The GEO Quarterly

Group for Earth Observation

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

Number 26

June 2010

Inside this issue . . .

Publisher

Published by The Group for Earth Observation Limited, a company in England and Wales, limited by guarantee and not having share capital.
Company number 4975597.

The registered office is Coturnix House, Rake Lane, Milford, Godalming, Surrey GU8 5AB England.

Printing
Advent Print Group,
19 East Portway Industrial Estate,
Andover,
Hampshire SP10 3LU.

The GEO Quarterly

June 2010

Editorial: Peter Green

The amount of data that is available to us just keeps growing. As you will see in this issue MODIS Data with all its channels is here with a new viewer program from David Taylor, with a terrific example on the inside back cover.

Envisat is capturing more of our members interest with some stunning images, Arne van Belle and Francis Bell share some of their first examples, with a promise of more to come, also David Taylor with an in-depth article on how to receive these data.

With volcanoes very much in the news David Painter who was already working on his two part article before our friend Eyjafjallajokull (which is now a household name, even if we cant say it!) bought Europe to a standstill and gives us his in-depth look at these untamed natural eruptions. I see plans are being formulated to ensure the next generation of geostationary satellites have improved censors and coverage for Europe to help volcanic ash tracking and modelling.

Les Hamilton looks at Antarctica's Mertz Glacier as Iceberg B-9B shatters, with stunning images for us to see.

Dale Hardy shows us the how weird and wonderful the weather can be in New South Wales when he awoke to a Martian Dawn.

In Q25 Francis Breame looked back at the early days of Dundee University, this prompted a pioneer of amateur reception to get in touch. John Tuke takes us through his trials, tribulation and success that so impressed NASA they invited him to America.

There are many varied and interesting articles from our members for you to enjoy.Please let me have your contributions for the next Quarterly before 31st July, without you this magazine is nothing. I would like to reflect all the members interest, whether APT or geostationary, beginner or experienced, let me know about how you got into the hobby. I prefer to use high quality images from our members rather that from other sources, so any that interest you may well be of interest to others, send them in.

I am very grateful to Douglas Deans for his new series in Computer Corner, explaining the data and channels available over EUMETCast and there uses to us to study our weather and world.

Thank you to all those that contributed, if you have not contributed before, why not send something in for Q27, it will be gratefully received In the meantime I hope you enjoy Q26.

Contents

The GEO Report

Francis Bell

I have recently been in touch with our membership secretary and he informs me that there have been a number of new members joining GEO for the first time. This is very encouraging and I would like to offer a warm welcome to all new members. Along with this welcome is a request and an invitation to contribute to the group with materials in the form of text, images, personal experiences for our Quarterly publication, whether you're a novice or an experienced user your contributions will be welcome. Materials should be sent to the editor, myself or anyone in the management team. There are also Internet discussion groups and contributions here are also be welcomed.

Our membership numbers are reasonably constant at just over 500. This means that new members balance those who do not, for what ever reason, chose to renew. When a membership renewal is due you will receive a notice with your last quarterly. Please act on this promptly as we do not have in place a routine system for reminding lapsed members that they have not renewed. The bottom line here is please renew promptly or we will lose track of you.

Membership numbers are closely related to our finances. Of course our two biggest items of expense are the cost of printing and distributing our Quarterly. These costs just about balance membership subscriptions hence our need to maintain membership numbers. It is reassuring to know that the shop as well as providing an outstanding service to members and non member with access to hardware that would be very difficult or impossible to source elsewhere, it also makes a modest profit for the group providing a financial buffer should it be needed for any reason.

Envi-Ham Project

GEO Quarterly 25 contained guidelines about how to become involved in the Envi-Ham project. As far as I know the opportunity to engage in this project is still available. However, there is one important correction to the contact point for ESA in Frascati. The email contact should be tta@esa.int not Stefano Badessi's personal email address. Just to repeat Envi-Ham correspondence should go to tta@esa.int

My involvement with the Envi-Ham project continues to excite me. I am receiving a steady stream of high quality images from ESA's Envisat earth observation satellite: examples of these images are published elsewhere in this Quarterly, see pages 21,22,32 and 37. I still consider myself a beginner with this project both for signal reception and image processing. With help from Arne van Belle I am learning to combine some of the different spectral channels contained within the raw image data and assign different colours and brightness to these channels to produce natural looking colour images. You will see from my examples I'm still on a learning curve. In the short term I have to admit to the satisfaction of displaying attractive images with identifiable coastal outlines rather than pursuing a specific scientific objective: perhaps this will come in time when I am more experienced. An exception here may be the eruption of Iceland's Mount Eyjafjallajokull with its disruptive ash plume. I am currently researching images showing this eruption. I have already seen spectacular film of the eruption recorded by 'National Geographic'.

The eruption of the Iceland volcano was not an insignificant experience for me as I was in Japan with my wife when the eruption of Mount Eyjafjallajokull with its dense ash plume became news-worthy on TV. Our hotels in Japan all had TV in the rooms allowing us to follow the story, sometimes on CNN or BBC but more often on a Japanese channel; well we could look at the pictures and recognise the closure of airports in London and Germany even in Japanese! For many days the volcano affected flights out of Japan and I know many British travellers were stranded for several days. For us the news was good as scheduled BA flights back to London resumed one day before we were due to return home but I am very sympathetic for those who were delayed.

Another point about Japan may be worth a note. Often on my travels I take my mobile APT system with me and the recent Japanese expedition was no exception, however, we were so busy with our travel programme that I did not have a single opportunity to set up my APT station and receive satellite images of Japan. There is consolation here because I took terrestrial based photographs instead - all 380 of them!

Freebie publications.

In Quarterly 23 I gave details of how to receive a number of free space / earth observation publications. Just as I write this report I have received my latest copy of 'Planet Earth' This is published by the Natural Environment Research Council. This publication has taken over from BNSC's 'Space News' and is more earth rather than space orientated but I think it is an excellent publication. A reminder that you can order it on-line at ***www.nerc.ac.uk***

The above reference to BNSC should prompt members attention to the fact that a new UK Space Agency has been formed. The 1st April 2010 was the 'launch' date for this new agency. The UKSA will take over responsibility for UK space policies which were previously in partnerships between Government Departments, Research Councils and BNSC. I'm sure GEO will follow the activities, influence and development of the UKSA. For a little further comment about UKSA see my 'Outreach' report of the UK National Space Conference on Page 8

Contact with membership

I would like to establish a data base with email addresses of members. I know that all members are not on the Internet but I suspect the majority of members do use the Internet and email. I know that in some cases members email addresses are lodged with our membership secretary but in some cases these may be out of date. In order to establish an up-to-date record it would be useful to have a fresh direct email contact point with members. I envisage using the system only on an occasional basis for important notices or news. There would also be the facility to send an occasional newsletter relating to GEO's activities. The system would not be used for routine contacts or as a substitute for our printed Quarterly.

I would like all members who are willing to send me an email using their preferred address. Just send me a one line message: 'Please include me on your email data base.' or something similar. Please also give your preferred full name. I will send a brief acknowledgement. I will keep the data

base on dedicated secure computer and the address list will be used only at my discretion. I think this will be a useful resource for the future. My address is francis@geo-web.org.uk

Additional Help

I was very pleased to receive an email from Rob Denton responding to my request for somebody to take over responsibility for either International Liaison or the more routine task of mailing out the Quarterly. You will recall our new editor previously looked after International liaison for us and Peter Wakelin the distribution of the Quarterly. Rob's offer of help is much appreciated and details will be agreed in due course.

A Satellite Status Report

In the past our Quarterly has carried details of orbits, operational status and downlink frequencies of a number of weather satellites. Contributions were generated by a number of people. I think it will be constructive for the future to establish a regular one page report covering weather satellites, and perhaps others, in which our members are likely to be interested. I notice this is covered well in 'De Kunstmaan' and in outline by EUMETSAT's 'Image'. It would be great if we could establish something similar.

The Request

Is there a member who would be willing to look after this Status Report page on a quarterly basis? Once a format or page layout was established the task of keeping it up to date should not be too much of a burden. The quarterly task would be to document as appropriate changes in available frequencies formats or services and reporting any new satellite or service.

Do we have a member who is willing to undertake this role? I can provide an outline of what I have in mind but this would not be prescriptive with format and presentation being left to whoever undertakes this role. Please contact me francis@geo-web.org.uk if you are willing to help.

Future events

31st July - 1st August AMSAT-UK is holding its annual colloquium. The venue is the Holiday Inn, Guildford. GEO hopes to be represented on both days with displays and a presentation relating to the Envi-Ham project. For further information visit ***www.uk.amsat.org***

4th-5th September The Royal Meteorological Society is planning a conference in Reading. This could be an important event and GEO would like to participate but details are uncertain and needed to be checked. A Keynote speaker from EUMETSAT has been invited and the detailed programmed is about to be published. GEO hope to be a major participant in this conference. Accommodation will be available, for the latest news ***http://www.rmets.org/***

1st - 2nd October The National Hamfest 2010 is to be held near Newark Notts. Last year this two day event was well attended and GEO plan to have a stand again this year running live satellite images. This event is well worth visiting. For further details Google Lincoln Short Wave Club or visit: ***www.nationalhamfest.org.uk***

11th September and 13th November 2010 These are the dates for De Werkgroep Kunstmanen meetings in Utrecht, Netherlands. I understand that there will be a number of GEO members attending their 11th September meeting For further details visit their web site ***www.kunstmanen.nl***

I expect there will be RSGB contact points as well.

