction between the positively charged top and the negatively charged bottom. However, the atmosphere is a very good insulator, so a tremendous amount of charge has to build up before lightning can occur. When that threshold is reached, the strength of the electric field overpowers the atmosphere's insulating properties, and lightning results.

STEP 1

While lightning occurs instantaneously, it consist of several steps:

STEP 1)

A CG lightning discharge typically initiates inside the thundercloud. When enough electrons collect in the bottom of the cloud, a very faint, negatively charged channel, called the stepped leader, emerges from the base of the cloud.
Under the influences of the electric field established between the cloud and the ground, the leader propagates towards the ground in a series of luminous steps about 50 meters in length and 1 microsecond (0.000001 seconds) in duration, in what can be loosely described as an "avalanche of electrons".

Between steps there is a pause of about 50 microseconds, during which time the stepped leader "looks" around for an object to strike. If none is "seen", it takes another step, and repeats the process until it "finds" a target. It takes the stepped leader in the order of 50 milliseconds (0.050 seconds) to reach its full length, though this number varies depending on the tortuosity of its path.

As the stepped leader's channel approaches the ground, it has a very strong electric potential of about 100 million volts with respect to the ground (though this can be as high as a billion volts)

STEP 2

STEP 2)

When the stepped leader approaches the ground, its strong, negative electric field repels all negative charge in the surrounding ground, while attracting all positive charge. This induces an upward moving positive charge from the ground and/or objects on the ground.

When this positive charge collects into a high enough concentration, they form bolts of ground-to-air lightning known as streamers. When one of these positively charged streamers contacts the tip of a negatively charged leader, (anywhere from 30 to 100 meters above the surface),

the following three steps occur:

STEP 3

The leader channel's electric potential is connected to the ground

STEP 4

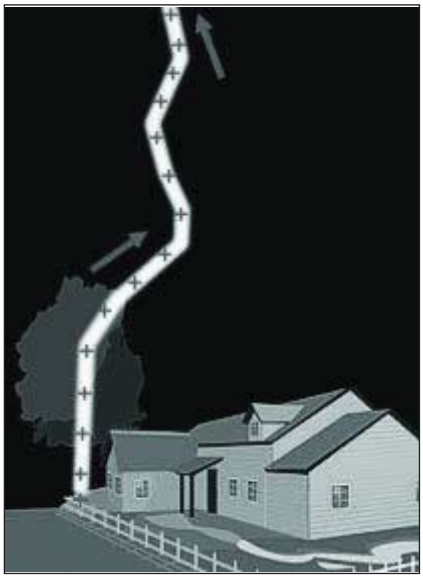
All other branches of the leader channel cease further propagation toward the ground, and all negative charge within these branches starts flowing to the ground through the newly established ground/cloud connection.

STEP 5

STEP 5)

An electric current wave then propagates up the channel as a bright pulse. This discharge process takes less than 100 microseconds and is called the return stroke. It produces almost all of the luminosity and charge transfer in most cloud-to-ground strokes.
The lightning is actually travelling from the ground into the cloud, but because the process takes place so quickly, to the unaided eye it appears that the opposite is true.

Electric charge flows up the channel behind the wave front and produces a ground level current. This current has a peak value of about 30,000 amperes, though it can be as high as 300,000 amperes. It takes about 1 microsecond for the current to reach its peak value, and about 50 microseconds to decay to half that value.



STEP 6

STEP 6)

After the current has ceased flowing up the leader channel, there is a pause of about 20 to 50 milliseconds. After that, if additional charge is still available in the cloud, another leader can propagate down the established channel.

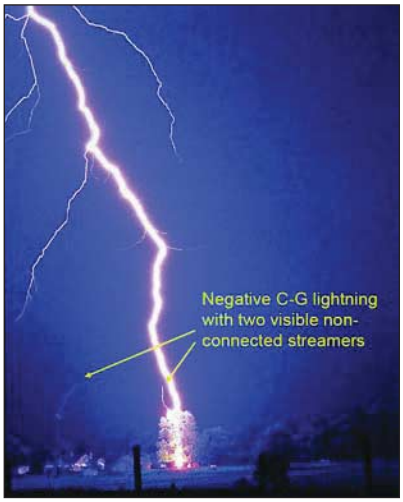
This leader is called a dart leader because it is continuous instead of stepped. Dart leaders are what give lightning its flickering appearance. Not every lightning flash will produce a dart leader, as sufficient charge to produce one must be made available within about 100 milliseconds of the initial stepped leader.

The negatively charged dart leader will induce a new, positively charged return stroke from the ground. The peak amplitude of the current usually decreases as additional dart leaders are produced. As a consequence, the induced field changes are also smaller in amplitude and have a shorter duration than those of the first return stroke. The combination of each leader (stepped and dart) and the subsequent return stroke is known collectively as a stroke. All strokes that use the same cloud-to-ground channel constitute a single cloud-to-ground flash.

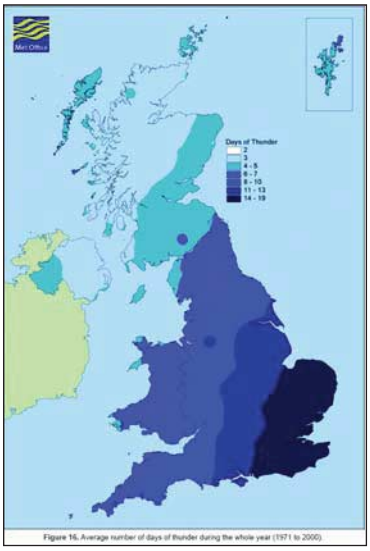
A flash can be made up of a single stroke, or as many as tens of strokes. (The highest number of strokes in a single cloud-to- ground flash ever recorded is 47.)

All these steps take place within half a second !

Communication towers are hit frequently:



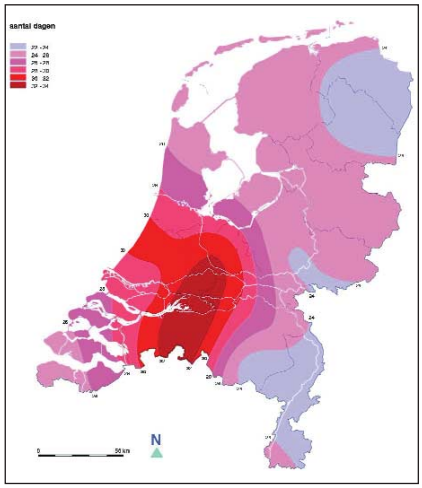
All steps caught in one photo, a "lucky shot" !



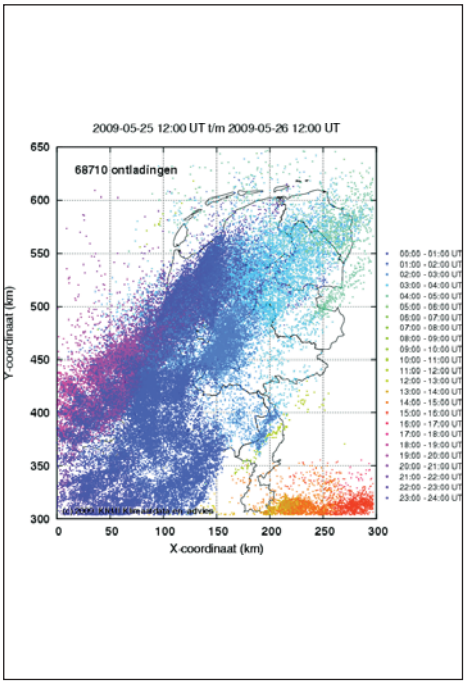
In the United Kingdom the average annual thunder frequency is less than 5 days in western coastal districts and over most of central and northern Scotland, and 15 to 20 days over the east Midlands and parts of southeast England. There is relatively little seasonal variation on the western seaboard but elsewhere summer is the most thundery season.

Last June a lightning strike killed 16 cows in a field in East Lothian.
That same week a man in Lincolnshire was struck by lightning as he was moving some sausages on a barbecue. He suffered burns to his arm but escaped with his life after the freak accident.

According to the Met Office : The chances of being struck by lightning are about one in three million, higher than your chances of winning the jackpot in the Lotto, which is one in 14 million!



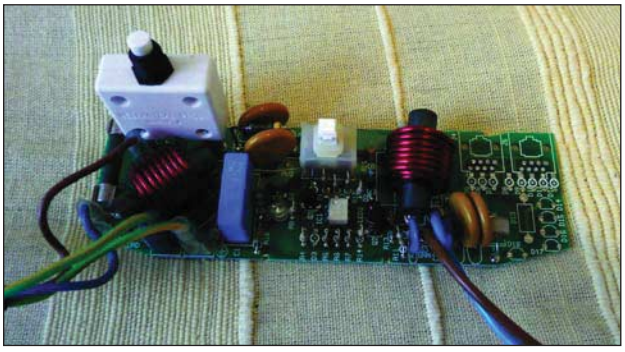
In the Netherlands we have 22 to 34 days of thunder per year.
But May 25th they counted over 68.000 lightning strikes in 24 hours which is registered as only 2 thunder days !



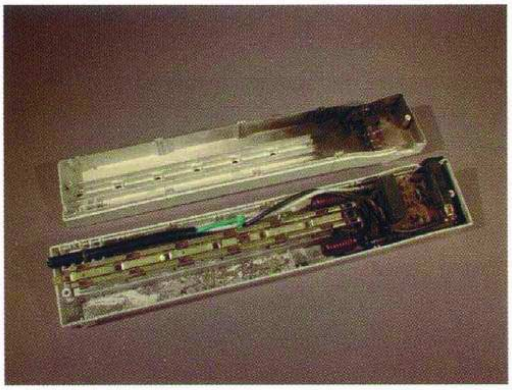
Although statistical data does not show an increase of the number of thunder days per year, NASA scientists have developed a new climate model that indicates that thunderstorms may become more common and more severe as Earth's climate warms.

Instead of counting the number of thunder days per year, measuring the number of lightning discharges over a year will prove that thunderstorms are getting more common and severe.

By the way, it is a long-standing myth that if something is hit by lightning, it will be spared a second hit. The Empire State Building in New York has been struck by lightning as much as 48 times in one day and 15 times within 15 minutes, but they have lightning conductors to carry the electricity harmlessly to the ground.



The internals of an APC SPD



This is the interior of the surge suppressor pictured on the front page. Closer inspection reveals that there has been significant damage and a near fire.

Indirect lightning:

Electromagnetic fields generated by the lightning flash can cause indirect lightning damage. Indirect lightning does not carry the severe punch that direct lightning strikes do. But the induced voltage and current can travel kilometers and can enter buildings through telephone wires, mains wires, metal pipes that are often buried. It is a myth that only overhead lines can carry lightning surges into your home ! A nearby lightning strike can cause a ground potential rise (GPR) that can cause damage to all grounded equipment in your home.

Even indirect lightning surges can cause serious damage to computers and other home electronics. People have been injured by indirect lightning while using "wired" equipment ! Surges caused by indirect lightning can travel for tens of kilometers along lines and can enter your home unnoticed. These surges can shorten the lifespan of "wired" electrical equipment. Nowadays most equipment does not have an isolating Off switch anymore. Instead it is always connected to the mains and running in stand-by mode !
Without visible arc damage (as is seen after a direct lightning strike), insurance companies are generally not convinced that failure of your equipment was caused by lightning !

How to protect against lightning damage:

Disconnecting all cables connected to your equipment gives best protection but this is not practical.
Although nothing can be completely protected from the damage caused by a direct lightning strike, we can take steps to prevent damage from the more occurring indirect lightning surges.

To minimize chances of a direct lightning strike, do not mount your antennas or dish higher than required. But even if you mount them well below the surrounding buildings, there is no guaranty it will never be hit ! Only an external Lightning protection system can lead a lightning bolt safely to ground without it causing damage to your home.

External Lightning protection systems consists of lightning collectors (lightning rods), multiple down conductors and a grounding system consisting of multiple earth electrodes . These systems are expensive and must be professionally installed an maintained, they will not prevent your building from being struck. They actually increase it by making your house taller. The purpose of the lightning rod is to direct the current from the lightning to the ground along a preferred path instead of into the house. However, this works only if the rod is connected to the ground with heavy gauge wire.
Only in high risk scenarios you see these systems applied like high towers or buildings, public buildings, data centers or other sensitive equipment labs or factories handling volatile products.

But additional measures are still required to prevent induction in power lines inside the building.

Surge Protection Devices:

Regular fuses, circuit breakers and residual current circuit breakers are much too slow to detect surges. Surge Protection Devices act very fast and prevent surges from entering your valuable equipment.
In addition to the lightning threat, SPDs also protect against surges created locally by switching large inductive loads or gas igniters.

An SPD from APC protecting Mains and phone line, fault and earth indicator lights

A simple mains-only SPD with fault indicator

SPDs are best used as close to your equipment as possible. They are available for power, telephone, network and coaxial lines.

But be careful ! Older or badly designed Surge protectors can be a fire hazard. Surge suppressors manufactured in the US before January 1998 and cheap Chinese ones often lack a thermal fuse. Without this fuse an SPD can start a fire when hit by too many surges.

SPDs consist of multiple Metal Oxide Varistors blue or yellow disc shaped devices (in the APC they happen to be yellow), sometimes combined with Spark Gap Arrestors (gas filled white ceramic tubes).

MOVs have a precise trigger voltage and can handle surges up to 8000 amperes each.
Spark Gap Arrestors contain a gas filled spark gap that arcs at a less precise set high voltage.

But MOVs wear out if they frequently have to act or when the current is above rated or stays on too long. A worn out MOV will heat up, even if there is no surge anymore, and finally burn or explode.

That is why an additional 1 Euro thermal fuse should be included in the design ! This fuse disconnects the MOVs and your valuable equipment from the mains if they heat up too much

The internals of an APC SPD (see colour image above) consisting of fast fuse, reset able fuse and thermal fuse (black cylindrical component with yellow bead placed in between the yellow MOVs)

Underwriters Laboratories now requires that SPDs should withstand a 2 fold over-voltage for at least 7 hours without igniting a fire. Look for UL 1449, 3rd Edition listing.

Good SPDs have a control light that signals when one of the MOVs is worn out. Some also warn when a proper ground is missing.

continued on page ii

GEO Shop

Manager: Clive Finnis
email: tech@geo-web.org.uk
FAX: +44 (0) 1202 893 323

The 'Pager-Hardened' R2ZX

APT Weather Satellite Receiver

This upgraded version of the German-built R2FX receiver has been developed specially for the UK market and is available solely from the GEO Shop. If you are in an area suffering from pager interference on the NOAA-18 frequency of 137.91 MHz, this receiver should be the answer to your problems - see the R2ZX review in GEO Quarterly No 14.

UK member's price - 210.00 UK non-member's price - £224.00

We still stock the **original R2FX** receiver which has proved itself to be a top-quality receiver throughout Europe and the world at large. Members in the UK find that the R2FX gives perfect reception of NOAAs 12-17, and in favourable locations (pager-free) of NOAA-18 also.

UK member's price - £180.00 UK non-member's price - £194.00

R2FX Accessory Pack

This contains everything required to implement a complete APT receiving system when used with either the R2FX or R2ZX receiver. It comprises:

- 137 MHz Turnstile Antenna
- UK plug-in power supply
- PC audio lead + PC Serial 'computer control' lead
- Aerial lead (20 m with fitted connector)
- CD of PC shareware starter software
- Instructions

We do not normally ship outside the UK as these items should be available elsewhere more cheaply from the manufacturers. But contact the GEO Shop if you wish a quote.

UK member's price - £59.00 UK non-member's price - £69.00

The Bias-Tee allows a mast head preamplifier to be used with the 'Antenna 2' input of an R2FX or R2ZX. Only the 'Antenna 1' input normally feeds power to a preamp. The Bias-Tee now allows you to power twin preamps and maintain the receiver's Antenna Diversity feature.

UK members price - £20.00
UK non-members price - £24.00

DVB World DVB-S USB2102

This superior 'free-to-air' **USB2** DVB satellite TV and data receiver is recommended for trouble-free *EUMETCast* reception on the Windows Vista platform. This plug-and-play unit comes with comprehensive installation instructions and a CD-ROM of driver software. It is very similar to the Dexatek unit reviewed by David Taylor in GEO Quarterly No 17

UK members price - £59.00
UK non-members price - £69.00

John Silver's APT preamplifier was featured as a constructors' kit in GEO Quarterly No 12 (December 2006). Now we are able to offer this high-linearity LNA to GEO readers, ready built.

UK members price - £35.00
UK non-members price - £40.00

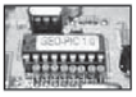
Universal Ku-band Satellite TV LNB 0.20 dB

(or equivalent)

This is a quality high specification Universal LNB for use with the SkyStar 2 PCI card, *Dexatek* and *DVBWorld* USB receivers and digital satellite TV receivers.

UK members price - £11.00
UK non-members price - £17.50

GEO PIC 1.0 for the RX2



Programmed with the new channel frequencies required for NOAA-18.

UK - £7.00
UK non-members price - £7.00

Current Price List

	Members Prices UK	EU	RoW	Non Members UK	EU	RoW
APT Equipment						
R2ZX APT Receiver (no PSU)	210.00	214.00	222.00	224.00	228.00	236.00
R2FX APT Receiver (no PSU)	180.00	184.00	192.00	194.00	198.00	206.00
R2FX Accessory Pack	59.00	-	-	69.00	-	-
BNC Lead (0.25 metre)	4.50	5.25	5.75	6.50	7.25	7.75
UK Power Supply Unit (12 volt)	8.50	-	-	11.00	-	-
Dartcom High Quality QFH Antenna	269.00	POA	-	289.00	POA	-
Turnstile APT antenna	43.50	-	-	48.50	-	-
John Silver Preamplifier (built)	35.00	36.00	37.50	40.00	41.00	42.50
Bias Tee	20.00	20.50	21.00	24.00	24.50	25.00
GEO-PIC 1.0	7.00	7.80	8.40	7.00	7.80	8.40
Martelec MSR40 EPROM	10.00	10.75	11.25	10.00	10.75	11.25
EUMETCast Equipment						
DVB-S USB2102 Receiver	59.00	62.00	-	69.00	72.00	-
TechniSat SkyStar 2 PCI Card	59.50	61.00	-	65.50	67.00	-
Telestar 80 cm dish with LNB	67.00	-	-	74.00	-	-
Telestar Ku band universal LNB	11.00	12.50	-	17.50	19.00	-
Technisat Satfinder Alignment Meter	23.50	26.50	-	26.50	29.50	-
Miscellaneous						
GEO Quarterly Back Issues (subject to availability)	3.50	4.20	5.10	n/a	n/a	n/a
GEO Quarterly (PDF issues on CD) Annual compilations 2004-2009 (state years required)	8.00	8.80	9.30	n/a	n/a	n/a
GEO Membership (4 x *GEO Quarterly*)	20.00	24.00	28.00	20.00	24.00	28.00

All prices are in £ sterling and include postage and packaging

Ordering and Shipping

We will ship by post, so please allow a few days for items to arrive in Europe and perhaps a few weeks for the Rest of the World.