I wish to express my disappointment that plans for our own symposium have been compromised this year. I did make a provisional booking at the NSC Leicester but uncertainty by others prevented me from confirming the event. I will not allow this to happen again.

Conclusion.

It would not be appropriate for me to finish my report without a 'thank you' to our new editor who produced GEO 25 for us. When talking to GEO members or members of the public who see our publication for the first time all are complimentary about its quality of presentation and content. It must have been a daunting task for Pete Green to undertake the role of editor and maintain the standard which we have enjoyed since GEO's formation in early 2004. This has been achieved so on behalf of our group an expression of thanks to our editor.

The Quarterly Question 25

Regular readers will remember the last Quarterly Question related to an Envisat image of the River Plate plus parts of Uruguay and Argentina. The question was prompted by my recent visit to the River Plate and the greetings message received from Carlos Cotlier at the Remote Sensing Centre, Rosario University, Argentina compounded by my new interest in receiving Envisat images. The question was: 'Could the town of Rosario be seen on the satellite image?' The image was printed on page 13 of GEO 25. Understandably the answer was yes. Using the standard graphical x, y coordinate system with the origin at bottom left, with a scale of zero to ten on each axis the following cities could be located:- Montevideo at 5.9, 5.7 Buenos Aries at 3.4, 5.4 and Rosairio at 0.5, 7.4. Rosairio is about 160 miles NW of Buenos Aires although I had to use a scaled map to determine this distance.

Disappointingly only two members responded but both correctly. My thanks to Peter Merlin, UK and Mike Bragg , Timaru NZ for their time and interest in this question.

Quarterly Question 26

This new Quarterly Question has again been generated by an Envisat image which this time I received on my own newly established Envi-Ham system. On this particular image I was astonished to see an island in the middle of the Mozambique Channel. I just didn't know that such an island existed. For the most part the Mozambique Channel is effectively ocean with a sea depth of about 3,000 m. However, I have now discovered that there are a small number of islands originally volcanic in origin, now subsided and contracted but leaving coral reefs at their surface. This is exactly the history of the island which had attracted my attention.

Here comes the double interest. In January of next year my travel plans will for a few days take me into the Mozambique Channel. I certainly don't want to be shipwrecked on the island I had seen - as others have in the past! I have been on a learning curve with respect to this island and have established some facts and figures.

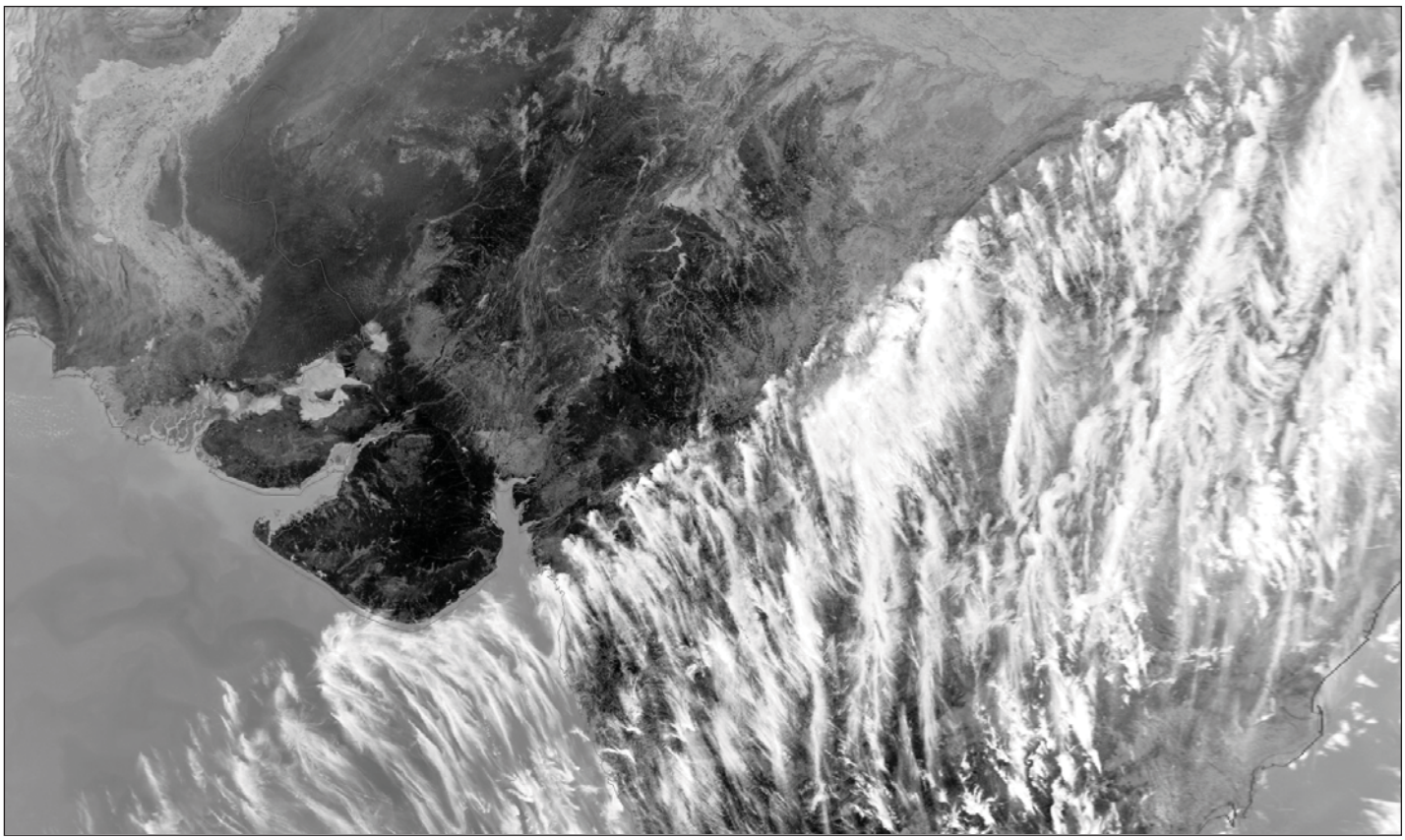
The island was first discovered by the Portuguese in the 16th century. The island rises steeply from the sea bed about 3,000 m below. The island is a roughly circular atoll about 10 km in diameter with a central lagoon of about 80 km sq and it is located in the southern Mozambique Channel. The reef rim averages about 100 m across and totally encloses the central lagoon which is about 15 m in depth. The atoll consists of 10 barren rocky islets with no vegetation and a maximum height of 3 m above sea level. At high tide the whole island is covered by the sea. The region is subject to cyclones and has long been a maritime hazard.

The question is straightforward. What is the name of this island. Either its original name or the modern name will be judged correct. The satellite image showing this island is on page 32.

A randomly chosen winner will receive an attractive marine related gift which I will buy in the Comoros Islands in January 2011.Answers to me by email by the copy deadline for GEO Quarterly 27. ***Francis@geo-web.org.uk***

Transverse Cirrus Bands

Robert Moore



On the 19th February 2010 while browsing Metop-A images I noticed a line of cloud across India approximately south-west/north-east from around Surat on the coast of Gujarat. This shows up very clearly in Channel 4 [above]. A quick look at my atlas reinforced my view that this was orographic cloud created by warm air from the north being forced up over a range of hills and mountains. Others pointed out that as this feature extended over the sea this was unlikely to be the case. David Smart on the TORRO (Tornado and Storm Research Organisation) list suggested that these were transverse cirrus bands and drew my attention to an article in January 2010's edition of Weather (the journal of the Royal Meteorological Society) 'Transverse cirrus bands in weather systems: a grand tour of enduring enigma' [1].

As the title suggests transverse cirrus bands are an enigma and the article reviews the current state of knowledge about them. The bands are, apparently, quite a common feature, often noted on the edges of tropical storms but also in mid-latitudes. They are poorly understood, but when not associated with tropical storms (as in the case illustrated here) the bands are aligned roughly perpendicular to the 300mbar wind flow. This means they are found along the edge of the jet stream. The authors note that 'The connection between transverse bands (especially the widest and thickest bands) and CAT (Clear Air Turbulence) is now a longstanding aviation forecasting rule-of-thumb.' They go on to suggest that understanding transverse banding is therefore of considerable interest to aviation forecasting.

So the chances are that this image is in part a picture of a mystery (or is it a mystery of a picture?). By the time I had seen some of the discussions I no longer had any upper air charts or the adjacent satellite images to continue my enquiry. It is most unlikely that I would have got much further anyhow, but it's nice to know that something that confused me also puzzles top scientists, albeit at a much more advanced level.

[1] John A. Knox, A. Scott Bachmeier, W. Michael Carter, Jonathan E. Tarantino, Laura C. Paulik, Emily N. Wilson, Gregory S. Bechdol, Mary J. Mays 'Transverse cirrus bands in weather systems: a grand tour of an enduring enigma' Weather Volume 65 Issue 2 , Pages 35 - 41 (February 2010)

Meteosat Third Generation

A consortium led by Thales Alenia Space of France will enter into negotiations for a 1.3bn-euro (£1.2bn) contract to build Europe's next weather satellites.

The TAS group was selected after a competitive process run by the European Space Agency (Esa).

The Meteosat Third Generation (MTG) system will comprise six satellites, with the first spacecraft likely to be ready for launch in 2016.MTG is expected to bring a step change in weather forecasting capability.

The programme should guarantee European access to space-acquired meteorological data until at least the late 2030s.

Sea of Okhotsk

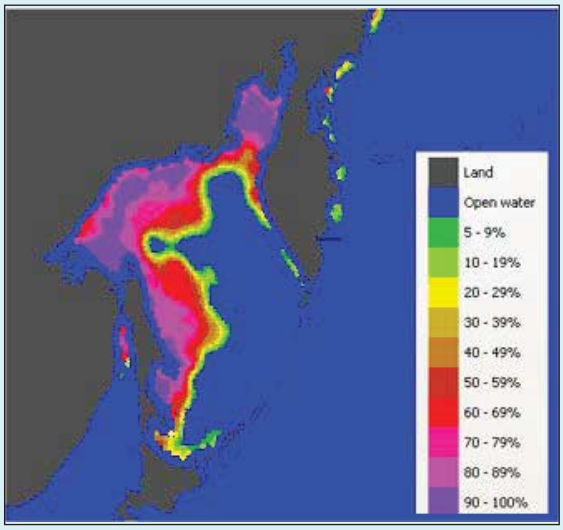
Robert Moore

copyright EUMETSAT and received 21 February 2010

The image from METOP-A on February 21st shows ice breaking up in the Sea of Okhotsk. This area is especially interesting, being one of considerable tectonic and volcanic activity – the latter being a notable feature of the Kamchatka Peninsula. The sea is a major region for marine wildlife including a number of endangered species and as such is deemed to be of global importance. The region also has substantial oil reserves. During the Cold War the Sea of Okhotsk, fully surrounded by Soviet territory, was an important location for military operations by the USSR and for US espionage.

The sea itself has a very large tidal range and is noted for its strong currents. The freezing of the sea is affected by the mixing of fresh water, from numerous rivers but mainly from the mighty Amur which flows into the sea behind Sakhalin Island. The inflow of fresh water raises the freezing point of the water by lowering its salinity.

The disintegrating ice sheet can be seen very clearly in this image and the section of the sea ice map produced using David Taylor's SeaIceViewer enables us to register the ice concentration against the visual imagery. The beautiful cloud streets to the south east of the ice are formed by cold air flowing off the ice and encountering warmer sea. UK observers are familiar with these formations off the south western tip of Greenland.



copyright EUMETSAT and received 21 February 2010 produced using David Taylor's SeaIceViewer

Perhaps the other point to note from this image is the extremely harsh, bleak nature of the mainland in the winter.

In the Beginning

John B Tuke

Several years ago, John Tuke compiled an article describing his early days producing APT satellite images. Following our appeal for more reminiscences at the end of Francis Breame's article last issue, John wrote in with some fascination information (see 'Letters' page). It also provided the ideal opportunity to reprint John's article for the benefit of new readers.

I suppose it really all started in 1940. If you suddenly find yourself working in North Uist in the Scottish Hebrides, you quickly come to the conclusion that the weather is such a dominant factor that, if you can't fight it, you might as well join it and get to understand it. After the war, there was always the problem of how to obtain weather information: the only way for the first ten or fifteen years was to copy hundreds of coded five-figure groups in *Morse*, and draw your own charts. To see what was happening out in the Atlantic took the best part of a couple of hours.

Things were improved with the coming of radio-teleprinter transmissions and in the mid-fifties radio fax came along. A drum-type fax machine using *Meccano* was built and, after a good deal of modification, was very successful. The main problem was getting the synchronous motor driving the drum to run at the correct speed—finally solved by making a tuning-fork oscillator kept in a home-made oven. The image was processed on 'Teledeltos' paper. A sharp pointed stylus rested on the paper and, when a current flowed, it burned off the top pale-grey layer to show black underneath. It smelled like fireworks, and gave off smoke. In the sixties came the happy day when I first heard about weather satellites; but how to receive them—that was the question.

Information from official sources was largely absent. I wrote to one well-known wireless magazine and was told that if I proceeded with trying to pick up the satellite transmissions I was likely to find myself in 'The Tower' for contravening the official secrets act! However, bits of information started to trickle through and it was obvious that a receiver in the 137 MHz band was needed, plus a fairly large aerial and a fax-type receiver. A receiver using valves was built up, with one RF stage, a mixer, a string of IFs and some simple audio filtering. The aerial was an eight-turn helix (good job I had plenty of space at that time) steered by hand with ropes by watching the signal strength meter and waving it about for best results, as I had no orbital information. With a bit of modification to

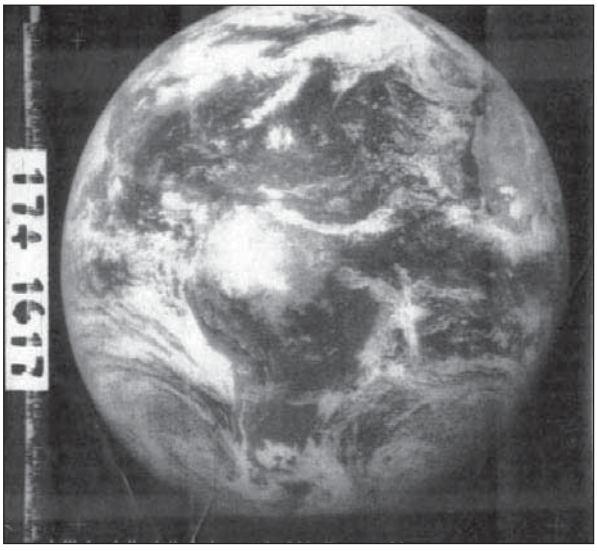


Figure 1 - An Image acquired from the geostationary ATS3 satellite

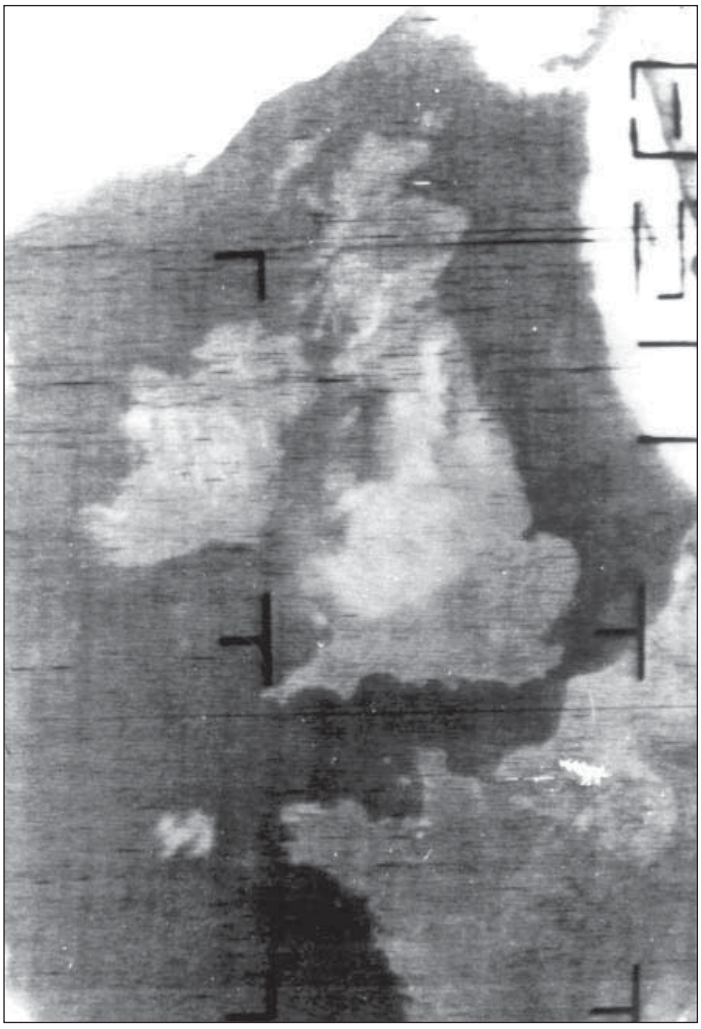


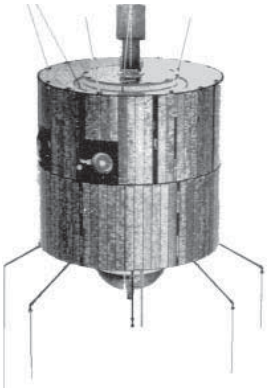
Figure 2 - One of the 'ESSA' images that John took with him to the US on his 1968 visit. You can clearly see the horizontal lines across the image. These were produced by the stylus as it burned into the *Teledeltos* electro-sensitive paper. John kindly provided this image as a print from one of his archived photographic negatives.

the fax receiver, so that it would run at 240 rpm instead of 120 (achieved by grinding the tuning-fork down a bit), and modifying the output so that the stylus would produce shades of grey instead of simple black and white, results were obtained. Unfortunately, there was only one satellite and it was only receivable once or at the most twice every twenty-four hours so improvements and modifications were tedious to say the least. But eventually, quite good results were obtained and, out of curiosity, I send some to NASA and asked them what they thought about them. Much to my surprise they were quite impressed, and as a result my wife and I were given a fortnight's all-expenses paid 'Cooks Tour' round the Space Programme in general and the GEC weather satellites in particular, from New York to Los Angeles.