Orders should be sent to:

GEO Shop,
44 Disraeli Road
Christchurch BH23 3NB
Dorset, England

If you are paying by credit card, you can FAX us your order to:

+44 (0) 1202 893 323

And remember, you can now order through the GEO Website using ***PayPal***.

Not a GEO Member?

GEO can provide most of the items advertised—with the exception of GEO Quarterly back-issues and CDs—to both members and non members. However, non-members cannot benefit from the discounted prices available to members.

Why not join GEO and take advantage of the discounted prices we can offer you as a member?

Subscription Rates (12 months/4 issues of GEO Quarterly) are just £20 (UK), £24 (EU) and £28 (rest of world).

TechniSat SatFinder Antenna Alignment Meter

This sensitive meter is a great help in setting up and aligning the dish for maximum signal. The meter comes with full instructions.

UK members price - £23.50
UK non-member's price - £26.50

Telestar 80 cm dish and Universal 0.2 dB LNB

(or equivalent)

This quality solid steel offset dish, designed for digital and analogue reception, is coated with electrostatic polymer. The bracket has been heat dipped and zinc treated for maximum corrosion protection. Complete with LNB.

UK members price - £67.00
UK non-members price - £74.00

(continued from page 22)

SPDs are most effective if they have a proper ground connection. But a surge can trigger your Residual Current Circuit Breaker.
When your RCCB is triggered multiple times without lightning nearby, make sure your SPDs are still functional.Although most Uninterruptible Power Supplies already have an SPD built-in, you won't find them built-in in your expensive PC or flat screen ! So add an SPD to your valuable equipment. Multiple SPDs can be used spread over the home to protect multiple zones

There are also telecom line and coaxial line SPDs available to protect all incoming lines to create a "bubble of protection"

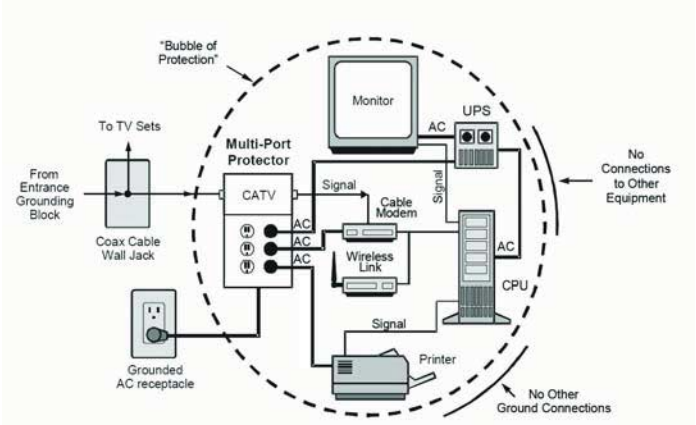
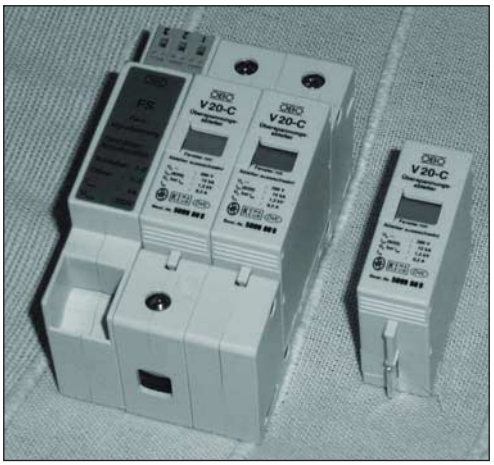


Figure 12: Connection diagram showing a multi-port (AC+CATV) protector for a computer system fed by a cable modem. A wireless link allows the cable signal and modem to be shared with other computers without interconnecting signal cables, which would need additional protectors. The UPS provides power in brownout or power failure conditions.

There are mains SPDs available that can be mounted in your switch panel as a first barrier, but this requires a qualified electrician. You can replace the MOV cartridges yourself if they wear out and the indicator shows up red.



Lightning safety guidelines:

If you are caught outside in a thunderstorm:

•Always look for an appropriate shelter, building or car, avoid taking shelter under trees, in or near water or simple sheds that have no wiring or plumbing to lead away lightning

• Stay away from fencing and overhead lines

• Do not hold antennas, umbrellas, golf clubs or wear other conducting materials like earphones/Ipods

• If you cannot find a shelter, find an open spot away and put your feet as close together as possible and crouch down with your head as low as possible without touching the ground.

• Never lie flat on the ground, when lightning strikes the earth, it induces currents in the ground that can be fatal up to 30 meters away from the strike centre.

• Flying a plane in a thunderstorm can be hazardous, especially in modern planes that have many parts build from non-conductive composites ! Metal bodied planes are safe as they form a Faraday cage but damage to instruments or control systems is likely.

If you are at home and a thunderstorm is approaching:

• Unplug appliances not necessary for obtaining weather information as soon as thunder is heard.

• Stay off the phone, about 4-5% of people struck by lightning are struck while talking on a corded telephone ! If you must call someone, use a cordless phone or cell phone.

• Stay away from the plumbing like bath tub, shower, kitchen sink, washer.

• Stay away from electrical appliances that are connected by wiring.

Protect your equipment against surges, stay inside and enjoy nature's most spectacular displays of energy !

(Links continued on page 25)

EUMETCast On-Line Registration Guide

If you require to register as a first-time user for any of the free *EUMETCast* data streams such as MSG, NOAA AVHRR, Metop etc., or need to renew an existing subscription, this **must be done on-line**.

GEO has produced a step-by-step guide to the entire process at

http://www.geo-web.org.uk/eumreg.html

This guide also contains a direct link to the official *EUMETCast* on-line **registration form**, which can otherwise prove somewhat tricky to locate.

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

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

Mike Stevens
Portland, Dorset, England.
Advice offered on EUMETCast (MSG and Metop) and APT.

- email: mikeg4cfz@mypostoffice.co.uk

Guy Martin G8NFU
Biggin Hill NW Kent, ENGLAND
Guy is prepared to advise anyone who wishing to receive MSG/Metop using Windows 2000 or XP. Can also help with networking and ADSL router setup..

- gmartin@electroweb.co.uk

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 GEO's own group, where members can exchange information and post queries relating to any aspect related to weather satellite reception (hardware, software, antennas etc), Earth observation satellites and any GEO-related matter.

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
This group provides weekly 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/

The Copy Deadline for GEO Quarterly No 26 is Saturday, May 1, 2010

The Editor is always delighted to receive articles and images for inclusion in *GEO Quarterly*. These can relate to any aspect of Earth Imaging, especially

- Technical articles concerning relevant hardware and 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, DVD). But of course we will also accept handwritten and 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: **JPG, BMP, GIF, TIFF** etc. Images in both monochrome and colour are welcomed. 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 for illustrative purposes within an article.

If your article submission contains embedded images and diagrams, please note that you must **also submit the individual, original 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,

Peter Green
'Hollowtree'
Eggesford, Devon EX18 7QX, England.
Tel: 01769 580 700

The most efficient way to do this is as **email attachments** to the following address

geoeditor@geo-web.org.uk

And finally . . .
if you do have material ready for the next issue of GEO Quarterly, please submit it **as soon as it is ready**—do not wait till the deadline above: this will simply create an editorial log-jam and delay publication.

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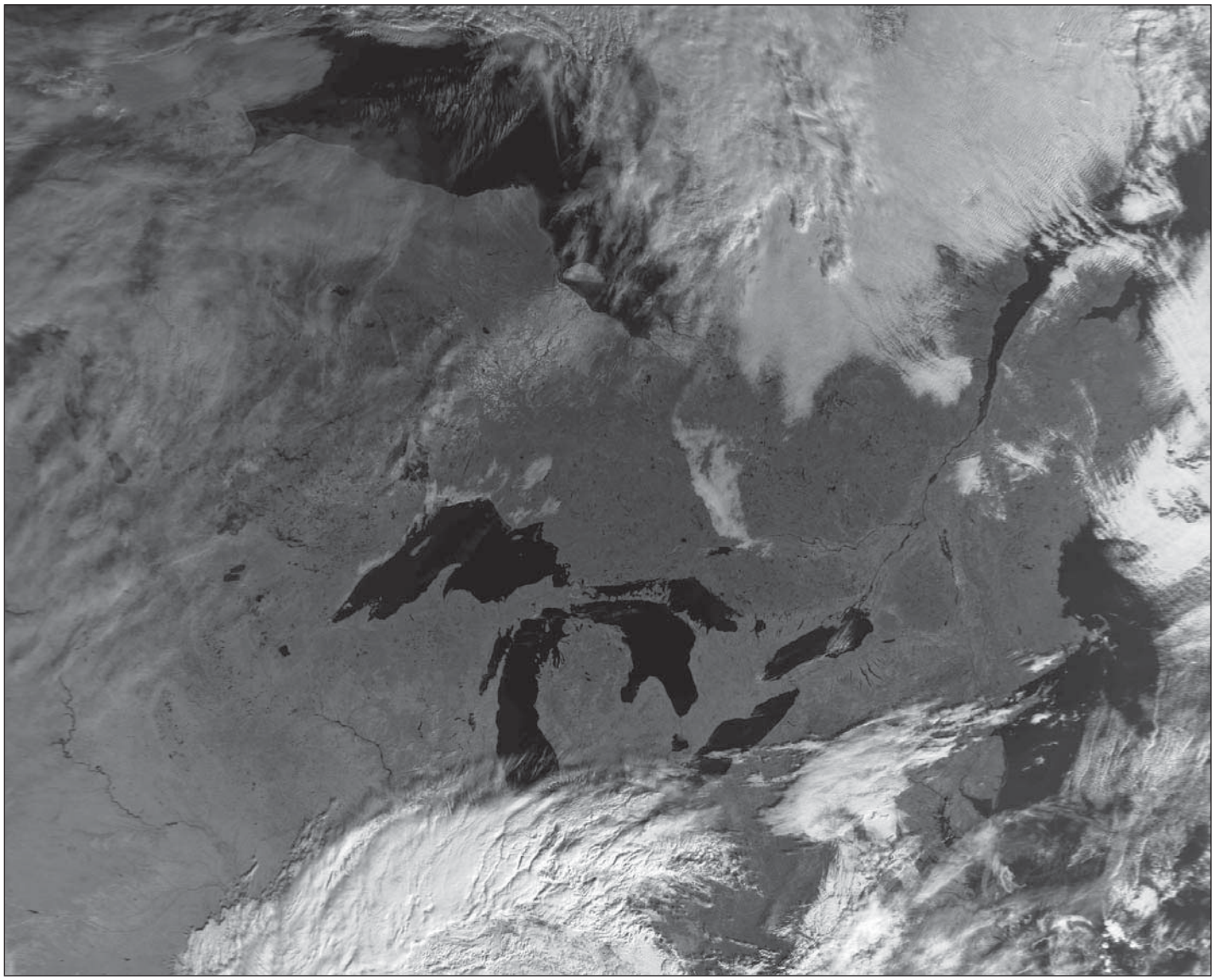
Metop Images North America's Great Lakes

Robert Moore



This image from Metop-A received on November 17 gave a very fine view of the Great Lakes. The St Lawrence River and its main tributary, the Ottawa River, also show up very clearly.

The St Lawrence is just over 3,000 kilometres long and drains an area in excess of one million square kilometres. The St Lawrence Seaway makes the Great Lakes accessible to ocean-going shipping and thus, as well as being a major Canadian highway, opens up mid-western US cities like Detroit and Chicago to the Atlantic.

Whilst the St Lawrence is a major commercial and international waterway, a number of its tributaries, notably the Ottawa River, are attractions for hardier adventure-seekers (white water rafting etc) and no doubt ordinary tourists seeking spectacular wilderness landscapes.

According to *Wikipedia* it also has thirteen hydro-electric generation plants.

The location of the Niagara Falls between lake Eyrie and Lake Ontario is plainly visible although the spray does not show up in this satellite image! The higher reaches of the Mississippi and Minnesota rivers can just be seen in the more hazy western part of the image. I am sure there is much more of interest in this image to geographers, geologists and mariners. Historians will already be aware of how important the rivers were in the early exploration of Canada. Four of Canada's major cities can be seen here; Toronto, Ottawa and Montreal are quite easily visible in the highest resolution on screen and one does not need too much imagination to pick out Quebec, although the latter is only faintly visible.

Maritime APT Reception from the South Atlantic

Francis Bell

Recent travel dispatched me to South America for almost three weeks. In anticipation of this visit I was particularly excited in expectation of visiting new places encompassing tropical South America to Cape Horn and back.

Part of my decision making about taking my APT receiving equipment with me when travelling relates to the countries to be visited. There should be a cautionary word here. Although most people would consider weather satellite reception an innocent technical hobby, some less enlightened political systems may be paranoid about satellite surveillance of their country. For example I did not take my APT system with me on a recent visit to Cuba and a GEO member in the past warned me not to take APT receiving equipment to Egypt. I also know we have a member in Sri Lanka who has had problems with local customs when importing APT receiver into their country.

I judged my planned operations on a cruise ship around part of South America sometimes in international waters would not be provocative to anybody. I always knew when the ship was in international waters because the onboard casino would be open. I have been known to gamble a little but this time I was satisfied to watch others lose their money and use the casino as a measure of the ship's position.

My Receiving Station was already well travelled. Although I had previously promised myself to smarten up my turnstile APT antenna the reality was that it was still the fold up wire and plastic piping I had taken abroad before. Its attributes are light weight and may be folded into a suitcase.

In my report about APT reception in Turkey I said that I had used my digital audio recorded to store the live APT signals but with the consequence that I could not instantly view the received image. For security and weight reasons on my Turkey visit I did not take my laptop computer with me hence having to wait until I returned home to view my recordings.

Technically this worked well but I missed the charm and excitement of having a live image immediately available on my computer screen. Hence for my travel this time I planned to take my lap top with me. Wow, how life can conspire against you! A few days before departure the battery on my laptop died leaving me with no time to replace it. Resourcefully I changed the plan: take the digital recorder and the laptop. It worked out well. I used the digital recorder on the ship's deck with the receiver and antenna, then promptly took the recording to my cabin where I had wired the laptop into the ship's 110v power supply. I said wired it into the ship's power because none of the electrical adaptors I had with me fitted the ship's power sockets so I stripped the ends of the computers power cable and inserted them, with care, into a power socket. It worked beautifully and the cabin steward made no comment.

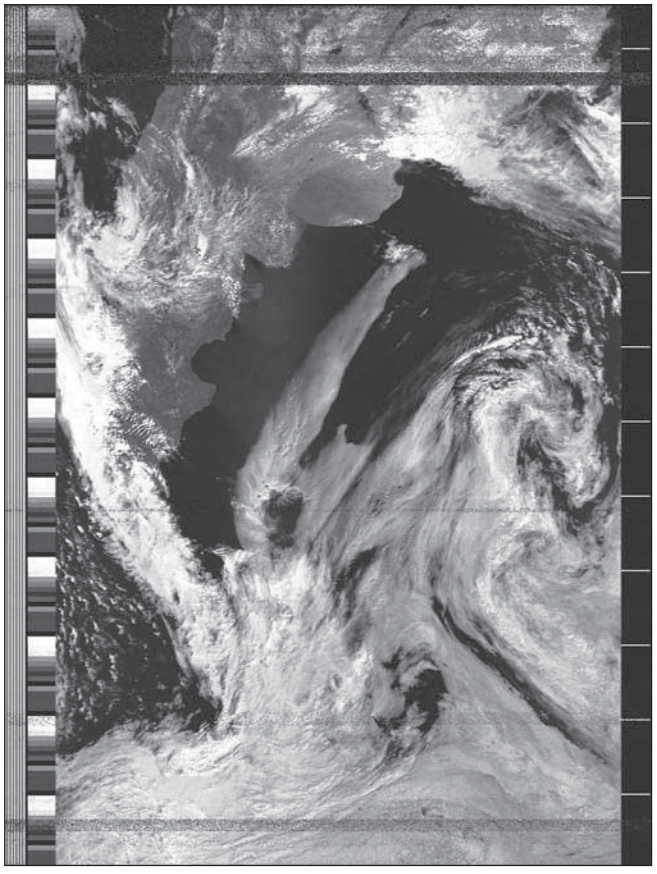
However, I do not recommend others take this approach; I was careful and I did know what I was doing.

After reconnoitring the ships decks I chose the highest open public deck for my satellite operations. The location was windy most of the time but it gave a clear view of the sky only partly shadowed in one direction. I think this was the best location available and my activities did not attract too much attention by fellow passengers. Because of the necessity of establishing my receiving station and then dismantling everything and taking it back to the cabin I only tried reception on four occasions. Each time I planned afternoon reception of NOAA 19 neglecting all other passes. The rationale was to receive high elevation visible images when the ship's decks were relatively quiet and my activities unobtrusive.

I received four good digital recordings of NOAA 19 passes which I transferred to my lap top in the cabin with further processing done at home when I had more time to devote to this mini project.

Three of the images are shown alongside this text. I was particularly pleased to see the coastal outline of the Falkland Islands on two of the images. The ship visited Port Stanley for just one day but it so happened that in spite of the moderate wind which was blowing the sky was relatively clear, hence the images showing visible coastal outlines which I think may be quite rare for this 'British Crown Dependency' .

The ship's captain said this was not uncommon in this area because the sea and air temperatures were almost the same. We entered this area of mist about 12 hours after leaving the Falkland Islands and this was not insignificant.