The result of this tour and the publicity it generated resulted in several people getting in touch with me on my return to UK and also the opportunity to acquire a genuine fax receiver, the big *Muirhead* photographic chart recorder commonly known as the 'Fish Fryer' because of its shape. This produced its picture on a sheet of photographic paper wrapped around a drum, the signal

altering the light intensity by moving a galvanometer mirror which reflected more or less light from a very bright bulb. It was necessary to do quite a bit of signal conditioning to give good results and I would monitor the signal on an oscilloscope to achieve really good pictures. There was of course no modifying the picture after it was received.

Some of the results were impressive and I had a visit from Dundee University as they were interested in starting up. In fact I gave them my original VHF receiver so that they could get going. When I moved from the west of Scotland, they also had my helix, which I understand was mounted on the university roof, but not steered by ropes!



ATS3
Credit: NASA

One early problem gave a bit of trouble. The first night-time transmissions were at some very slow and very odd line frequency. I cannot remember what it was but something like 48 rpm, but with several decimal places following! This necessitated making a new tuning-fork and replacing the motor drive transformers with bigger ones so that they would operate successfully at a low frequency.

Eventually all the worst of the bugs were ironed out and, by the early seventies, everything was going fine on a regular basis. Interest was growing everywhere in the reception of the satellites and for a while it was even possible to receive a geostationary image on the 137 MHz band. This was from a satellite called ATS3 and one of its images is reproduced here. They are not very good, as the signal was extremely weak (figure 1).

The original satellites produced their pictures by taking a 'snapshot' of the scene below, and then scanning and transmitting it. The Nimbus series was the first to use the continuous transmission which we have today. The first pictures like this were not linearised at the edges, and you 'saw' from horizon to horizon. This was really quite remarkable and a good picture, if looked at it sideways on, gave quite an impression of the view you might get if you were up there!

Figure 2 was obtained during the 'sixties from one of the early *ESSA* satellites. These spacecraft were designed and configured exactly the same as *Nimbus-1*. The satellite had a mass of 138 kg, and took the form of an 18-sided polygon, 105 × 55 cm. The craft was made from aluminum alloy and stainless steel covered with 9100 solar cells which served to charge the 63 nickel-cadmium batteries.

Although I had a lot of fun making all the equipment in the early days, my main interest is really in the weather itself, and the coming of modern gear and the use of computers means that I can concentrate on the results rather than the technical side. Together with the conventional surface weather charts the satellite images help to build up an overall picture of the meteorological situation.

Finally I must remember my good friend Drewie McGuffie (GM3CEA), unfortunately no longer with us, who was happy to spend long hours both by day and night in assisting in all the experiments of the early days. I guess we kept each other going when everything went wrong, as it often did! He also acquired a '*Fish Fryer*' and together we produced images which are as good as any you can get today.

AMSAT-UK

FUNcube UKSC 2010

The United Kingdom Space Conference was held from 24-28 March in Godalming Surrey. This premier event always attracts a stellar cast of speakers and this year was no exception. The launch of the UK Space Agency in same week added to the excitement. Many of the presentations are available for view from the Upstream server.

AMSAT-UK attended to explain their exciting plans for the FUNcube satellite. As well as the Amateur Radio SSB/CW transponder FUNcube will provide an in-orbit tool for science education outreach and hands-on training in space and all the STEM subjects (Science Technology Engineering & Mathematics). The telemetry system is designed for easy reception by school pupils using extremely simple hand held VHF receive equipment connected to a PC soundcard or USB port.

The satellite contains a materials science experiment and pupils will be able to receive the results direct from space and compare them with similar reference experiments in the classroom.

The FUNcube stand at the conference included a mock-up of the new satellite and a demonstration of the telemetry. FUNcube is expected to be launched in early 2011.

Michael Castle, G1ZVN, gave a short introduction on FUNcube during one of the education sessions and FUNcube was also featured in a presentation on the UK National Cubesat project.

During the 5 days over 1000 people attended the event and the concept behind FUNcube was well received.

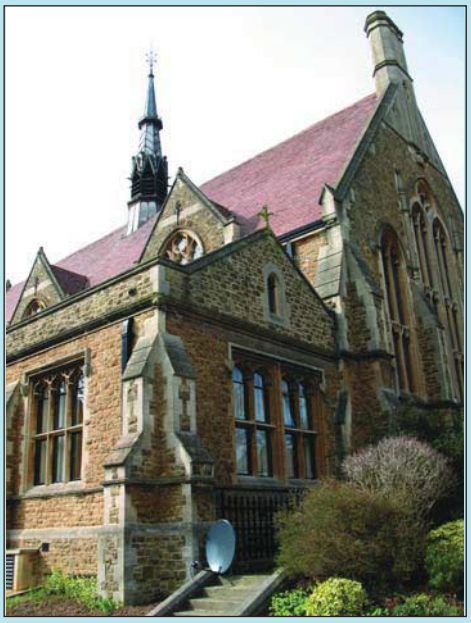
There will be more demonstrations of FUNcube at the AMSAT-UK International Space Colloquium to be held in Guildford from 31 July to 1 August.

AMSAT-UK publishes a colour A4 newsletter, OSCAR News, which is full of Amateur Satellite information. Join online at
https://secure.amsat.org.uk/subs_form/
FUNcube: http://www.FUNcube.org.uk/
AMSAT-UK: http://www.uk.amsat.org/
Upstream Server: http://www.upstream.tv/channel/uksc-2010

GEO OUTREACH 2010

Francis Bell

Alton Brownies:- Lauren, Chloe, Megan and Ella with their posters courtesy EUMETSAT

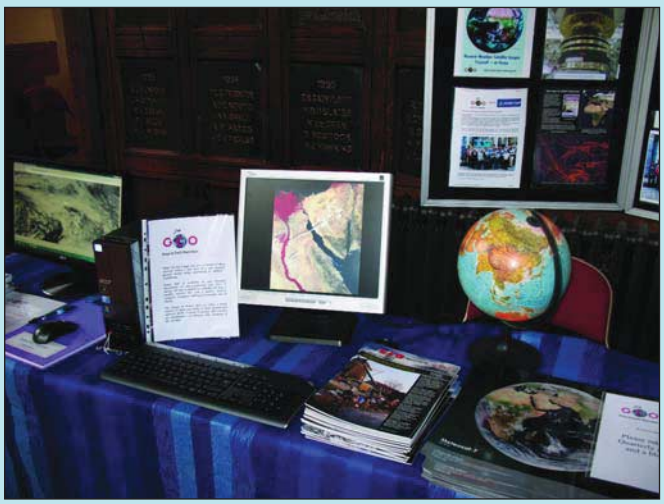


GEO satellite dish outside the Charterhouse conference hall

Lunch in front of the GEO stand in the main exhibition hall

Slightly desertedGEO and ESA stands while delegates were attending a lecture

Question and answer session with Lembit Öpik MP via 'Skype'



GEO stand the centre monitor showing recent Envisat images on the left live EUMETCast imaging

GEO Outreach 2010

The early part of 2010 saw GEO busy with two events involving school-children, the general public and the space industry.

Thinking Day on the Air

The Three Counties Amateur Radio Club (TCARC) of which I am a member has a long association with the Alton Brownies, so to celebrate this year's special event for them a radio station was established at the Brownie HQ in Alton. The station ran HF and VHF in different modes plus interfacing with the Internet. I took my weather satellite receiving station which I ran for two and a half days.

Some people will know that 2010 is special for the Guide and Brownie movements. It is the centenary birthday of Lord Baden Powell founder of the Scout movement and then the Guides.

To commemorate this special year, special events are being held around the world. One dimension to these events includes amateur radio contacts using special event call signs. The call sign being used in the UK is GG100 ***. The G prefix is allocated by international agreement to the UK, the second G is for guides, the 100 representing the anniversary year. The final suffix is allocated to individual groups: so the suffix we used GIA represented Guides in Alton generating the full call-sign GG100GIA.

I'm always impressed by the various activities undertaken by the Brownies at their residential events which I attribute as a function of the commitment and enthusiasm of their organisers.

During the two and a half days I was there all the Brownies, under supervision used the radio equipment achieving world wide contacts with other groups.

They all visited the weather station at least once, (see picture opposite)with some coming back several times learning how to zoom and scan the received images. I ran a live EUMETCast and displayed recorded Envisat images on a laptop. I noted their reaction between the two systems, like me they wanted to know "what's the weather like now!" Not yesterday, or a pretty picture of Miami USA. Some resourceful Brownies also used the weather satellite images to tell their world-wide contacts in real time what the weather was like in their own countries.

Thanks must go to EUMETSAT for their support with literature, posters and other materials they made available for this event.

UK National Space Conference

This was the fifth year that GEO has been invited to exhibit at the UK Space Conference incorporating the British Rocketry Oral History Programme (BROHP) held annually in Godalming Surrey.

Each year GEO has provided live satellite weather images for the interest of those visiting the event and this year was no exception.

My perception of the conference is that it has grown in statue over the years to the point where it now attracts heads of government departments together with their civil servants, research organisations, those representing the UK space industry and special interest groups.

This year the conference was generally described as the 'UK National Space Conference' but still in touch with its antecedent BROHP. The programme lasted five days from March 24th to March 28th 2010

Days one and two had an educational bias with school groups visiting the exhibition areas and attending the many and varied workshops which were on offer.