NOAA 19 APT visible image 16th December 2009 showing an extensive band of sea mist stretching NE from the Falkland Islands

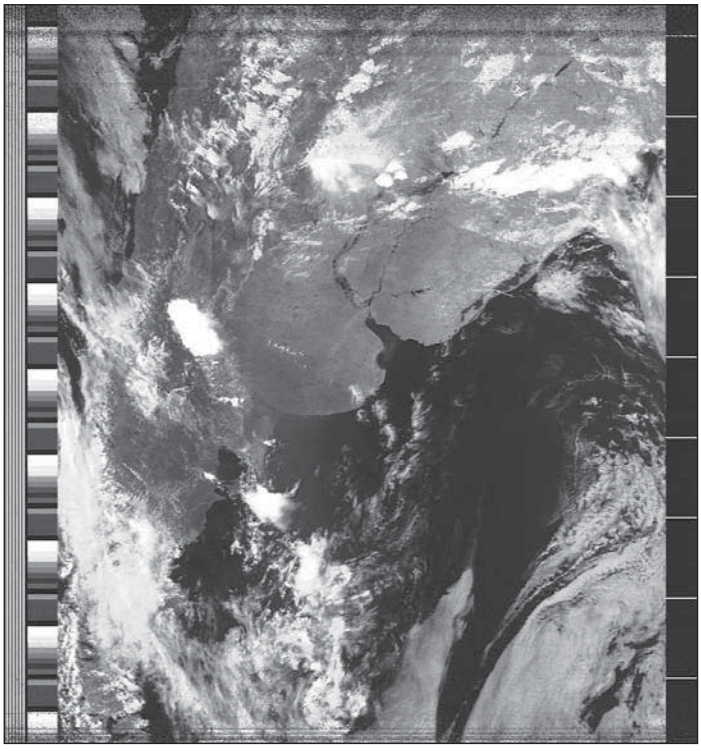
It so happened that before we entered the sea mist there was a medical emergency onboard. The ship changed course back to the Falkland Islands and a Sea King helicopter was dispatched from the Falkland Islands to rendezvous with the ship which was still many miles from the islands. The image below I recorded the day after we left the Falkland Islands shows sea mist stretching for several hundred miles north east of the islands.

The helicopter did hover over the ship for about 30 minutes to take of the medical patient and apparently arrived safely back in the Falkland Islands.

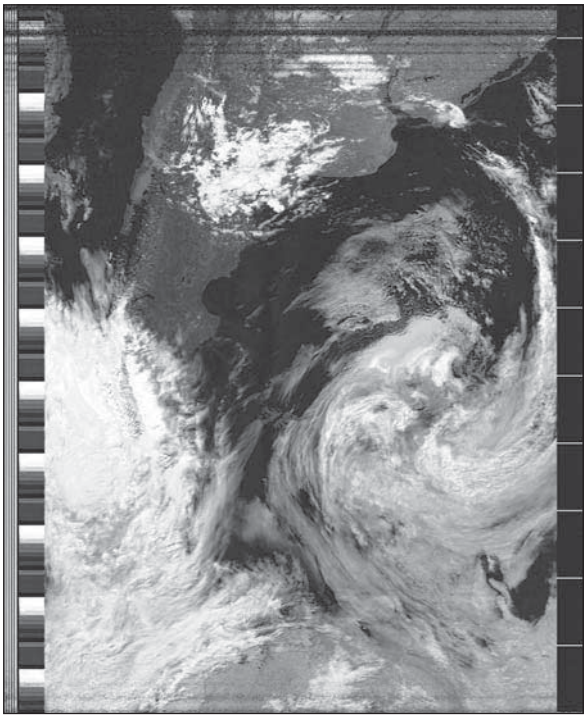
During this night time emergency everybody except the emergency crew were exclude from any outer deck and lighting was restricted. The point of relating this event is that just a few hours later the ship was enveloped in the sea mist and any helicopter rescue mission would have been impossible.

A further point is to express my admiration to the brave and committed individuals from a British base involved in such a medical emergency.

I was pleased with the images I recorded because they remind me of visiting the area. The location of Port Stanley, Montevideo and Buenos Aires can be identified on the images - if you are good at geography. Montevideo and Buenos Aries are located on banks of the extensive River Plate (Rio de la Plata) estuary.
I learned about the large river systems of South America which drain into this estuary and yes I did see in Montevideo bits of the German battleship 'Admiral Graff Spee' which sank in the River Plate in 1939 just a few kilometres off shore.
Just as a comparison between the resolution of my NOAA APT and Envisat MERIS images of the same area I have chosen an Envisat view of the River Plate taken in 2008 which covers some of the area I recorded recently from the ship. This images also closely relate to the article about direct Envisat reception which is becoming available to licensed users.



NOAA 19 APT visible image 20th December 2009 centred on the River Plate with its associated river systems



NOAA 19 visible image received while the ship was anchored in the Falkland Islands

Lightening & Surge Protection **Continued from page ii**

General information:

http://fire.cfs.nrcan.gc.ca/lightning-eclair-eng.php
http://www.srh.noaa.gov/jetstream/lightning/lightning_max.htm
http://www.srh.noaa.gov/mlb/?n=what_is_lightning
http://www.metoffice.gov.uk/corporate/library/factsheets/factsheet02.pdf

External Lightning protection:

http://www.obo-bettermann.com/downloads/en/kataloge/tbs_grund_blitz_en.pdf
http://www.obo-bettermann.com/downloads/en/prospekte/blitzsch_en.pdf

Indirect lightning and ground potential rise:

http://www.ipst.org/techpapers/2007/ipst_2007/papers_IPST2007/Session23/197.pdf

Firehazard SPDs:

http://www.rbs2.com/fire.htm
http://www.eeel.nist.gov/817/pubs/spd-anthology/files/Black%20boxes%20ICLP.pdf

Dangers of wearing iPod:

http://community.wddty.com/blogs/adverse_reactions/archive/2007/07/13/The-unexpected-dangers-of-the-iPod.aspx

Christophe Suarez's lightning images:

http://www.thunderstorm-chaser.com/thunderstorm-pictures.htm

Dutch only links:

http://www.weerstationarnhem.nl/uitlegonw.htm
*http://www.eenvandaag.nl/binnenland/32268/waar_slaat_de_bliksem_morgen_in_*
http://www.knmi.nl/kenniscentrum/luchtelektriciteit_onweer.html
http://www.knmi.nl/klimatologie/daggegevens/onweer/
http://www.knmi.nl/cms/content/8307/onweer_en_bliksem

AVHRR and SEVIRI A Comparison

Marciano Righini, I4MY/Giampaolo Rossini, IW4CSG/Franco Tiozzo, IW4CQD

Francis Bell in The GEO Quarterly No 24 drew up a list of free publications related to weather satellites.

One of these is MSG Meteosat Second Generation, In Orbit -In Use, a book produced by EUMETSAT in 2005.

In the first chapter, on page 16, they say "Comparisons are inevitable between HRV with its nominal 1 km resolution and the Advanced Very High Resolution Radiometer (AVHRR) instrument with similar resolution on the polar orbiting NOAA satellites of the USA". On the same page they publish two images of the Alps: one from the NOAA AVHRR channel 2 and the other from SEVIRI HRV channel. The former taken from near-overhead at about 800 km, the latter taken from a position over the equator at an altitude of 36,000 km. They conclude by saying that "HRV cannot provide quite the same level of detail".

This is true over central and especially northern Europe where the perspective from the equatorial plane is considerably oblique, but what level of imagery does MSG provide at or near the subsatellite point? In other words: Can the images generated by AVHRR and SEVIRI be compared? In order to answer this question let's see when, where, what and how to compare.

When And Where

In our archive we have looked for passes of NOAA and HRV images of MSG taken the same day at the same time. We have found two showing a cloudless Sahara, clear skies over the Mediterranean, and a fleecy sky over western England. On July 21, 2005 a view from Meteosat-8 at 12:30 UT and a pass of NOAA-18 between 12:45 and 13:00 UT. Meteosat-8 was located at 3:4°W and the highest elevation of NOAA-18 over our horizon was 62°W. Moreover, on October 10, 2009 a view from Meteosat-9 at 12:45 UT and a pass of NOAA-19 between 13:11 and 13:26 UT. Meteosat-9 was located at 0° and the highest elevation of NOAA-19 over our horizon was 35°W.

Where

Of course the most meaningful comparisons are those made in areas not too far from the MSG subpoint, that is to say in Africa, but we have expanded our research also to more northern countries.

In the Sahara desert three main types of surface and scenery may be recognised: the hammada, the reg and the erg. The hammada are rocky plateaus with bare rock outcrops. The reg consists of windscoured plains strewn with pebbles, boulders and gravel. The erg is the desert of shifting sand dunes. The undulations of the surface of the Great Eastern and Western Ergs are a proper testing bench for a picture from above. (Figure 1)

What

Let's consider the instruments generating the images.

AVHRR (Advanced Very High Resolution Radiometer) is the environmental sensor for the NOAA satellites. It is a 6-channel scanning radiometer sensitive in the visible, near infrared and infrared window regions.

A scan motor continuously rotates the scan mirror at 360 rpm to produce a cross-track scanning in orbit. The mirror (21 by 29 cm) fills the field-of-view of a 20 cm telescope. The instantaneous field was chosen so that the

satellite motion along its orbit would cause successive scan lines to be contiguous at the subpoint.
Data is read at the appropriate rate for the HRPT (High Resolution Picture Transmission) data format. All spectral regions are transmitted at full resolution, i.e. 1.1 km on the Earth surface at the subpoint. For the comparison we have used channel 2 (0.725-1.1 μm).

SEVIRI (Spinning Enhanced Visible and Infrared Imager) is the instrument which delivers images and data thus performing the core mission of MSG (Meteosat Second Generation). The images are generated through a combination of an east to west scan obtained from the spinning of the entire satellite at 100 rpm, together with the stepping of a 51-cm telescope mirror from south to north after each scan line.

SEVIRI has the capability to observe the Earth in12 spectral channels at 15-minute intervals. We have used channel 12 which is the High Resolution Visible channel (0.5-0.9 μm) it provides a nominal resolution of around 1 km at the sub-satellite point.

How

After receiving the data of MSG with Tellicast, we converted the image files into a sequence of pixels with 256 grey steps. Then we processed the new files with our traditional METEO programme, the one supplied by Giampaolo, with which we have always displayed and processed the images of Meteosat, NOAA, Meteor, etc. All the views from each satellite were displayed at the maximum level of resolution so that they can be compared.

A Draw

In the three pairs of images taken over the Sahara (Figures 2a/b, 3a/b, 4a/b) it is practically impossible to distinguish between those taken from NOAA and those from MSG in spite of the great distance from which MSG sees the Earth surface. SEVIRI is a very efficient instrument. Its capability is outstanding.

Also the MSG pictures taken over the Mediterranean (Figures 5a/b, 6a/b) are more than acceptable even if the AVHRR shows a certain superiority in portraying the smaller structures.

Figures 7a/b portray an unfair comparison. The view from the equatorial plane is too oblique compared with the vertical view of NOAA. However, these images demonstrate that excellent use can be made of SEVIRI imagery even in the northern countries of Europe.

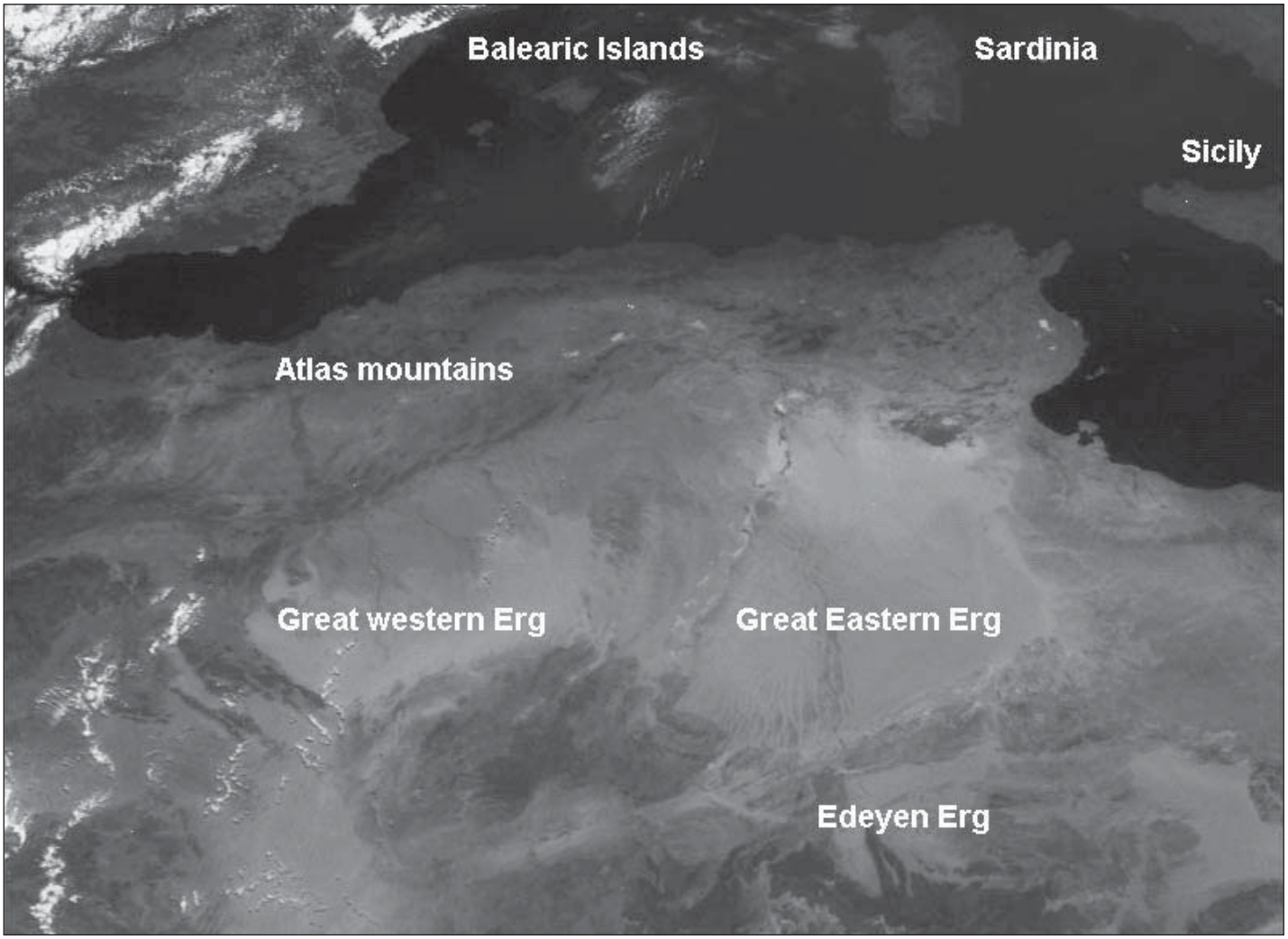
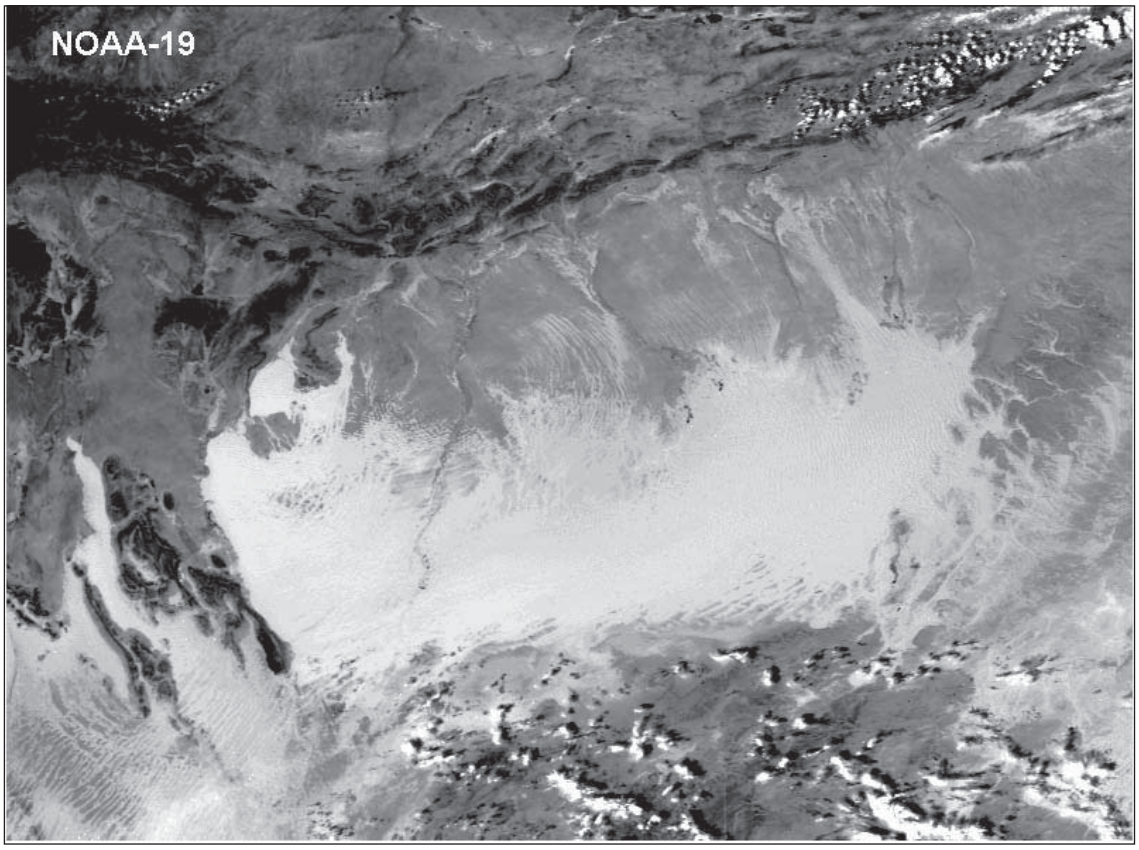
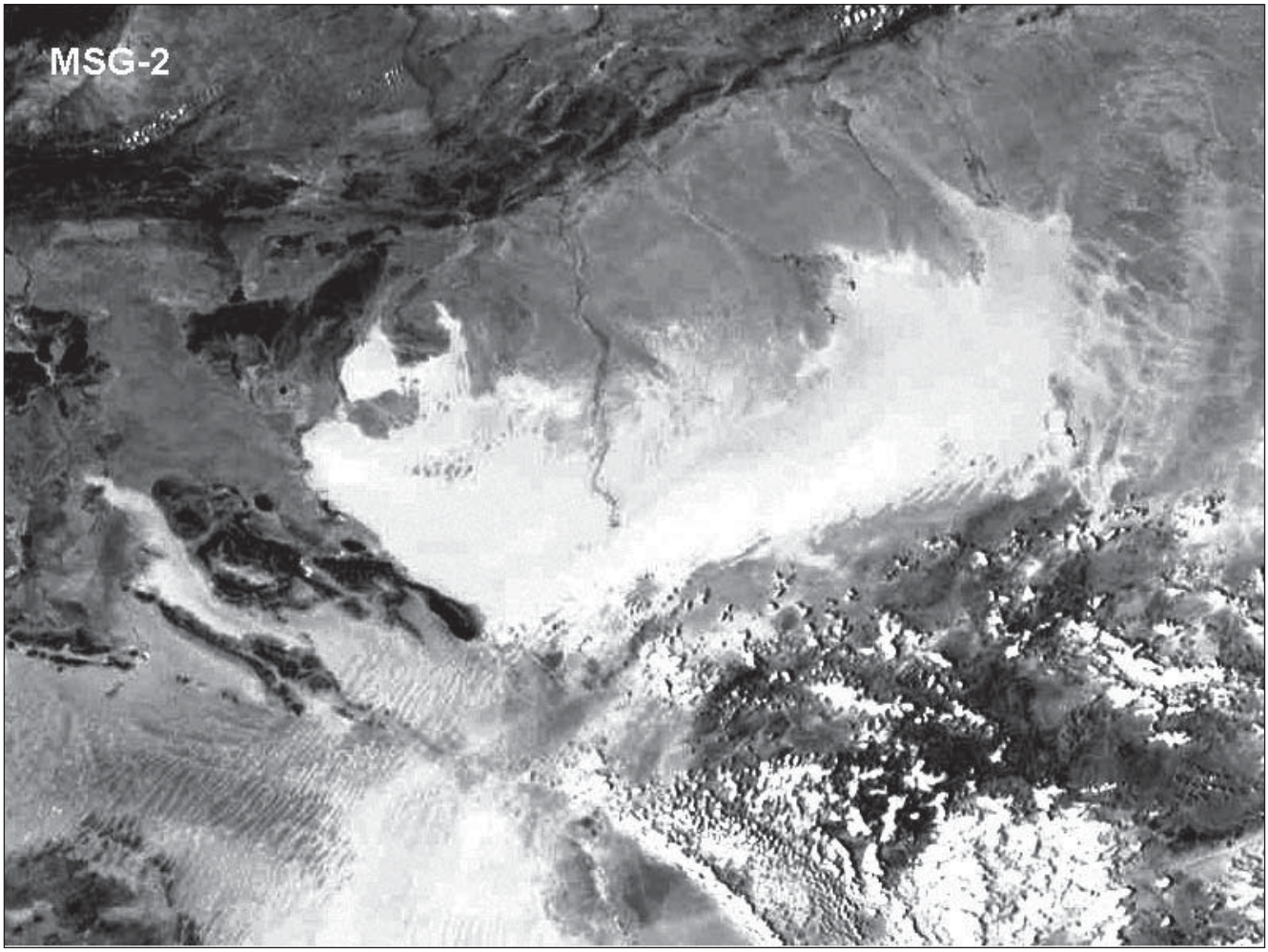


Figure 1 - An HRI VIS image of Meteosat-7, ch. BIV, showing the areas used to compare AVHRR and SEVIRI Great Eastern and Western Ergs

a refers to NOAA images b refers to the images of MSG in all examples

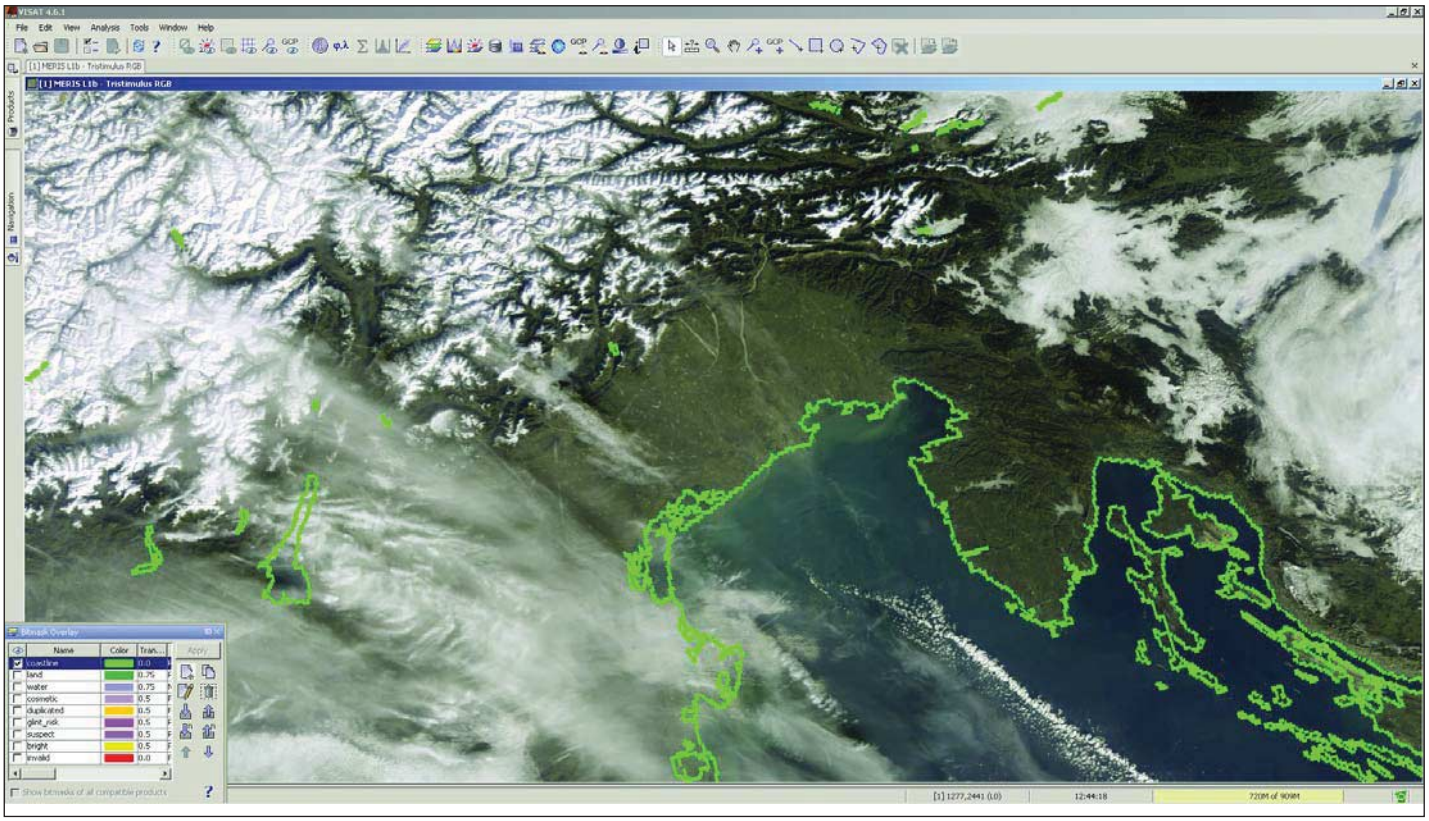


Figures 2a/2b - The Great Western Erg lies in the bottom of a great basin where the ancient rivers (wadis) piled up most alluvium. In these pictures some wadis, or dry rivers, flow down from the Atlas Mountains.

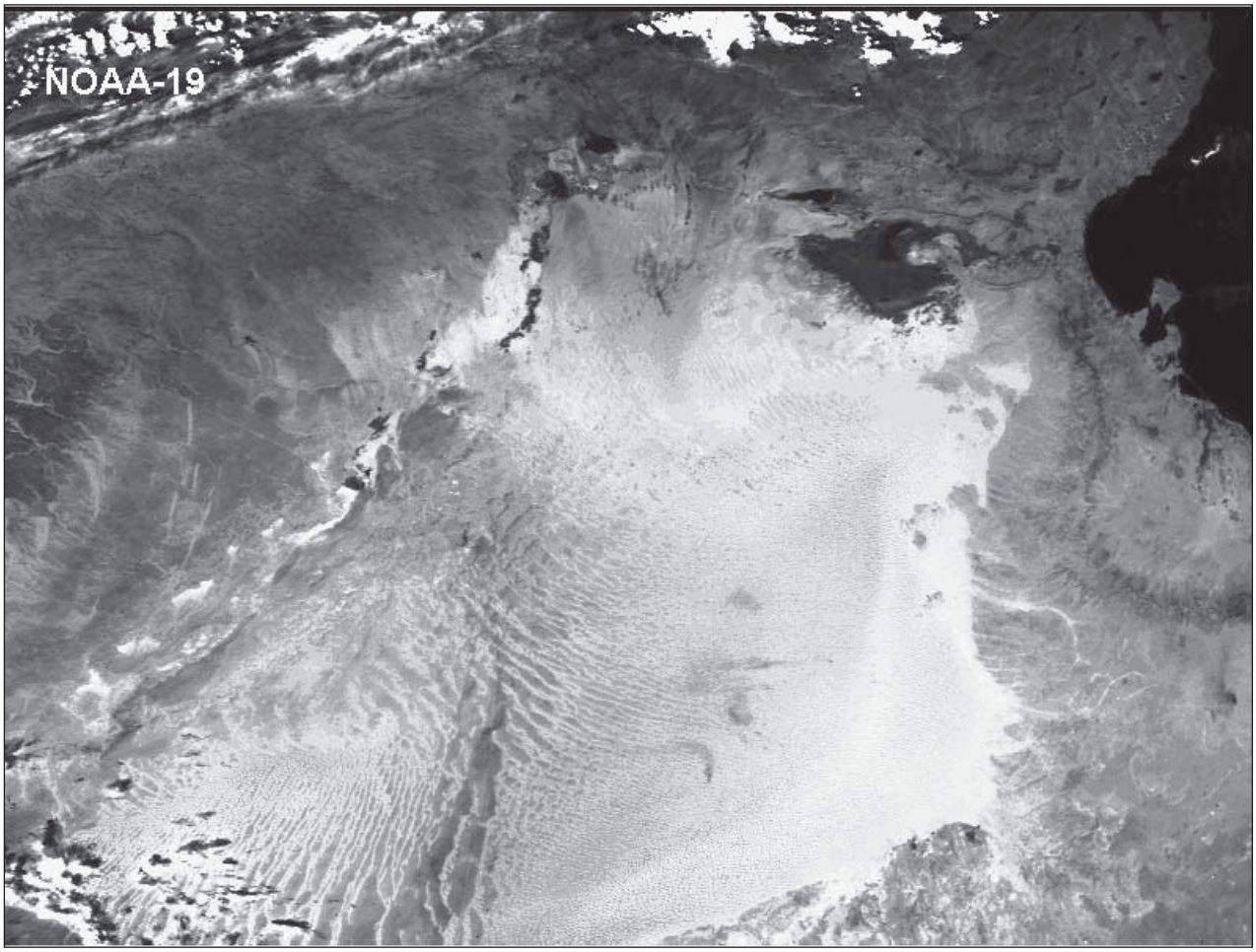


Continued from page 17

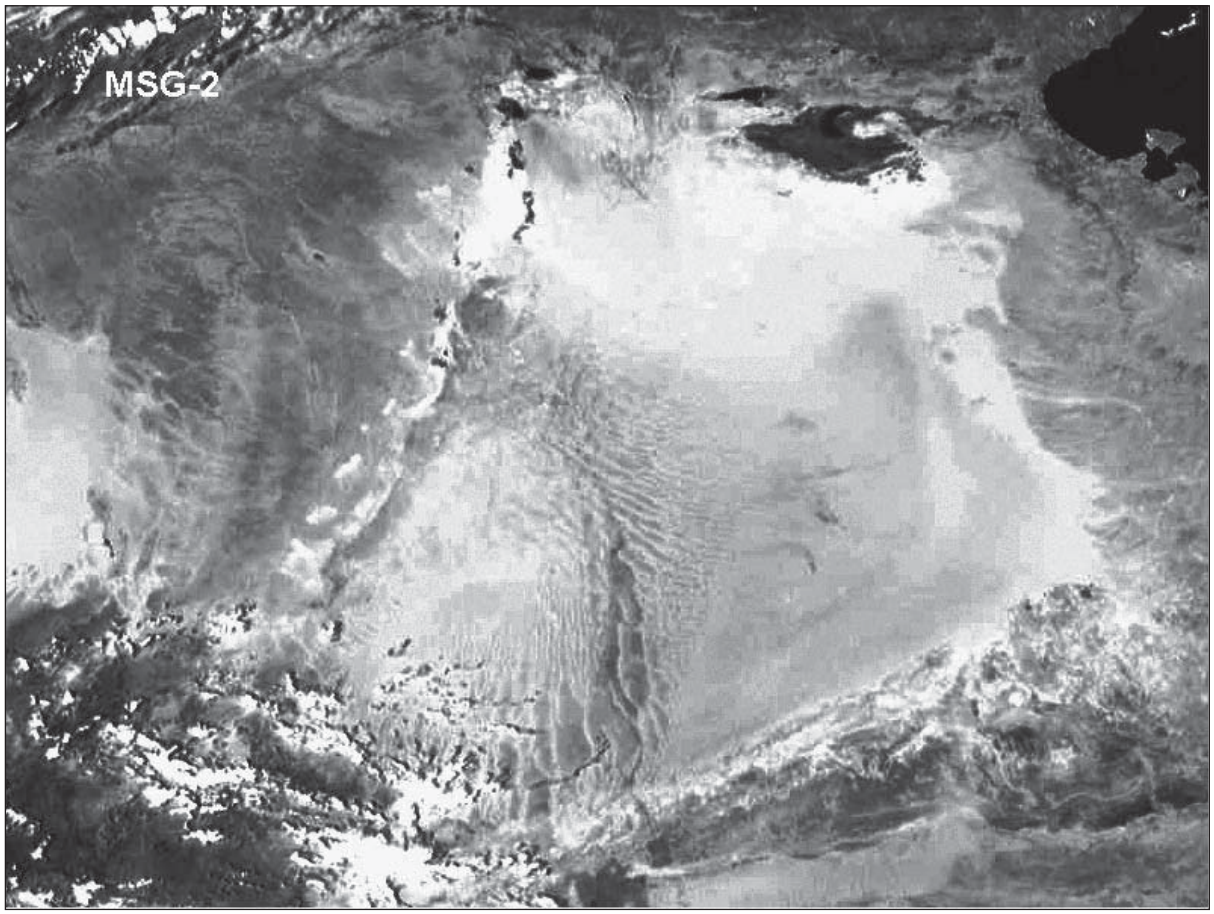
This MER_FRS data (full resolution) only covers certain areas of interest. All MER data covers daylight passes only, in mid-winter Edinburgh sadly falls outside the received data !

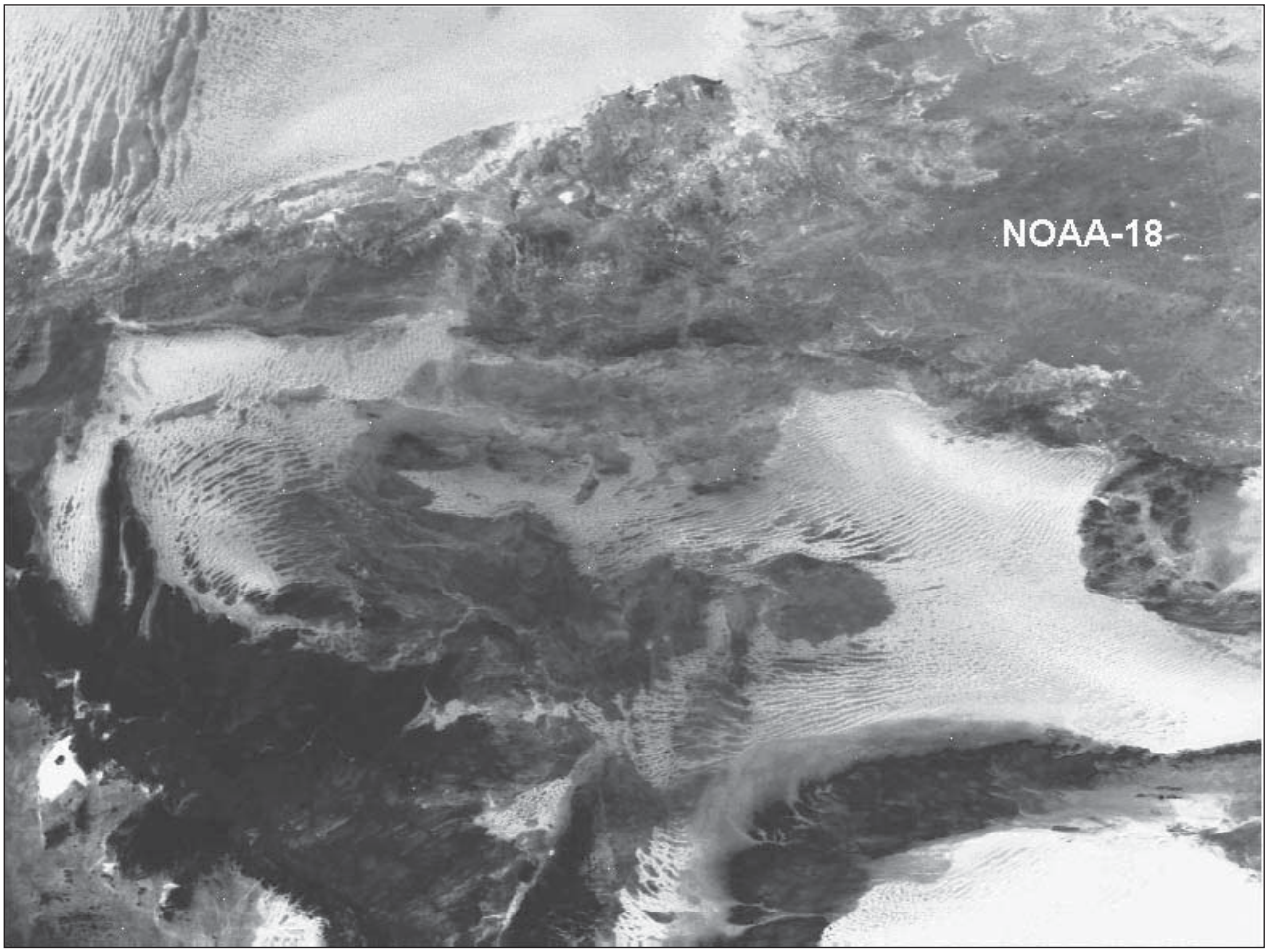


Hidden in the program is also a border overlay option, seen from this BEAM-Visat-bitmask-option.jpg