Days three and four were the principle conference days with delegates attending learned lectures and presentations on space related topics.

Day five was a public day with visitors coming as individuals, family groups and others either personally interested in space topics or seeking to promote understanding for others such as amateur radio groups, planetariums and receiving equipment for schools.

During the public day there were a series of short remote presentations to a seated audience using a 'Skype' link. These included a question and answer session from Wales with Lembit Öpik MP (Lib-Dem) who has a special interest in space (picture bottom left opposite).There were also sessions with NASA scientists from the USA.

An important theme running through all five days of the conference was the anticipated changes to the public presentation of space within the UK. The British National Space Centre (BNSC) is / was a government department staffed by civil servants and represents the UK's public involvement in space. However during the conference it was announced that on 1st April 2010 there was to be a totally new UK Space Agency (UKSA). According to the minister for space the new agency will take over responsibility for government policy on key budgets for space in close partnership with industry and research institutions.

For more information about the new UKSA visit their web site:

http://www.ukspaceagency.bis.gov.uk

This is such a new institution that the background to its formation, structure and policies cannot be covered in this short text but it will be interesting to follow developments and policies as they unfold over to coming years.

I thought GEO's contribution to the five day conference was outstanding. Resourcefully we ran live EUMETCast images into two systems on our stand. This required positioning the dish and routing cabling through an old building into their central exhibition hall (picture top right opposite). Additionally we ran the very latest Envi-Ham images onto a free-standing monitor. The stand was attractive and interesting to a wide spectrum of visitors. Here is a quote from our visitors book:-

Ian Jones Orbital Research Ltd

'Excellent exhibition. Really inspiring and I will be in touch regarding establishing a system at my local school.' Thank you Ian.

Our thanks must also go to EUMETSAT for providing posters and other literature for our stand. Some of this literature I passed on to the 'Space Bus' which tours schools and other venues promoting an interest in space topics to schools and the general public.

Arrangements for a similar conference next year are still to be formulated but doubtless the new UKSA will be well established by then and may promote a similar conference in 2011.

My thanks to John Tellick who was at the conference with me for three days establishing the electronic equipment we had on the stand and informing visitors of GEO's activities.

Antarctic Collision

B-9B Iceberg Shatters Mertz Glacier

Les Hamilton

Antarctica's **Mertz Glacier** was discovered during Douglas Mawson's 1911-14 expedition and was named after party member Xavier Mertz who died returning from an expedition to survey King George V Land. The glacier, approximately 30 km wide and 70 km in length, originates in a 60 km long fjord then flows off East Antarctica along the George V Coast and into the Southern Ocean.

After crossing the coastline, the glacier originally continued to push out over the open ocean (at a rate of a kilometre per year) in the form of a 40 km wide tongue of ice with an overall length of approximately 100 km. The *Envisat* ASAR (radar) image on the facing page shows the entire Mertz Glacier Tongue, its surface scarred by crevasses and showing a number of major deep fractures. Fractures of this nature have been observed for many years and regularly result in the calving of new icebergs from the tongue. Such an event occurred on January 10, 2010 and the new iceberg created was pictured by the *Advanced Land Imager* aboard NASA's EO-1 satellite (figure 1).

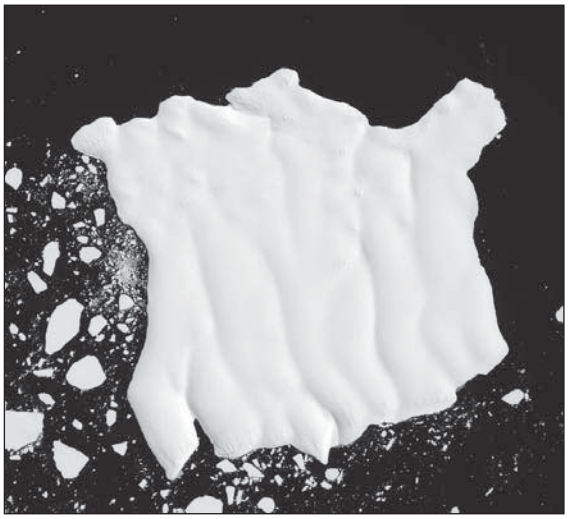


Figure 1 - An 80 km^2 iceberg spawned by the Mertz Glacier Tongue, imaged by NASA's EO-1 satellite on January 10, 2010
Image:NASA

Similar to the glacier that spawned it, this iceberg, sports a rippled surface, accentuated by the sun's relatively low elevation at the time of acquisition. Roughly 8.5 kilometers in width, the iceberg is surrounded by smaller chunks of ice which may have broken from the Mertz Glacier Tongue during the same fracturing episode.

The **B-9B** iceberg is part of the 5390 km^2 B-9 iceberg which calved from the Ross Ice Shelf in 1987. Like the majority of Antarctic icebergs, B-9 became trapped in the strong currents that surround the continent (some icebergs have been known to circumnavigate the Southern Ocean twice before

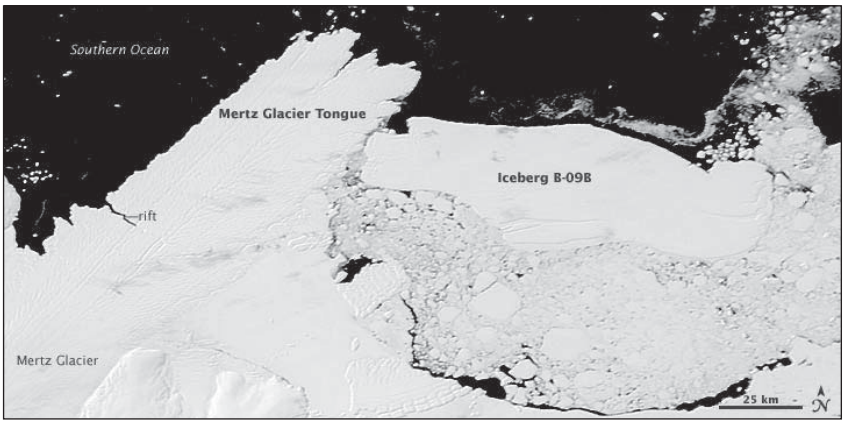


Figure 2 - This annotated image shows the Mertz Glacier tongue and iceberg B-09B on February 7, 2010, shortly before the collision.

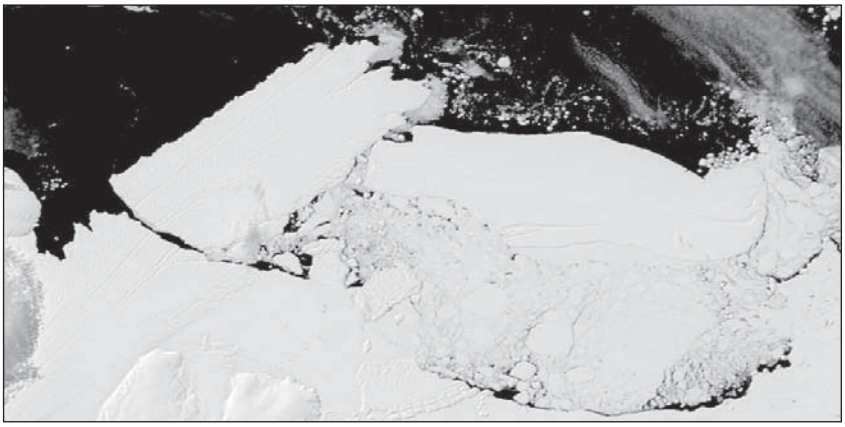


Figure 3 - This is the scene on February 20. The collision has fractured the tongue to create a new iceberg almost as large as B-09B itself.