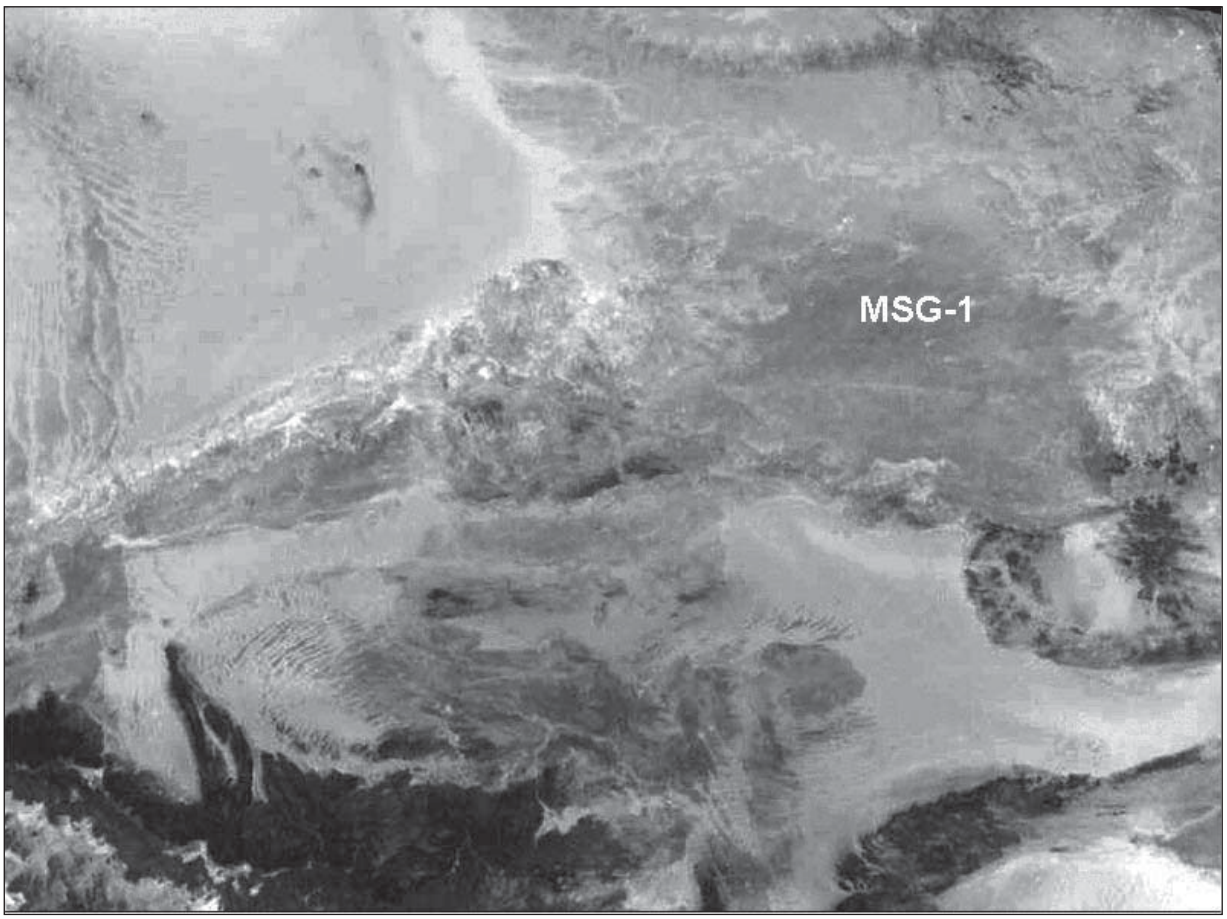


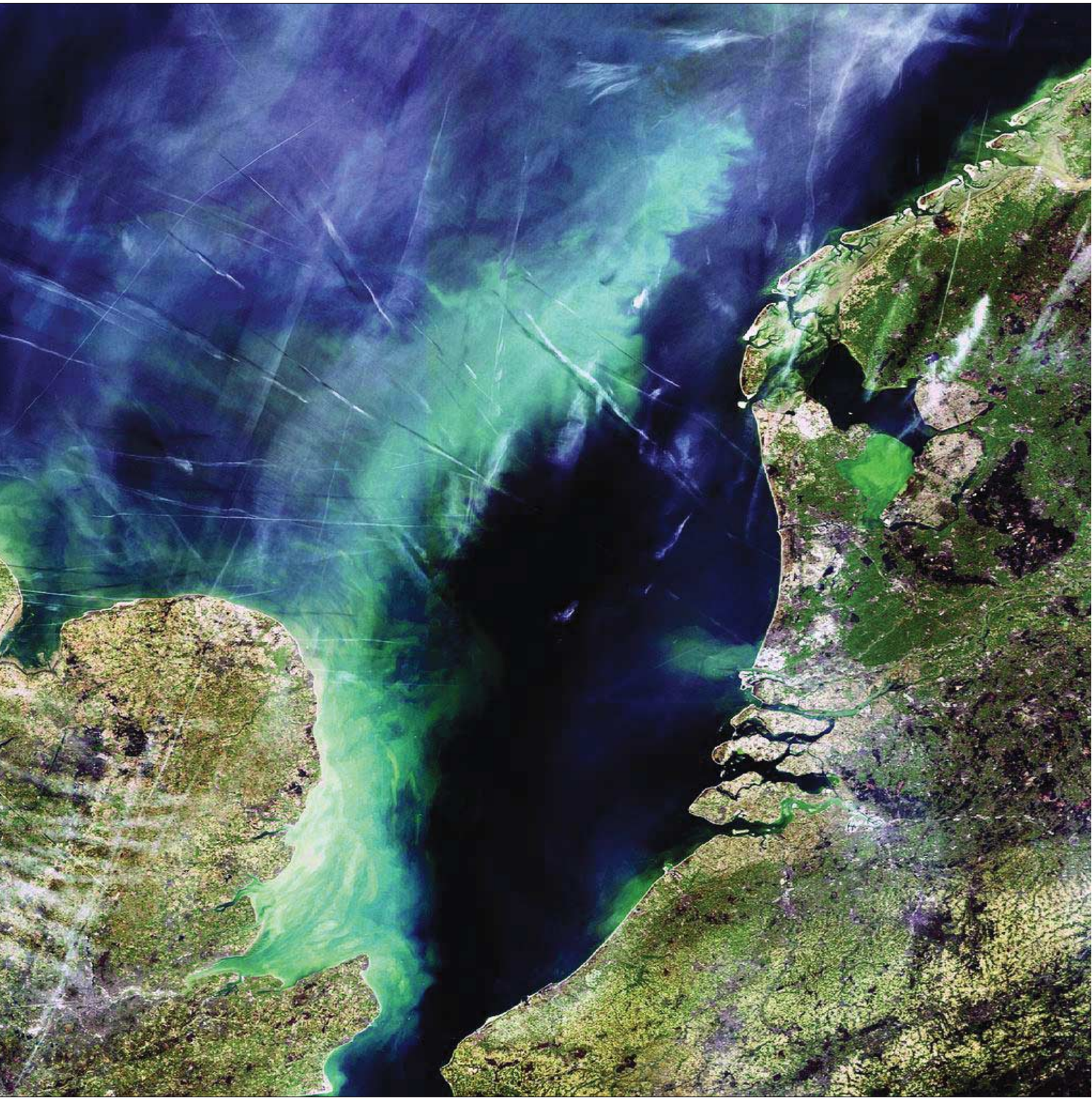
Figures 3a/b - The Great Eastern Erg, a region of dunes lying between Algeria and Tunisia. Today it is dotted with black spots that are oil and gas wells from which plumes of smoke rise.





Figures 4a/b - The Edeyen Erg lies to the south of the Great Eastern Erg. It consists of strip of land covered with dunes surrounded by the Hammada.





North Sea Image

This is an Envisat MER-FRS image of the North Sea.This picture illustrates the quaility of the images which can be generated from the raw Envi-Ham project data.

Image courtsey ESA

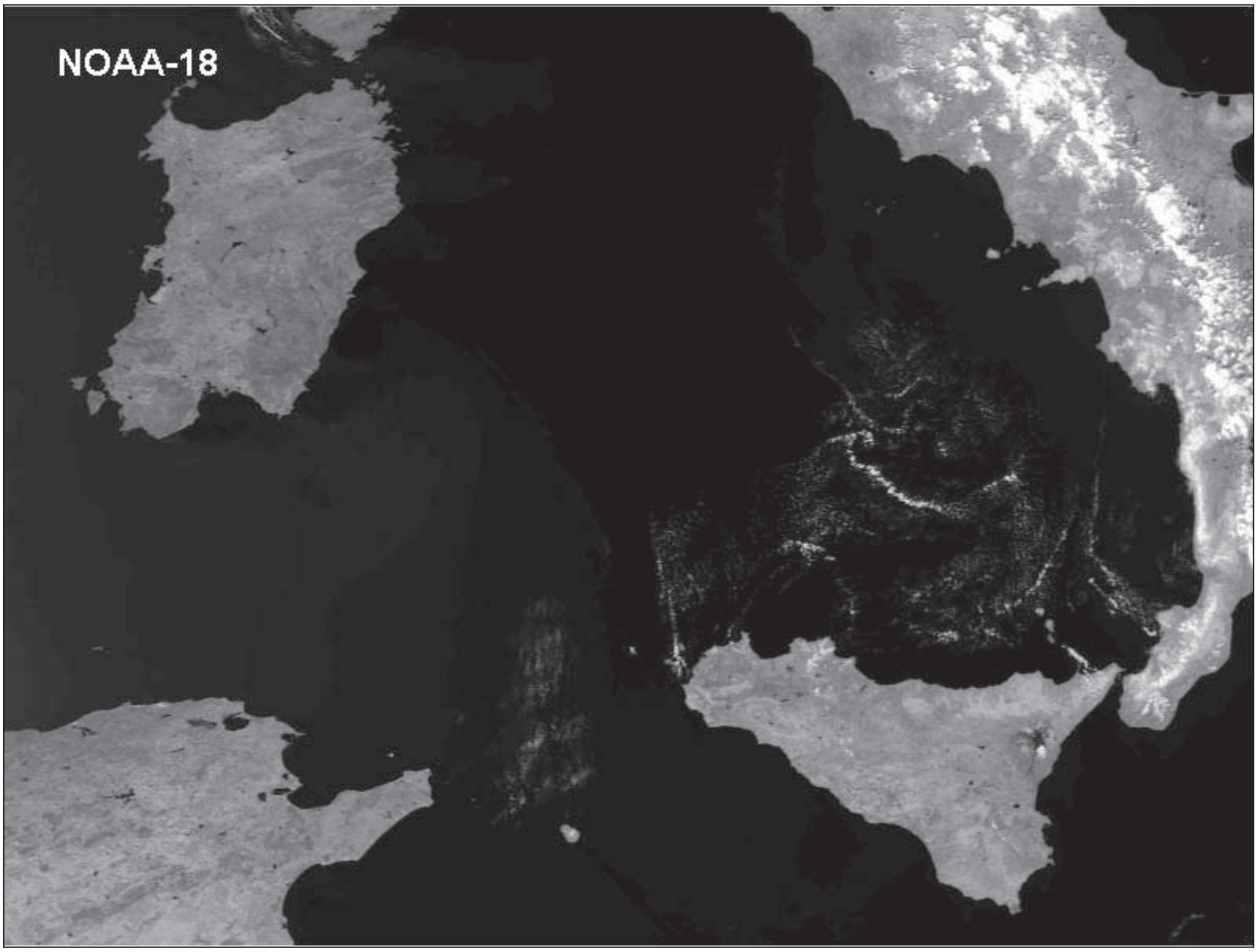
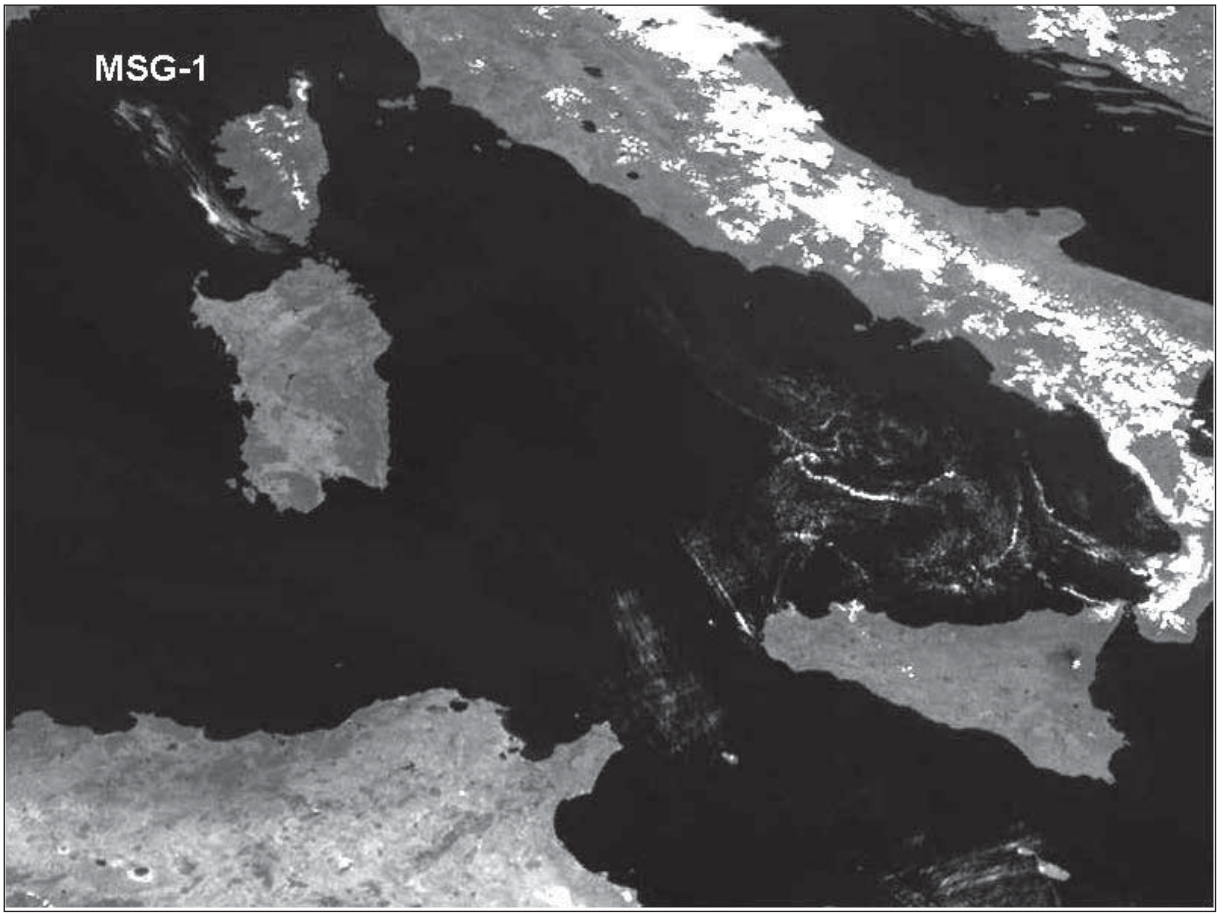


Figure 5a/b - The three great islands of the Tyrrhenian Sea, Sicily, Sardinia and Corsica, are well represented in the HRV channel.



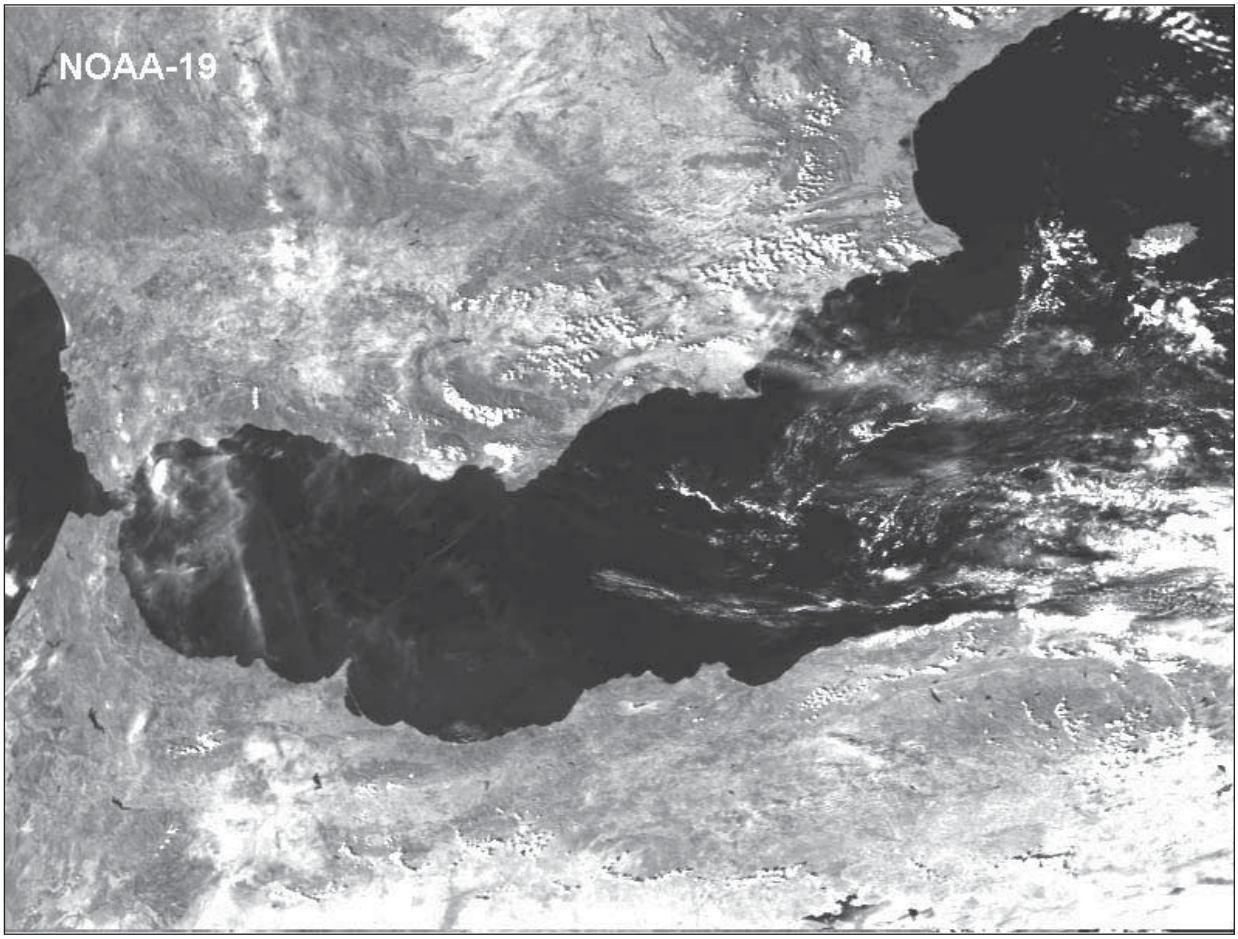
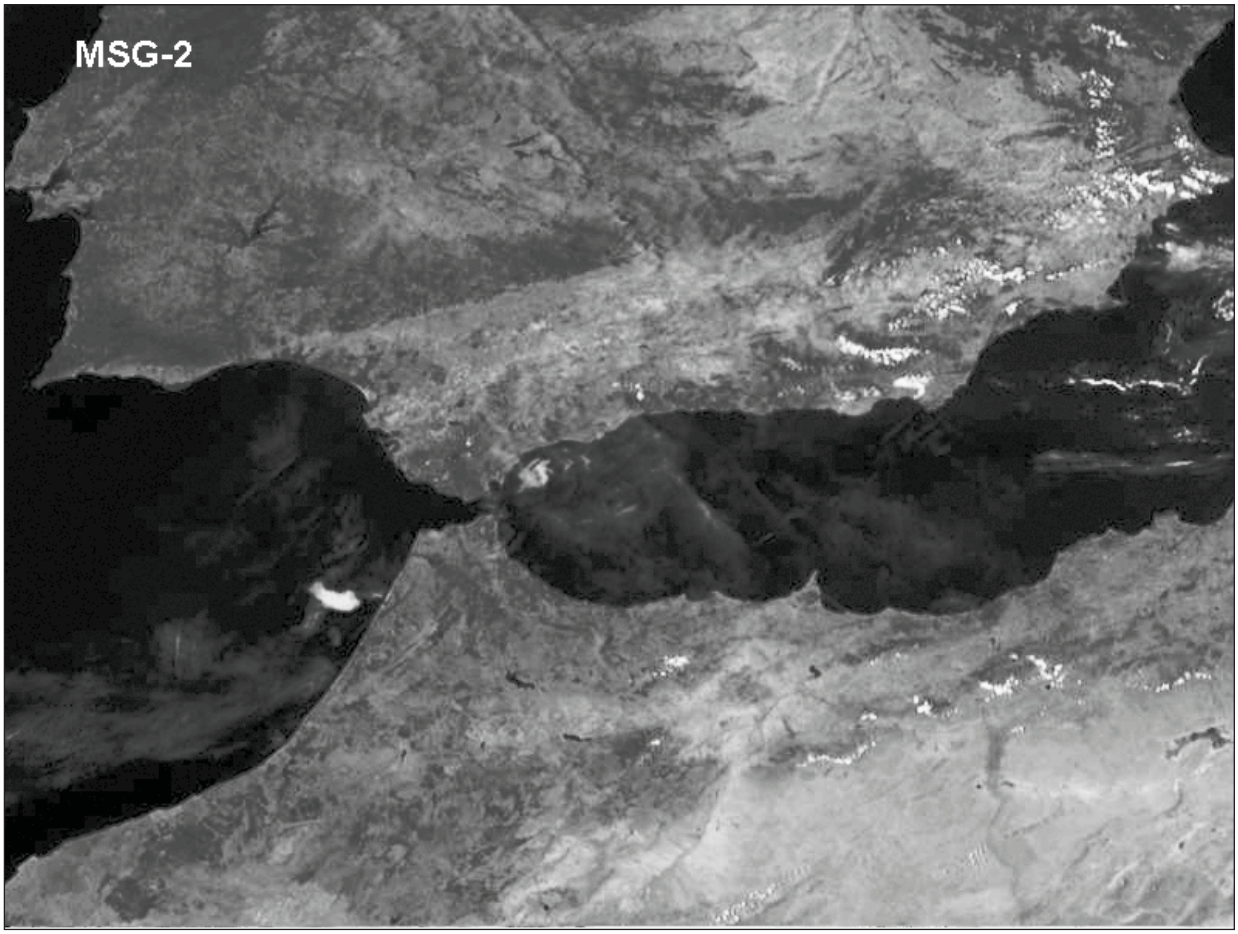


Figure 6a/b - A view of the western Mediterranean where the Balearic Islands, Gibraltar and the strip of land near Melilla are clearly represented in both images.



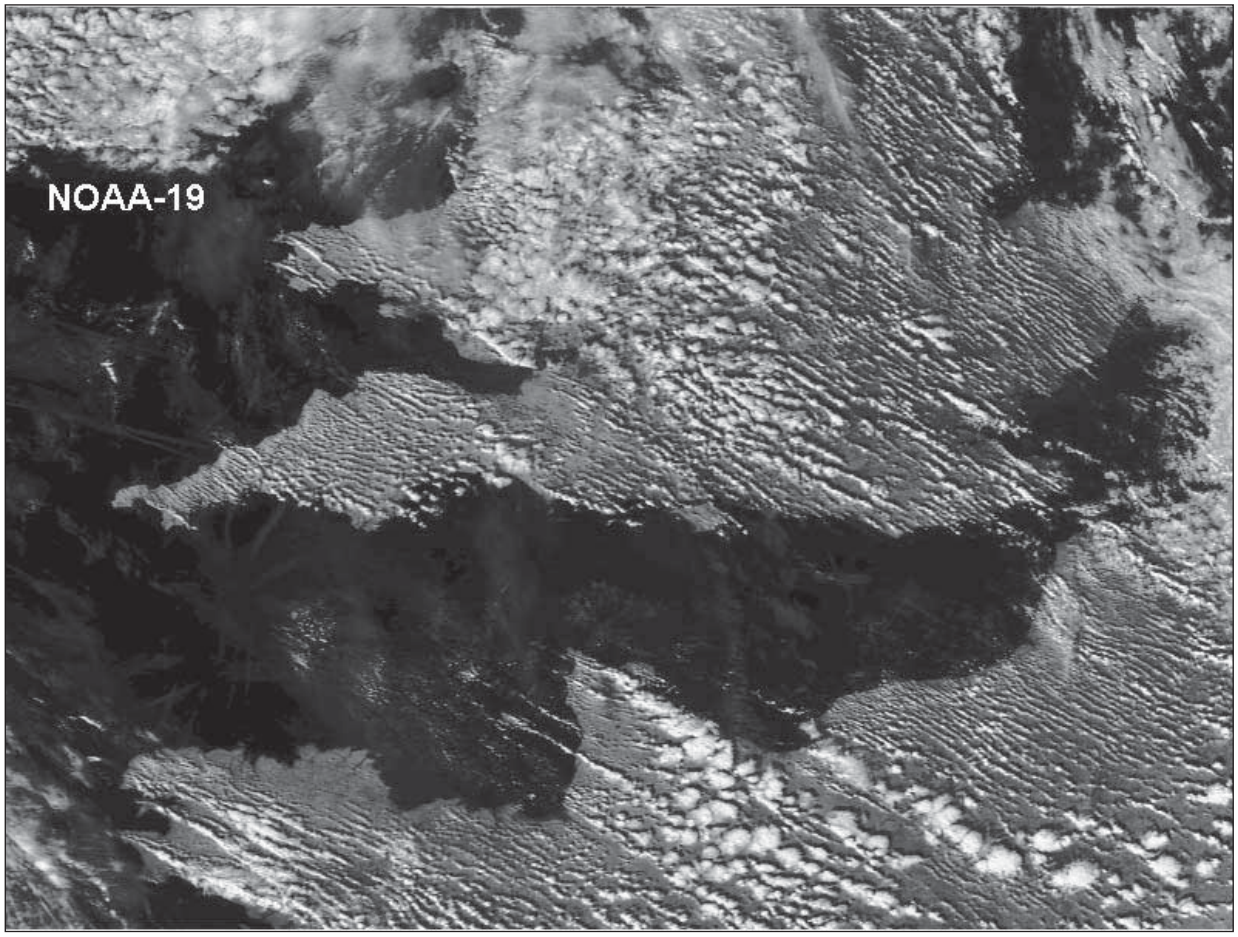
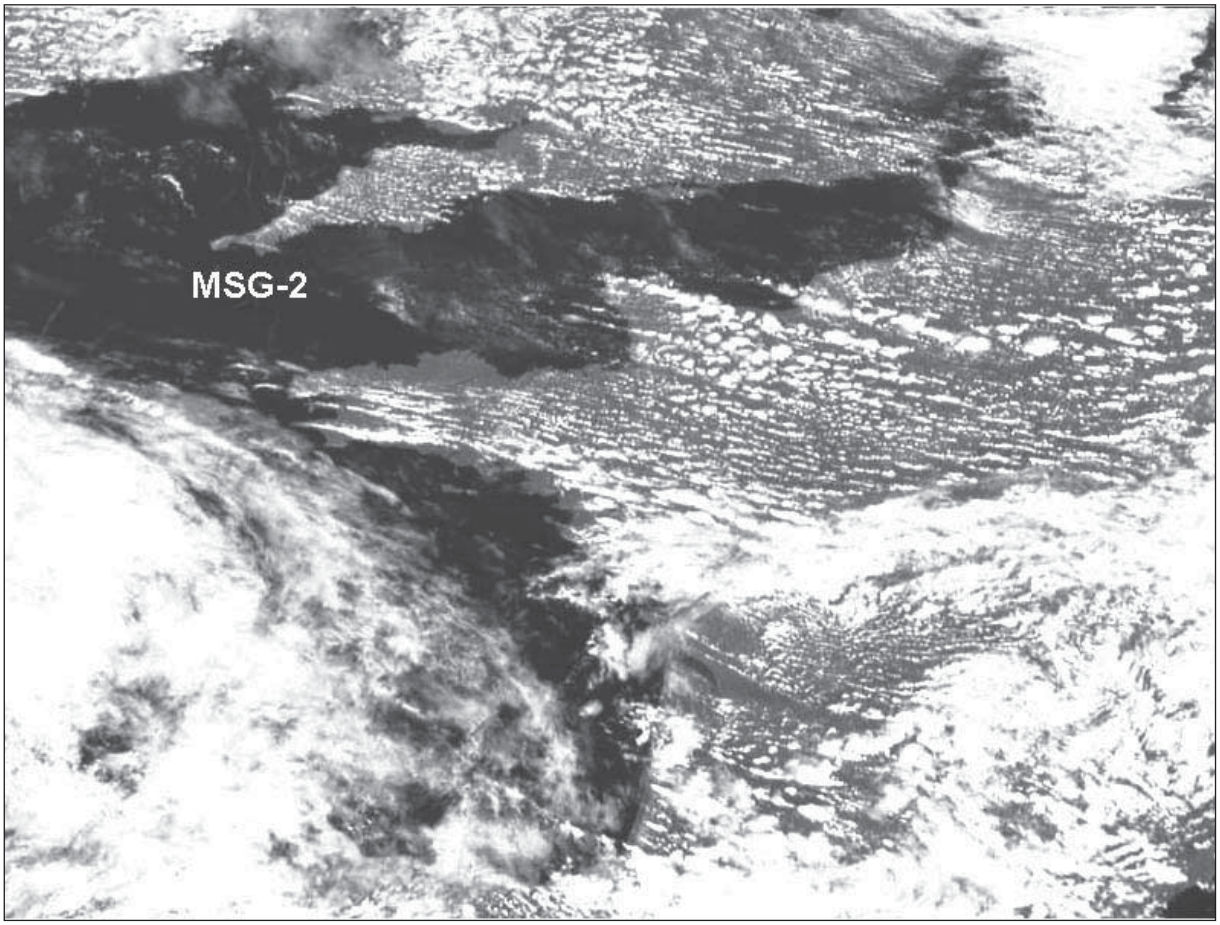


Figure 7a/b - The views of Brittany and south-western England were taken on a day of light cloud cover. The HRV image cannot be compared with that of NOAA, but it shows the MSG capability of producing valid imagery far from the sub-satellite point.



Tropical Cyclone Laurence

Dale Hardy

The warm tropical waters surrounding northern Australia are the home and breeding grounds to a vast array of exotic marine creatures and corals. However when these ocean waters warm to at least 26.5°C through a relatively deep layer (~50 m) of the ocean, something more menacing can breed: the Tropical Cyclone. This 26.5°C value is tied to the instability of the atmosphere in the tropical and subtropical latitudes. Above this temperature deep convection can occur, but below this value the atmosphere is too stable and little to no thunderstorm activity can be found.

A tropical low formed in the Arafura Sea (Fig 2 & 3) on December 8 and was given the designation '92P'. The low moved southwest, passing over Darwin on December 12, causing heavy rain in excess of 100 mm and squalls causing tree damage. As it passed back over open waters it intensified and when west of Darwin was named Laurence, the first tropical cyclone of the Australian 2009/10 season. Quickly gaining strength, Laurence attained category-3 on December 15 when close to the north Kimberly coast with recorded wind gusts to 187 kph.

Still small but intense, Laurence was now feasting on the 30°C tropical waters as it skirted the Kimberly coast, where it rapidly matured into a category-5 severe cyclone (> 250 kph) for a brief period on December 16 before crossing the coast east of Koolan Island, south of Kuri Bay that evening as a category 4 cyclone with -estimated gusts to 260 kph near its centre.

By the afternoon of December 20, Laurence had reduced to category-3 and turned south south-east, taking aim at the Pilbara coast. As it made the final dash on the course to devastation Laurence grew to a mighty category-5 again and crossed the coast near Wallal, 230km NE of Port Hedland, with estimated wind gusts of 285 kph near its centre.
As it moved inland considerable damage to property and livestock occurred with the estimated loss of 1500 cattle reported. It still had a pressure of 929 hPa.

Finally Laurence, starved of energy, gradually weakened, dumping heavy rain as it moved southeast, some areas reporting of 245 mm in the 24 hours to 9 am on December 22. Although dying, Laurence was not going to give in easily and sought to join an approaching front from the southwest coming across Perth and wreak more havoc. By now, Laurence was 6 days old and had travelled some 3500 kilometres.

By December 24 it had travelled another 1200 km across central Australia to the borders of NSW, Queensland and Northern Territory, and had joined the up with the front (figures 9, 10). A stationary High over the Tasman Sea hindered Laurence's progress and the system formed a trough with the remnants of the cyclone feeding moisture from the Coral Sea into the front causing severe flooding in northern NSW. In Coonabarabran it was described as 'biblical'.

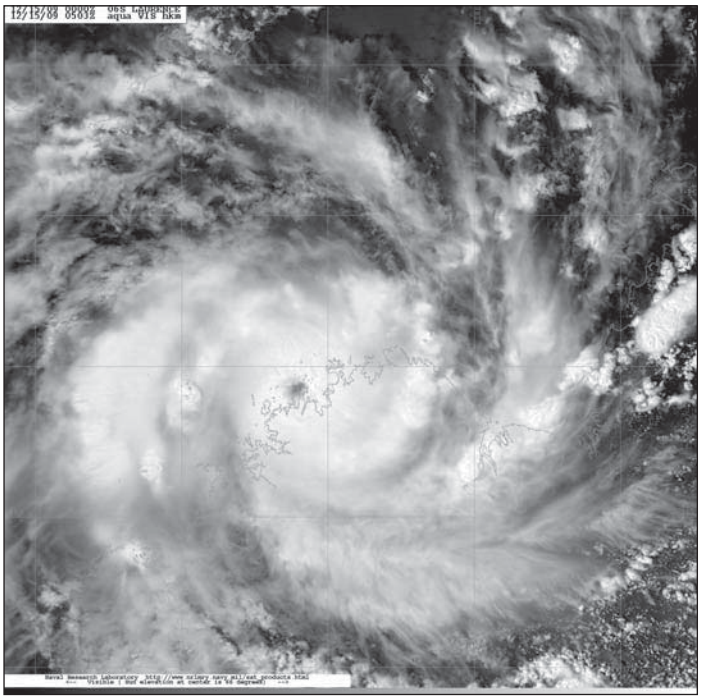


Figure 1 - Tropical Cyclone Laurence on December 15

Tropical Cyclone Wind Speed

Strength	Category	1 Minute Maximum Sustained Winds		
		Knots	mph	km/hr
Tropical Depression	TD	<34	<39	<63
Tropical Storm	TS	34-63	39-73	63-118
Cyclone	Cat 1	64-82	74-95	119-153
Cyclone	Cat 2	83-95	96-110	154-177
Severe Cyclone	Cat 3	96-113	111-130	178-210
Severe Cyclone	Cat 4	114-135	131-155	211-250
Severe Cyclone	Cat 5	>135	>155	>250
	Cat 6			

Windspeeds in Tropical Cyclones

Roads were submerged in floodwater, ghostly rivers rose from the dead, paddocks became seas of green and mosquitoes were breeding as if it were the tropics. 'Welcome to the drought, NSW style' quoted one newspaper.

By January 4, 2010 the cyclone system finally cleared, having starting 27 days earlier.