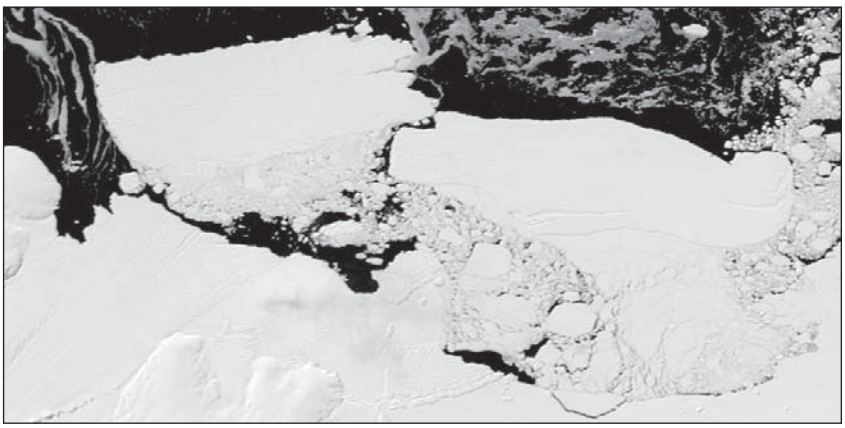
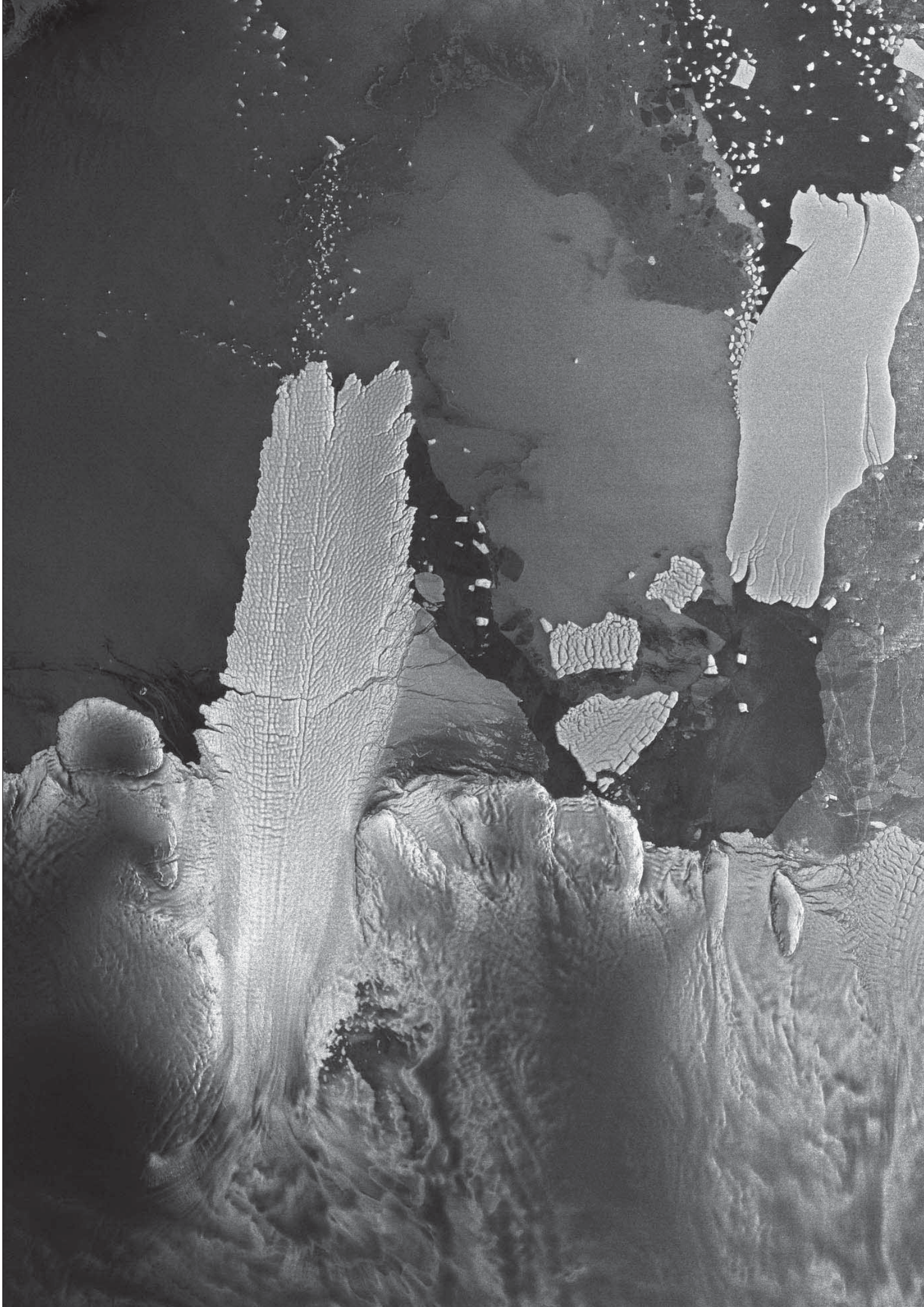


Figure 4 - February 26, and the new iceberg has started to drift northward.

Figures 2, 3 and 4
MODIS imagery from NASA's *Aqua* satellite
Credit: MODIS Rapid Response Team at NASA/GSFC
Opposite Page
The Mertz Glacier tongue, along with Icebergs B-09B (upper right), C-14A and C-15, imaged by Envisat's ASAR instrument on December 11, 2007.
Credit: ESA



escaping to warmer waters and finally melting). After slowly drifting out of the Ross Sea, B-9 broke into three smaller fragments off Cape Adare in 1989. The B-9B fragment continued drifting westwards until 1992, when it finally ran aground less than 100 km to the east of the Mertz Glacier Tongue—and it remained there until January 2010.

Collision

It was at some time during January this year that B-9B finally resumed its travels, and it was on February 12 or 13 that the 'berg finally made contact with the Mertz Glacier Tongue.

Two deep fissures cutting through the southern part of the Mertz Glacier Tongue had been developing since the 1990s. Progressive rifting was observed from the eastern margin of the glacier until 2002, at which time a new rift started to develop from its western edge (figure 2). Recently, these two rifts had almost joined, leaving the northern portion of the glacier tongue barely attached—like a 'loose tooth'. The final separation came when B-9B collided with the eastern flank of the Mertz Glacier Tongue, the impact creating a new iceberg nearly as large as B-9B itself. Clouds hid the actual impact but, on the afternoon of February 13, they thinned just sufficiently to reveal that more than two thirds of the ice tongue had indeed broken adrift.

The Mertz Glacier Tongue did not simply separate along the line of these pre-existing rifts, however. Although the separation did follow the line of the western rift for much of its length, shearing finally took place across the section between it and the eastern rift to produce a clean line—which allowed the southern end of the new iceberg to move freely past the remainder of the tongue.

The next cloud-free view of the region showing the two separate icebergs was not acquired until February 20 (figure 3). A huge chunk of the Mertz Glacier Tongue had clearly broken away from the glacier, leaving behind a residual tongue of only 20-25 km. Over the course of the following week the new iceberg pivoted away from the glacier like a door hinged at the point where B-9B collided with it (figure 4).

Iceberg Designations

The new iceberg formed from the Mertz Glacier Tongue, now designated C-28, measured 78 × 39 kilometers and had a mass estimated to be in the region of 850 *billion* tonnes. This represented some seventy years of glacial advance!

The US *National Ice Center*, located in Maryland, names all icebergs located within a set distance from the South Pole that are at least 10 nautical miles (19 km) long. These names are assigned according to where and when the iceberg first broke off from a glacier or ice shelf. The letter represents one of four longitudinal quadrants of Antarctica ranging from 'A' through 'D', quadrant 'A' facing the southern tip of South America while quadrant 'C' faces Australia. Iceberg names are related to the quadrant where they were originally sighted. The quadrants, listed counter-clockwise, are

A 0-90W (Bellingshausen/Weddell Sea)
B 90W-180 (Amundsen/Eastern Ross Sea)
C 180-90E (Western Ross Sea/Wilkes Land)
D 90E-0 (Amery/Eastern Weddell Sea)

A sequential number is then assigned to the iceberg, corresponding to the number of named icebergs that have emerged from that particular quadrant since 1976. Iceberg C-28 was given its name because it was the 28th iceberg to form in the 'C' quadrant.

Polynyas

The Mertz Glacier Tongue had previously contributed to maintaining an ice-free area of ocean, known as a polynya; this is a relatively large region of open water that tends to persist throughout the year within the polar sea ice. Due to the physical processes responsible for their formation, many polynyas recur in the same region every year. Polynyas may range in size from a few square kilometres to hundreds of thousands of square kilometres. The 350 000 km^2 Weddell Sea Polynya which existed adjacent to the Ronne Ice Shelf between 1974 and 1976 was the largest ever observed.

Polynyas provide significant feeding sites for coastal wildlife, particularly penguins. It is currently uncertain whether the shortened glacial tongue will provide similar protection from sea ice. If not, the polynya may become reduced in area—or even disappear completely. There are also fears that the new configuration may compromise the salinity of the surrounding ocean, again with damaging effects on marine life and global ocean currents.

How do Polynyas Form?

The occurrence of a polynya depends on the presence of agents that actively discourage the presence of permanent sea ice over a region of ocean. Some polynyas owe their existence to an upwelling of relatively warm water which melts existing ice and inhibits new ice from forming. Others occur in regions where sea ice is systematically removed as quickly as it forms by the action of winds or ocean currents. Indeed, many polynyas are formed by a combination of these two mechanisms.

Coastal polynyas such as the Mertz Glacier Polynya are created through the advection of sea ice to the north by winds and ocean currents. This produces a stretch of ice-free water adjacent to the coastline. Although the exposed seawater tends to refreeze almost immediately because of the harsh environment, the offshore winds are so persistent that they keep the ice at bay for long periods. The result is that there is almost continuous formation of new sea ice but, because it is rapidly transported northwards, the region is, in effect, an ice factory. Salt is expelled from seawater when it freezes, rendering the underlying ocean increasingly salty, and therefore denser. This cold, dense water sinks to the ocean floor and eventually exits the Southern Ocean as part of the global ocean circulation 'conveyor' that distributes energy, nutrients and gases around the world. The Mertz Glacier Polynya is one of the most significant polynyas of this type on Earth.

Polynyas and their Environment

As well as their impact on global ocean circulation, coastal polynyas play a major role in many important physical and biological processes in the high-latitude Southern Ocean.

The open water areas within Antarctic coastal polynyas are important for marine mammals such as killer whales (giving them places where they can surface and breathe) and sea birds, particularly during the winter months. Biologically, they are highly productive and offer ideal conditions for rapid growth of early-season phytoplankton blooms. Due to the lack of a thick ice cover, the polynyas form 'windows' through which the ocean can absorb high levels of sunlight from early spring onwards. Additionally, the open waters in the polynya absorb heat from the sun (as opposed to ice which reflects it) thus helping to discourage surface ice formation.