Fig 2 Afafura Sea

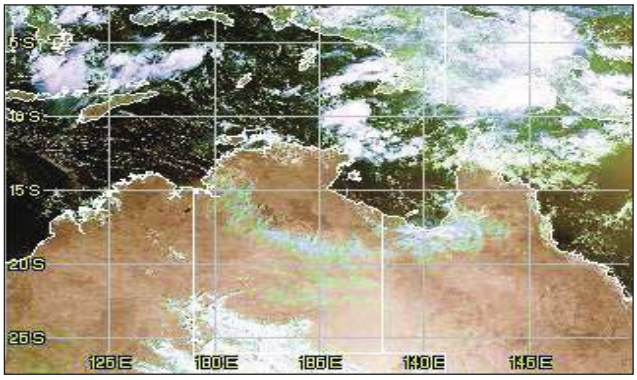


Figure 3 - Tropical Cyclone Laurence on December 8th

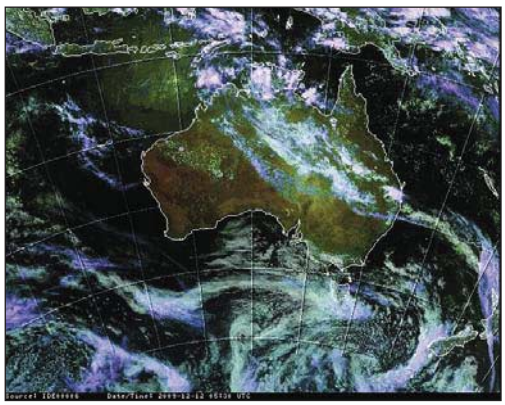


Figure 4 - Laurence on December 12

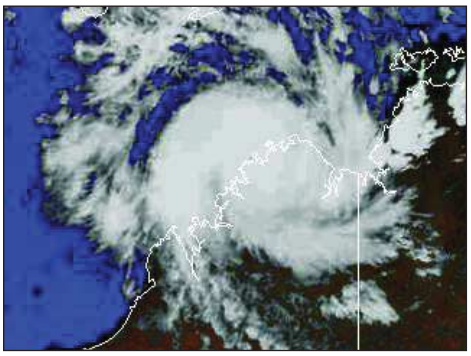


Figure 5 - Laurence on December 15

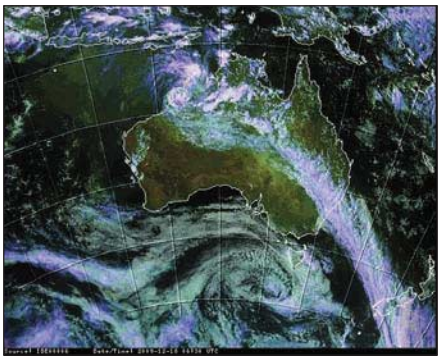


Figure 6 - Laurence on December 18

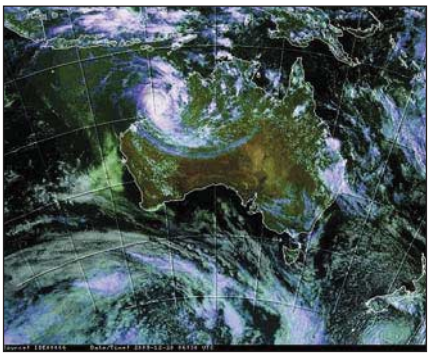


Figure 7 - Laurence on December 20

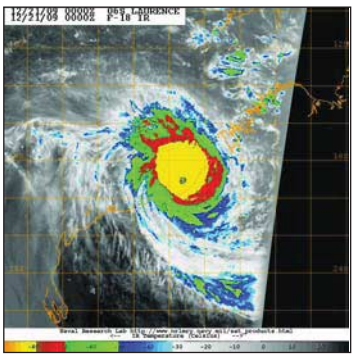


Figure 8 - Laurence Thermal Signature

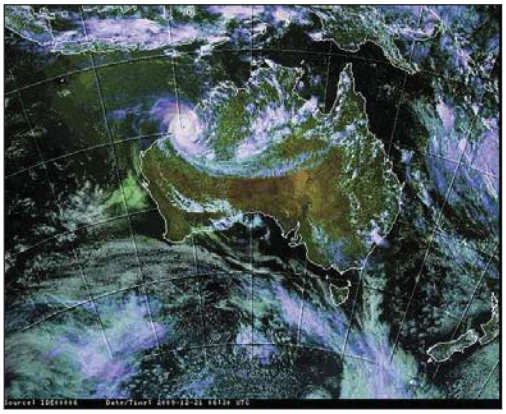


Figure 9 - Laurence on December 21-Cat 5

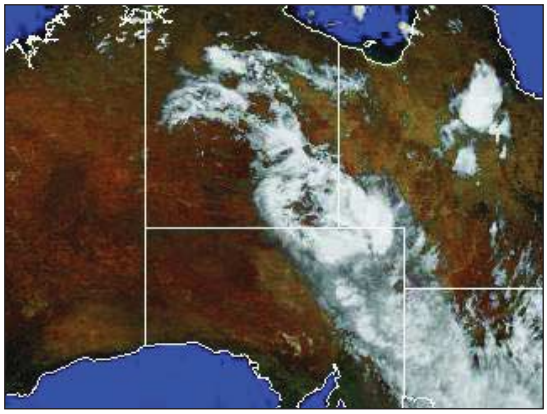
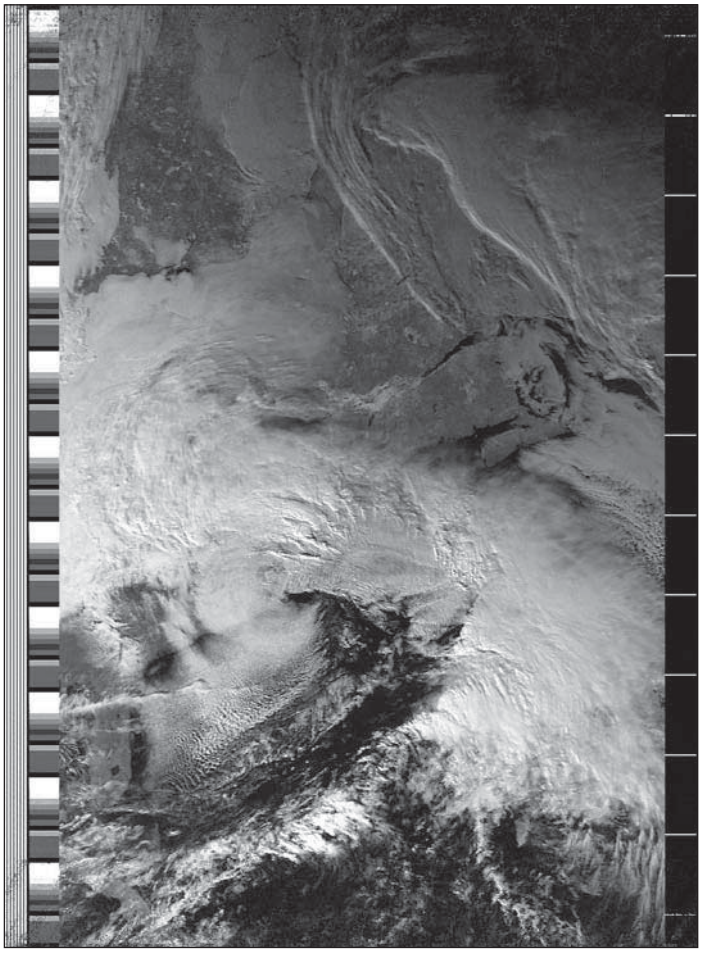


Figure 10 - Laurence on December 24

POTOMAC FALLS BLIZZARD

Steve Ross

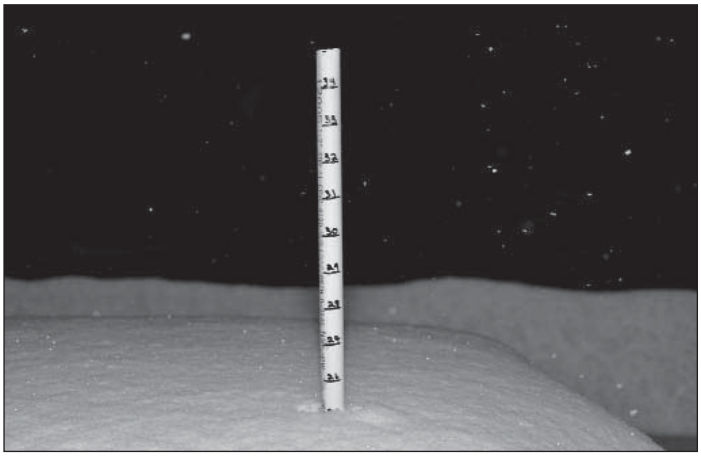


Steve sent these images in when here in the UK everything was at a stand still with just a few inches of snow.

He used a R2FX receiver with a homebrew QFH he made from 8mm copper tubing.

The decoding software is WxToimg running on a MacPro 8 core. The total snow accumulation in his area was 25 inches. He was snowed in for 3 days until he was ploughed out. The last time a storm this big hit his area was back in 2003. Visit Steve at:

www.weatherscience.net

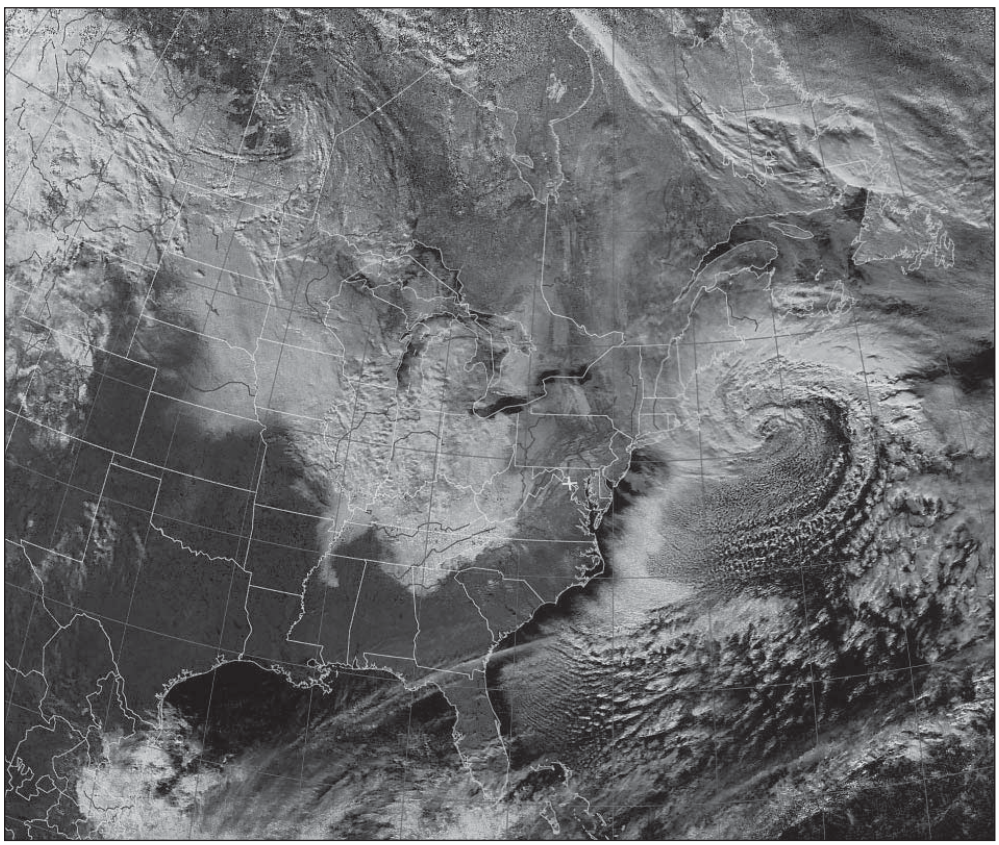


Yes, this is inches!

Fig 1 NOAA19 1758 on 19 December 2009

Potomac Falls VA

Post-Blizzard noaa-19 hvc composite



Faeroe Islands Disturbance

Anders Höök

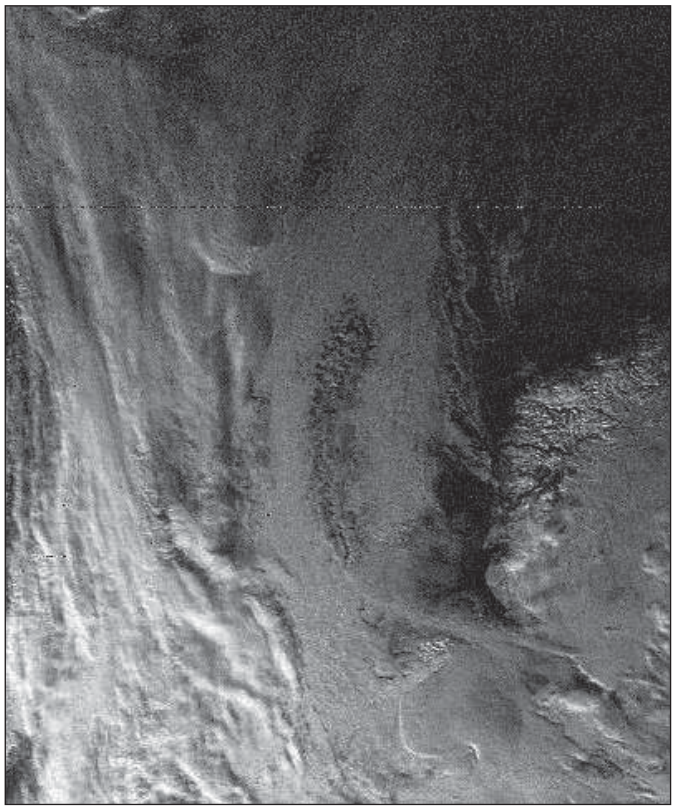
On the APT images of 2010-01-20 (I only have APT), I saw a "disturbance" in the cloud flow around the Faeroe Islands. I attach an image (NOAA 19, 2010-01-20, 12:35 UT, max elevation 38 deg., decoded and processed with Patrik Tast's APT Decoder).

In order to see a little more of what was happening, I turned to Modis, where I found the "disturbance" in an image from the Aqua satellite (Modis Aqua 2010-01-20, 13:10 UT).

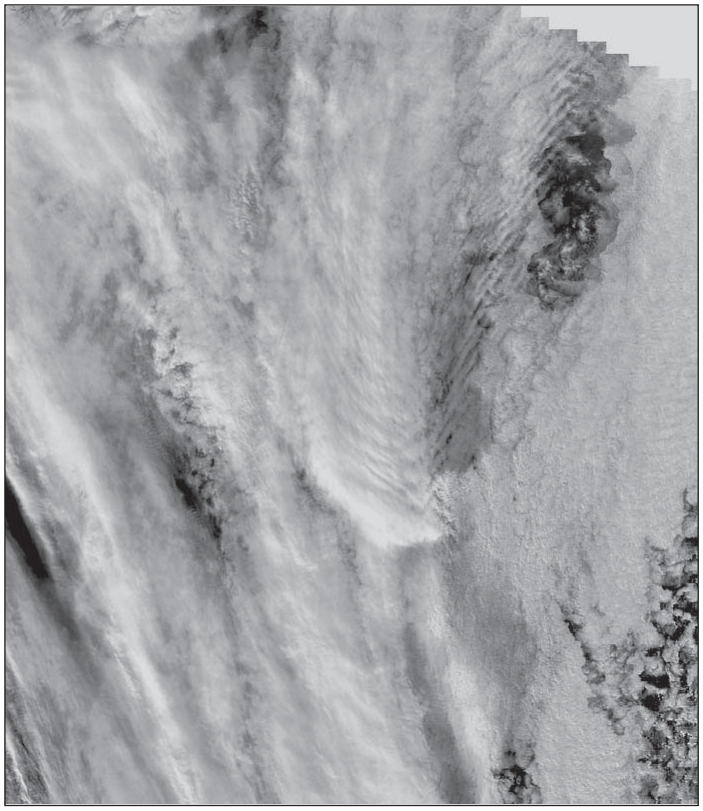
I processed it with Les Hamilton's "Smooth Modis" and David Taylor's "CorrectGeometry" (I attach this image too). Looking thoroughly at the resulting image, it is possible to see the sort of "ship waves" described by Les in GEO Q 11, p10. The waves are not as clear as in Les' article, but are clearly there. I don't know if it is of importance, but the highest mountain on the Faeroe Islands that I could find on a map is 882 m.

It may be also be of interest that my equipment is a DC antenna of Jerry Martes design and a R2FX receiver (we don't have problems with pagers in Sweden).

One interesting thing is that the last month I have had a much weaker antenna signal than usual. I guess that this has to do with some deterioration of the down-lead coaxial cable or some contact due to the very cold weather we have had, occasionally down to minus 25C degrees. And I will not climb the roof until it becomes a bit over zero. My QTH is Vallentuna, some 25 kilometres North of Stockholm.



NOAA 19, 20 January, showing area of interest



Modis Aqua 20-01-2010 13:10 UT Faeroe Islands

Peter Green

Like me you may well have heard all the chat about twitter and thought, “well do I really want to know what Stephen Fry is doing every minute of the day” and probabley came to the say answer.

Well having just bought a new mobile phone with internet access I spotted that the MET Office were doing alerts by region via twitter and so signed up.This was just before Christmas so I was kept up to date with all the snow and ice warnings.The nice thing about twitte is that its free. You can access it from any internet enabled device, so you can use it on your laptop or desktop.

There is an amazing array of “tweets” that interest me. Space related, you get info and photo’s from the ISS as the astronaughts tweet from the ISS. Just have a look around I think you may be pleasantly surprised.

Below are a some example tweets.

www.twitter.com

metofficeSWEng ADVISORY of Widespread Icy Roads for South West England valid from 1732 Wed 10 Feb to 2359 Wed 10 Feb http://bit.ly/bkoDOq

NASAKennedy Fueling of the GOES-P weather satelite is now complete and today the spacecraft is being mated to the Delta IV payload attach fitting.

ExploreSpaceKSC http://twitpic.com/12mlnf - The Solar Dynamics Observatory gets a big lift toward the sun from an Atlas V rocket during launch viewed from K

KATABATIC WINDS

Rake Antarctica's Terra Nova Bay

A NASA Earth Observatory Report

Shortly before the southern hemisphere's spring, Antarctica's Inexpressible Island and the Northern Foothills Mountains were illuminated by a glimmer of sunlight from a low angle when the Advanced Land Imager (ALI) on NASA's Earth Observing-1 (EO-1) satellite captured this image on September 16, 2009.

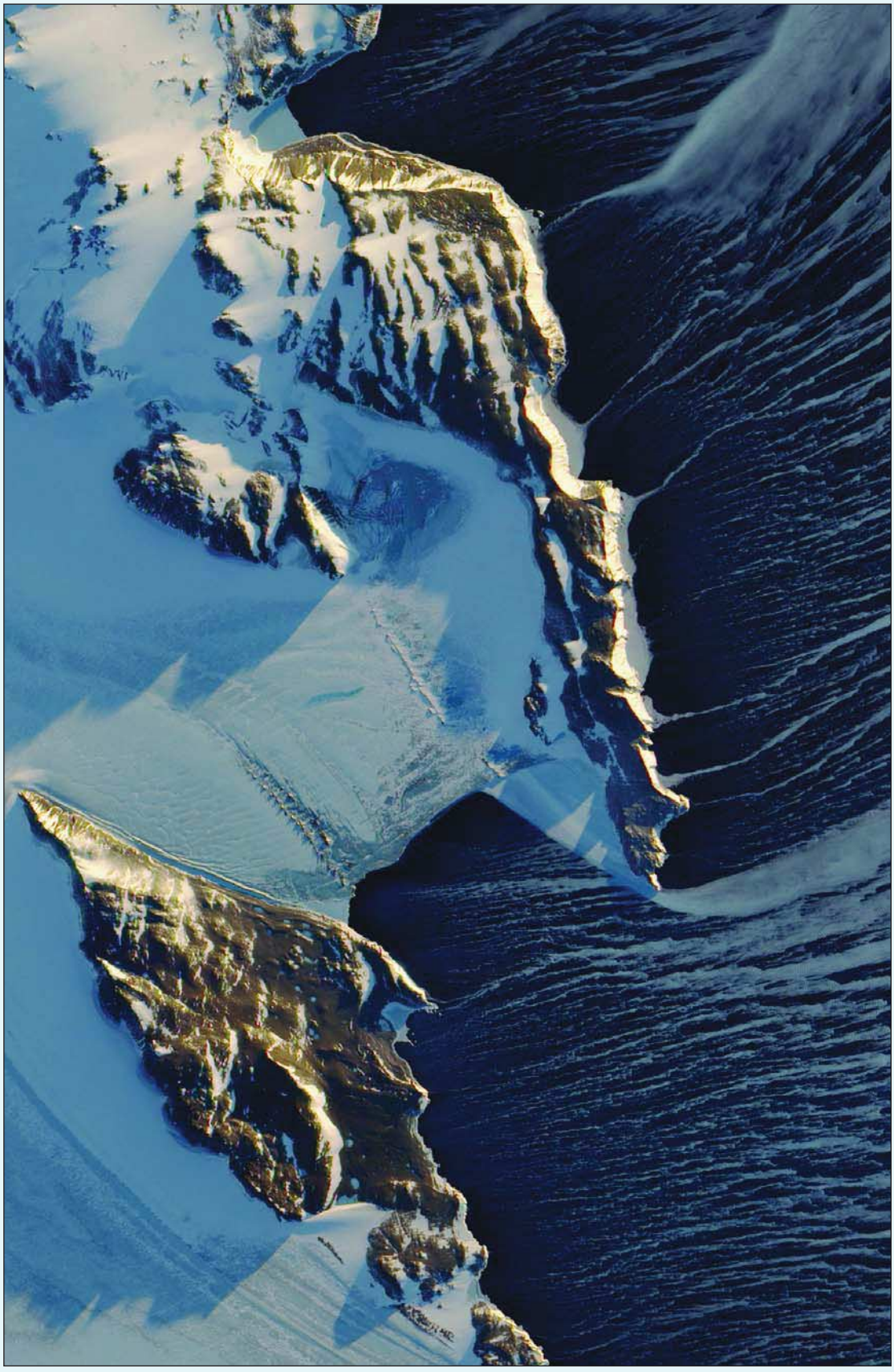
The seaward slopes of the mountains are gleaming white and cast long shadows inland over the Nansen Ice Sheet.

The scene provides two indications of the bay's persistent and fierce katabatic winds—downslope winds that blow from the interior of the ice sheet toward the coast .

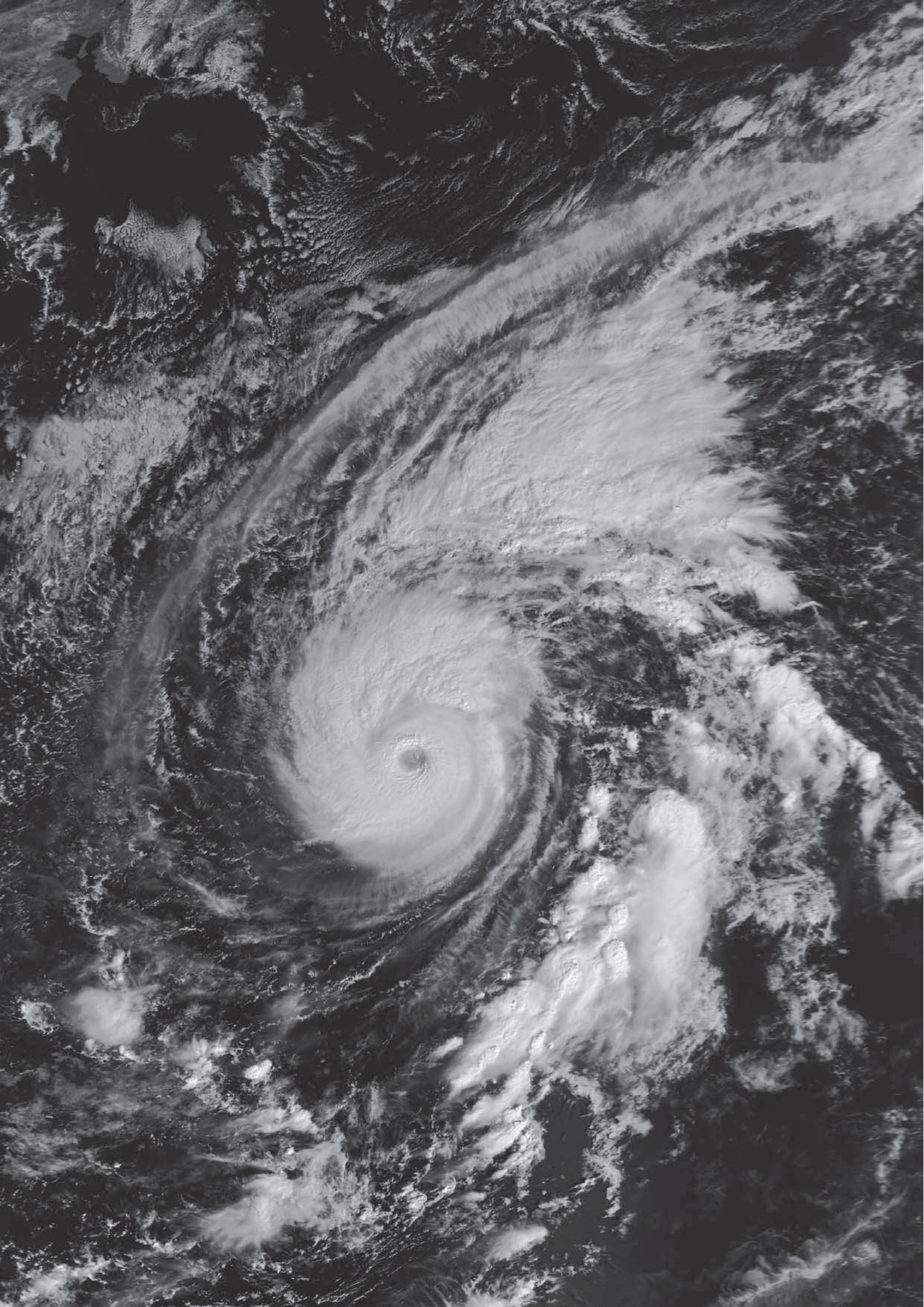
One is the windswept ground in the mountainous terrain. In many places, there is a pattern of bare rock and snow drifts that suggests the winds have scoured snow from upwind slopes and deposited it on the lee sides.

The second sign appears in the open waters of Terra Nova Bay (upper right), in the parallel white streamers of newly formed sea ice. The ice is continually pushed out to sea by the strong offshore winds, leaving a pocket of open water, a polynya.

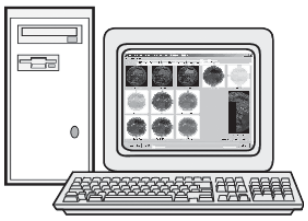
The winds are responsible for making this location an ideal spot for Adélie penguins, which have a colony on Inexpressible Island and at other sites around Terra Nova Bay. Unlike Emperor penguins, which breed on sea ice, Adélie penguins nest on ice-free land, which must be accessible to them via open water and close to their marine food supply.



NASA Earth Observatory image created by Jesse Allen and Robert Simmon, using EO-1 ALI data provided courtesy of the NASA EO-1 team and the United States



Computer Corner



Douglas Deans - dsdeans@tiscali.co.uk

Well I wonder how many of the membership are now using some edition of Windows 7 and whether you upgraded or undertook a fresh install?

As I mentioned in my last column I was facing a decision as to whether to install the 32 or 64 bit option. Both DVDs are provided with all editions of Windows 7.

In the end I played safe and decided on the 32 bit system. I could have upgraded as I was already running Vista (upgrade is not possible from XP) but decided that a fresh install would be the best choice, providing a new clean installation after several years of running Vista. The speed after a fresh install makes the additional effort all worthwhile. Of course it is essential under those circumstances to ensure that you have back-ups of all your data files and can readily put your hands on programs which will need to be re-installed. It is also worthwhile to check drivers for your new Operating System and have them ready if necessary. In other words a little fore-thought and effort can save a lot of headaches later. Nevertheless there will always be something you will forget. To be absolutely sure I took an image of my Vista system using Norton Ghost so all my data was readily accessible for loading back. Better safe than sorry.

By the way it is worth noting at this stage that all editions of Windows 7 now provide an option to take an image of your hard drive in addition to the usual back-up provision. It is not as good as some of the commercial offerings with less options, but it is still a very useful and potentially cost saving tool ….. well done Microsoft.

I should also mention that my brother showed more courage than me and installed the 64 bit Windows 7.

He reports very good performance all round and it is reassuring to hear that his Eumetcast results are excellent (probably better than mine) even with a single computer system. Indeed his opinion is that the 64 bit system is giving a better performance from Eumetcast than the 32 bit, he previously used. Perhaps I should have been more courageous !

Following my previous critical comments regarding the interference by the European Commission to stop Microsoft offering only Internet Explorer with their operating system, I am pleased to report that the dispute has been settled and a compromise reached.
This nonsense has been on-going for years, with the EC imposing fines on the basis of Microsoft's anti-competitive behaviour. Microsoft will now provide a range of browsers (choice screen) to make the installation of your choice straightforward to achieve. It will be added to new computers and the existing Windows XP, Windows Vista and Windows 7 computers in Europe, where Internet Explorer is set as the default browser, for the next five years. Goodness me have the EC nothing better to do.

Google Earth has been around for a very long time now but I wonder how many are aware of the interesting options it can offer our hobby. I will take a brief look at those as well as the usual program updates.

Google Earth

Eumetsat and David Taylor provide options to view their products via the Google Earth framework. Obviously you will first need to have Google Earth installed on your computer. For those that do not yet have it, simply go to :-

http://earth.google.com/download-earth.html

There is a multitude of interesting things to do and enjoy with Google Earth so it is a fascinating program to use even without the hobby related options.
Let us first look at the Eumetsat package which at the time of writing is limited to their 0 degree (Meteosat 9) and IODC imagery. For the moment the package only uses their Multi-sensor Precipitation Estimate data (MPE) for the 0 degree and IODC data. Do not expect too much from this but Eumetsat have stated that further products will be made available in due course so this data provides an introduction to the uses of overlays on the system. Download the kml file from the following site.

http://www.eumetsat.int/Home/Main/News/Features/713983?l=en

Double click on the file from its download location and the Eumetsat options will be loaded into your Temporary Places. When you decide to close Google Earth you will then be given an option to put the Eumetsat links into your my Places for future use. As simple as that. To view the products simply select the ones required from the expanded My Places. I have shown an example of this in the adjacent image.

David Taylor's WXtrack (registered users only) can also be used in conjunction with Google Earth. It can send the sub-satellite location of the currently selected satellite to Google Earth and drive the map display on a regularly updated basis. As David says in his own notes this is a fun mode of operation. The speed of the update can be adjusted by simply selecting Options > Google Earth and setting as required. In addition there is an option to control the camera height. Well worth a try.

An example of what is currently possible can be found on the inside cover.

Software Updates

POVIM
There have been a number of updates to Fred van den Bosch's POVIM program.

Let me remind readers that POVIM stands for Product Orientated Video, Images and Maps. Fred developed the program many years ago for the weather satellite fraternity recognising that our hobby often comprises a wide selection of different quite separate programs and a wide array of files and file locations. The idea behind it was to provide a structured and integrated environment to help draw everything together. There has been a couple of interesting articles by Fred in two of our previous journals and I strongly recommend those interested to have a read.
The first was in GEO Quarterly 8,

December 2005 and the second in GEO Quarterly 21, April 2009.

POVIM Presentation Manager which integrates the suite of programs under the umbrella of POVIM, has two constituent parts. Those are Product Manager and Presentation Manager.

Very briefly Product Manager allows you to create your own products and select where you want them stored. A wizard is provided to ease defining the products. You can put similar types of products into your own defined groups.
With the Presentation Manager there is a vast array of options, and I have tabled some of the more interesting ones below.

selecting up to 20 products from a list of products.
present them in thumbnails: 2, 6, 12 or 20 on the screen.
synchronized scrolling in steps of 15 or 60 minutes.
synchronize the time with a button or automatically.
setting the time with a slider.
call your favorite photo viewer to see the images on full screen.
use all the options of your photo viewer like zoom, scroll and print.
make a slideshow of all images in one folder (only with IrfanView: hardcoded functionality).
display generated images or generate the image "on the flow".
always display the latest received image depending on the selected time.
display images (jpg, bmp,gif) video (avi, mpeg) and maps(jpg, bmp,gif) from e.g. Digital Atmosphere (due to limitations of Delphi png and tiff are not possible).
start satellite- or weather program or go to a specific internet site.

To learn more about Fred's suite of programs and to download the latest updates please go to :-
http://www.fredvandenbosch.nl

David Taylor's programs (latest releases).
Just a reminder that the list below is for full tested releases and does not include the latest beta (or alpha) versions currently on test. Those can also be downloaded from David's site.
To learn more about those programs and to download the latest updates please go to :-
http://www.satsignal.eu

ATOVS Reader	v 1.2.0
AVHRR Manager	v 1.6.6
BUFR Viewer	v 1.1.4
CMA Viewer	v 1.2.0
DWDSAT HRPT Viewer	v 1.1.2
GeoSatSignal	v 7.1.2
GRIB Viewer	v 2.3.4
GroundMap	v 2.1.2
HDF Viewer	v 1.4.2
HRPT Reader	v 2.9.2
Kepler Manager	v 1.3.2
MapToGeo	v 1.1.6
Metop Manager	v 1.4.2
MSG Animator	v 2.5.32
MSG Data Manager	v 2.5.36
PassControl	v 3.2.4
SatSignal	v 5.1.4
Sea-Ice & Viewer	v 1.4.2
Wxtrack	v 3.8.2

Storm Dunlop, Sky, Guild of Master Craftsman Publication, 2009. ISBN 978– 1–86108–660–0, pp. 160, £14.99.

Robert Moore

Storm Dunlop's work will be well-known to many GEOQ readers. While we mainly look down on the sky and clouds from Earth orbits, he looks upwards and, more importantly points his camera upwards also.

This handsome volume contains photographs from photographers across the world. Every shot is a work of art and the images include a number of rarities, seldom seen and much less photographed (a circumhorizontal arc, a combined parhelion and subparhelion and a 'bishop's ring' for example).

The pictures will not disappoint the reader – they are magnificent. The brief captions accompanying each image may however disappoint GEOQ readers. Most of us know something about climate and weather, many may be keen amateur photographers.

The text is too sparse to tell us anything of scientific interest and there is no information about how the pictures were taken or processed.

There is, of course, a problem for authors which effects both academic writers and serious popular authors like Dunlop: if you write for a scientific readership you lose your popular readers, if you write a book that is accessible to all, the more specialist readers will be frustrated by the lack of technical detail. In these matters the publishers usually hold the whip hand.

So Sky will not become a reference book although it will be one source of images of some rarer types of cloud and optical phenomena.

Readers with an interest in climate and weather will turn to Dunlop and Wilson's Weather and Forecasting (Chancellor Press, 1982) and anyone wanting information on clouds, as such, will probably pick up Pretor-Pinney's The Cloudspotter's Guide (Sceptre, 2006).

Aspiring weather photographers will read Dunlop's Photographing Weather (Photographers Institute Press, 2007).

Whilst Sky would enhance any coffee table it is much better than a 'coffee table book'. It would, for example, be of great value in a school library where it might encourage young people to look upwards and to ask questions about clouds and the sky. Furthermore kept on a shelf in the Art class it would stimulate debates about colour and form and perhaps lead to the production of some very adventurous art works.

There is a big 'Wow!' factor in this book and given the extraordinarily low price for such books it can be enjoyed and admired by the more technically minded reader as well as enchanting the casual reader. Any book that challenges us to look, and to look intelligently, at our environment is to be welcomed.

FEEDBACK

The Column for Readers' Letters and Queries

email: geoeditor@geo-web.org.uk

May I through GEO quarterly, express my thanks to Les Hamilton for his sterling service and help he has given me in writing articles for GEO over the years. (Even though his answers are sometimes not what I wanted to hear, he is always honest and to the point)

I wish you luck in your new ventures Les and thanks for being a friend.I have decided to continue with the hobby when I find another place to live, (Ed Murashie was right, I have a passion for the hobby) and it would be a shame to give up all I have learned and accquired over the years. I look forward to helping our new editor Peter Green who I have met and is a great guy, Thanks to you both.

Rob Denton G4YRZ

www.wxsat.org

Greeting card from Argentina

I would like to express my thanks and acknowledgement on behalf of GEO to all those individuals and organisations who posted and emailed Christmas and New Year greetings to our group. I received greetings from within the UK and from four other countries. It is rewarding to think our active membership is spread so widely.

I found the above email greeting from Carlos Cotlier of special interest because on my recent travels I came so close to his home town of Rosario, Argentina. I have met Carlos at two NOAA conferences in 2004 and 2008. I hope we will keep in regular touch in the future.

Note that this greeting card and the Envisat image of the River Plate estuary shown elsewhere, form the basis of this issue's Quarterly Question.

Francis Bell


Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2010 Cnes/Spot Image
Image IBCAO
Image © 2010 TerraMetrics
22°05'01.86" N 5°43'09.40" E elev 1110 m
©2009 Google
Eye alt 11000.91 km