Many Antarctic penguin colonies are closely associated with polynyas. In Eastern Antarctica, for example, more than 90% of Adélie penguin colonies are situated next to recurrent coastal polynyas and research shows that changes in polynya productivity from year to year are reflected in the numbers of penguins in the associated colonies.

The Future?

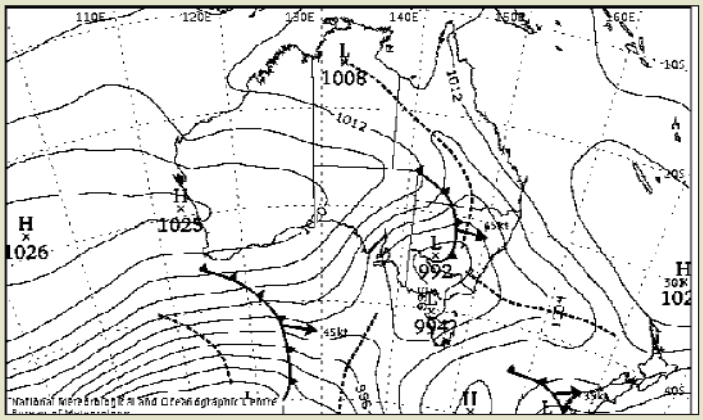
The future behaviour of the two icebergs is of great interest. Satellite images show the recently-calved C-28 to be moving into the Adélie Depression, a coastal basin situated to the west of the Mertz Glacier. Although the Mertz Glacier Polynya occupies only one thousandth of one percent of the overall Antarctic sea ice zone at its maximum winter extent, it is responsible for 1% of the total sea ice production in the entire Southern Ocean.

As previously stated, to the immediate west of the former Mertz Glacier Tongue lies a polynya that produces dense 'bottom water' on the sea floor which helps to drive global ocean circulation. The future positions of the two icebergs may affect this process and there is concern that, should they remain in the polynya area, they could block the formation of the 'bottom water'. This would mean less oxygen finding its way into the deep currents that feed the oceans and would have implications for marine life in the region and beyond.

NSW MARTIAN DAWN

Dale Hardy

A spectacular dust storm raged across southern Australia from Lake Eyre basin across NSW then onwards over the Tasman to New Zealand whilst spreading northeast over Queensland in late September 2009.An intense low pressure system formed over The Great Australian Bight on 22 September extending a front across South Australia. This front was travelling eastward at 35kts.



Synoptic chart: front over NSW

View from my window during the dust storm and my normal view.

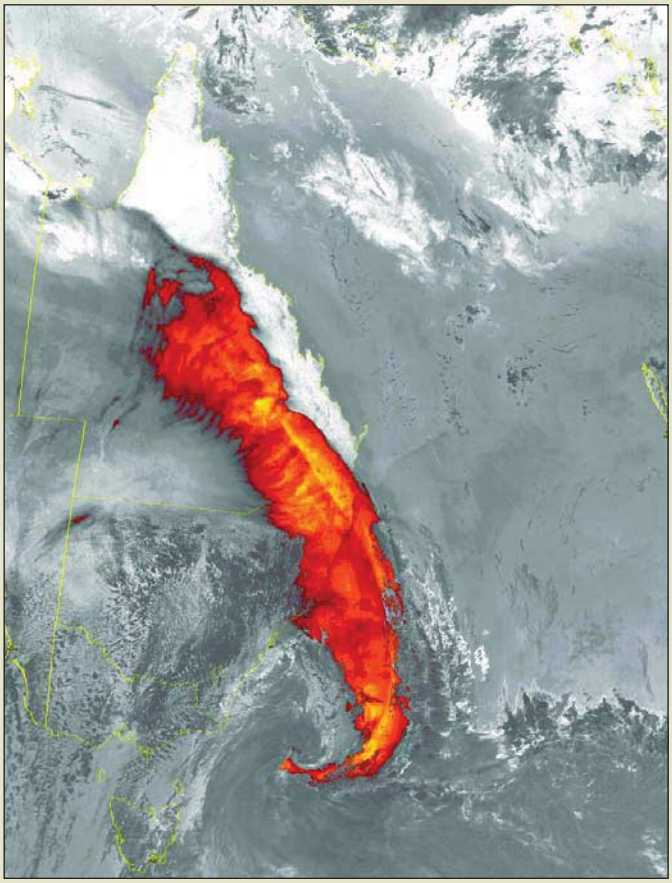


Image processed with David Taylor's HRPT reader "Ash enhancement"

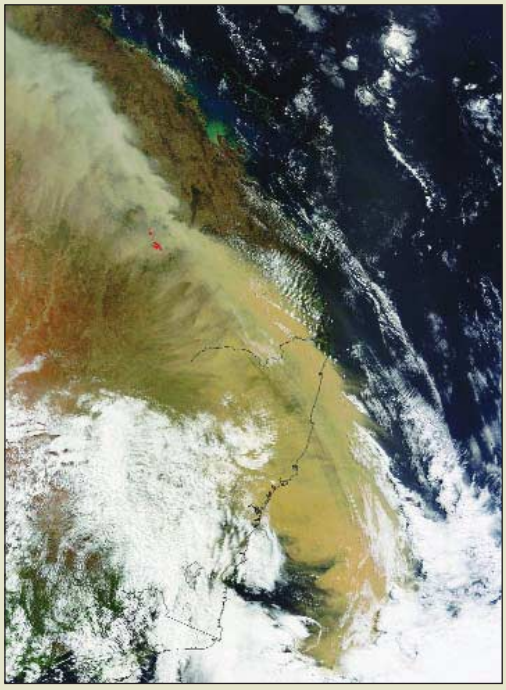


Image from Terra (NASA) dust moving up to Queensland

The land has been in the grip of drought with very little rainfall in the preceding months.The strong winds combined with the arid landscape resulted in millions of tonnes of topsoil being stripped from the arid lower lake Eyre Basin and western NSW and then transported and deposited across NSW. The dust storm went on to reach New Zealand, travelling 2,160 kilometers across the Tasman.

Estimates of 5 tonnes of dust per square km fell in Sydney. The dust consisted mainly of particles of 18 µm and 5 µm in size. Particles of dust are normally between 10 and 100 µm in size, if they are any bigger they're too heavy to be carried any distance by winds while any smaller they can stay suspended indefinitely.

Dust storms are common in the arid "red centre" of Australia, but they rarely reach the populated coastal regions.

Visibility in Sydney was so bad that flights were diverted and harbour ferry traffic disrupted.

Landmarks such as the Opera House were obscured, and many residents took to wearing masks.

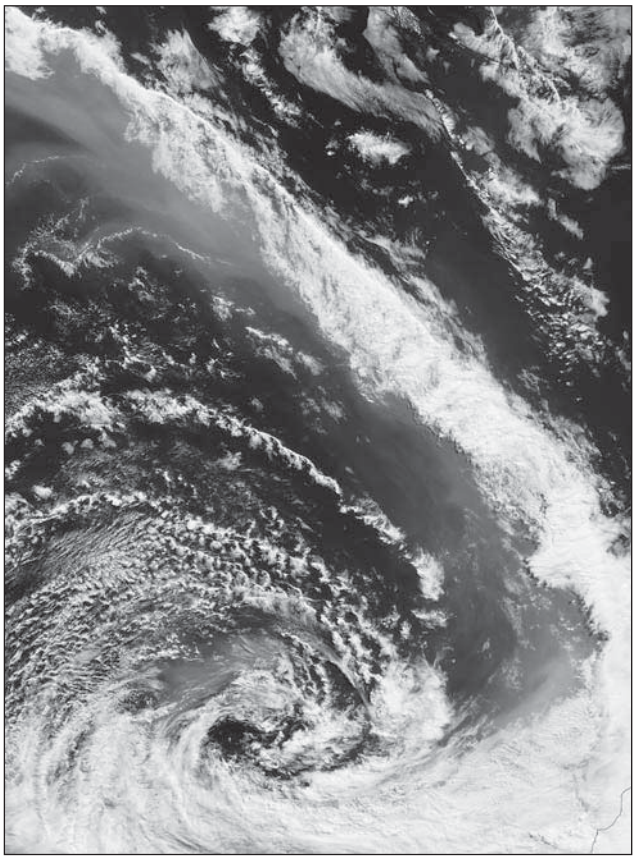
Emergency services reported a surge in calls from people with breathing problems.

The storm crippled the transportation system, with long delays to flights and bumper-to-bumper traffic on major roads.

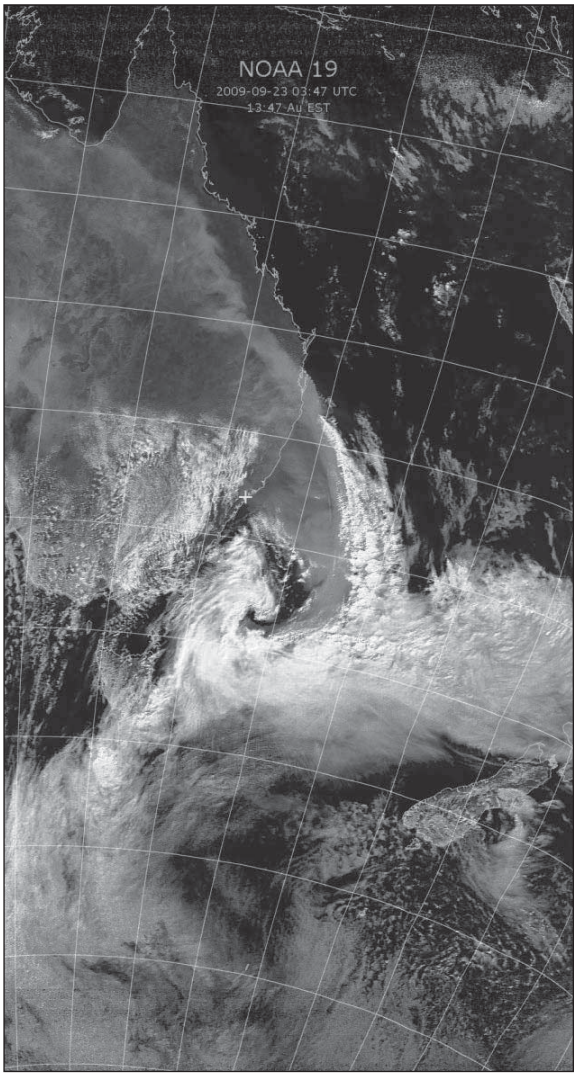
Children, the elderly and people with respiratory problems were told to stay indoors until the dust had cleared later on Wednesday. It was blown out to sea and up the coast by the strong winds.

Officials said air pollution levels from the dust were the highest recorded since records began in the 1970s, with 15,500 micrograms of particles per cubic metre.

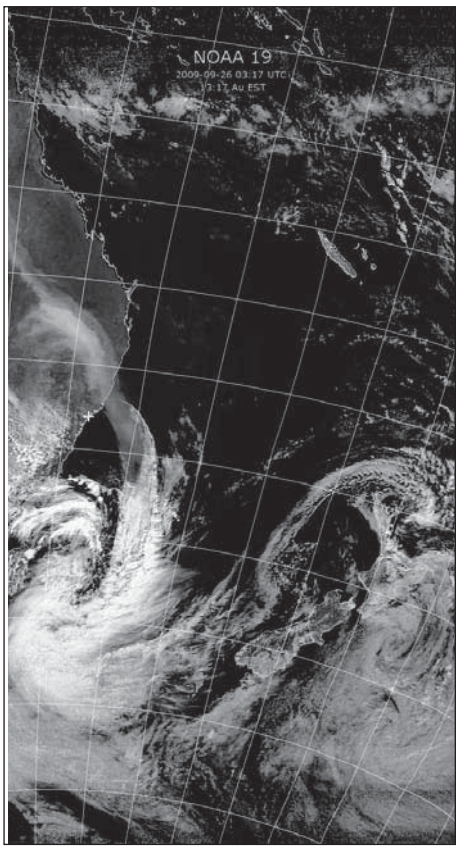
On a clear day the readings for particulate matter or PM10 is around 10-20 micrograms per cubic metre. During a bushfire, when there is heavy smoke around, we might see readings of around 300 to 500 micrograms per cubic metre.



Dust Northwest of New Zealand: NASA Terra



NOAA 19 received at my location



Cover and Full Page Images

Front Cover

Fascinating Metop-A image acquired on the 10:30 UT pass on March 8, 2010.

image: NOAA CLASS Archive

Inside Front Cover

The image from METOP-A on February 21st 2010 shows ice breaking up in the Sea of Okhotsk.See page 5 for full details

Images copyright EUMETSAT

Page 21

Sumatera and Malysia
This is a very small section of half an orbit's worth of image data. The resolution is not as high as the MER-FRS data sets but allows you to examine any section within half an orbits worth of image data. This section shows Malaysia and Sumatera using a single channel. With more experience using the display software and combining channels more detail could be revealed.

Red Sea
This is a black and white image of the Red Sea using a single channel centred on 778 nm with a bandwidth of 15 nm. It was chosen because it shows blown sand which is an important nutrient for the marine systems in the Red Sea which has few rivers flowing into it.

Page 22

Crater Lake. This was one of my first images from Envisat. I was attracted to it because I could recognise geographical features, in this case Canada's Manicouagan Reservoir , I call it Crater Lake, and the St. Lawrence Seaway.. The image uses a single channel centred on 778 nm and with a bandwidth of 15 nm. I had not learned to combine and colour channels when I recorded this image.

Page 37

Red Sea Colour. This is a MER_FRS images of the southern Red Sea. Note the sand being blown from Saudi Arabia across the sea. This mineral transport and subsequent enrichment of the sea is important for the primary production of the seas which may otherwise be marine deserts.

The Gaza Strip. Not many satellite images show political boundaries but here the boundary between Egypt, Gaza and Israel can be identified. Salt pans in the Dead Sea can also be seen. This image is a zoomed in section of a larger MER_FRS images. At its highest resolution irrigation circles in Iraq can be seen but they are not seen on this small section taken from the full image.

Page 40

MODIS image of Iceland's Eyjafjallajokull volcano eruption plume14th April 2010, from the Terra satellite

Inside Back Cover

This image of the UK was from data captured by NASA's MODIS instrument on the Aqua satellite on 2010 April 12, and sent over the EUMETCast data stream. This 1km resolution data has been processed in David Taylor's MODIS L1 Viewer software which is in beta development at the time of writing. The image here is a false-colour composite from one thermal and two visible channels, and has been rectified to an approximately natural projection to show the true shape of the UK, at a rectified resolution of 500m per pixel. The different colours of the clouds are caused by different temperatures, and you can see the differences between the countryside and the city, caused by differences in the amount of vegetation. Over central Wales you may be able to make out what I believe is the straight line of an aircraft trail (lighter colour) and its shadow on the ground (darker colour).

For more information on the MODIS system:
http://modis.gsfc.nasa.gov/

For more information on the MODIS L1 Viewer software:
http://www.satsignal.eu/software/modis-L1-viewer.html

Back Cover

The Wadden Sea.

This satellite image shows the ever-moving sandbanks in the shallow Wadden Sea in the north of the Netherlands. Declared a UNESCO World Heritage Site last year, this unique region is one of the largest wetlands in the world.

Shaped by the ebb and flow of the tides, waves and wind, the area appears very different depending on the time of day; at times there are kilometres and kilometres of open mud flats full of life and the next moment, awash with incoming waters from the North Sea. These tidal flats and wetlands give rise to an excellent habit for a wealth of wildlife, in particular, an estimated 1.5 million migrating birds.

As this satellite image shows, the sandbanks are bordered by relatively deep channels and gullies, which provide a route for boats crossing between the islands and mainland.

The image shows the southern part of the Wadden Sea with part of the Dutch mainland on the right and the island of Texel at the bottom left, and Vlieland and Terschelling to the northwest.

The impact of waves and currents, which carry away sediment, is slowly changing the layout of these and the other islands further west. For example, the islands of Vlieland and Ameland, which is not visible here but it is the next island after Terschelling, have moved eastwards over the centuries and are being eroded on one side and growing on the other.

The Wadden Sea, a name that comes from the Dutch 'wad' for mud flat, extends from the south of Texel, along the coast of Germany to just north of Esbjerg in Denmark, a total length of some 500 km.

Also visible in the image is the 'Afsluitdijk' - a causeway that creates a division between the Wadden Sea to the north and the Zuiderzee to the south. Built between 1927 and 1933, this causeway dammed off what was a salt water inlet of the North Sea and turned into a fresh water lake.

SPOT-4 acquired this image on 8 May 2006 with a spatial resolution of 20 m. SPOT-4 is supported by ESA as a 'Third Party Mission', which means ESA utilises its multi-mission European ground infrastructure and expertise to acquire, process and distribute data from the satellite to its wide user community. The SPOT system was designed by the French space agency (CNES) and is operated by Spot Image.

Image courtesy Spot Image

MODIS L1VIEWER-NEW PROGRAM FOR NEW EUMETCAST DATA

David Taylor

What is MODIS?

MODIS is the "moderate resolution" scanner carried on two NASA satellites – AQUA and TERRA – launched in 2002 and 1999. While similar to the AVHRR scanner familiar on the NOAA series of weather satellites, instead of only 5 transmitted channels there are 36, and instead of 1.1km resolution, some of the MODIS channels have 250m resolution, and all are at least 1km resolution. Another difference is that rather then the single detector assembly used on AVHRR, up to 40 detectors are scanned in parallel on the MODIS instrument. This means that the linear "distortion" seen on the edges of the AVHRR scanned images, is also present as a "butterfly effect" in MODIS images, requiring special processing to remove. The multiple spectral channels allow processing to produce a more comprehensive set of derived images than can be had either from the five transmitted channels of the AVHRR or even the twelve channels of SEVIRI data from the geostationary Meteosat-8 and Meteosat-9.

How do I get the data?

In late 2009, EUMETSAT started re-broadcasting a subset of the MODIS AQUA data on the EUMETCast system. As you may appreciate, the full data stream from MODIS could easily take over all the available bandwidth on EUMETCast several times over, so the data is thinned in three ways before it is sent over EUMETCast. The first thinning is to reduce the geographical coverage from the whole world to a region covering much of Europe; the second thinning is that only half of the 36 available channels are sent; and the third thinning that the resolution of all the data is unified at 1km. You may notice that the file name starts with "thin"! Even thinned, each five-minute data chunk, including internal data compression, can still occupy up to 90MB (and 25MB of geolocation data), so you may need to increase the size of your FSY database to avoid data loss.

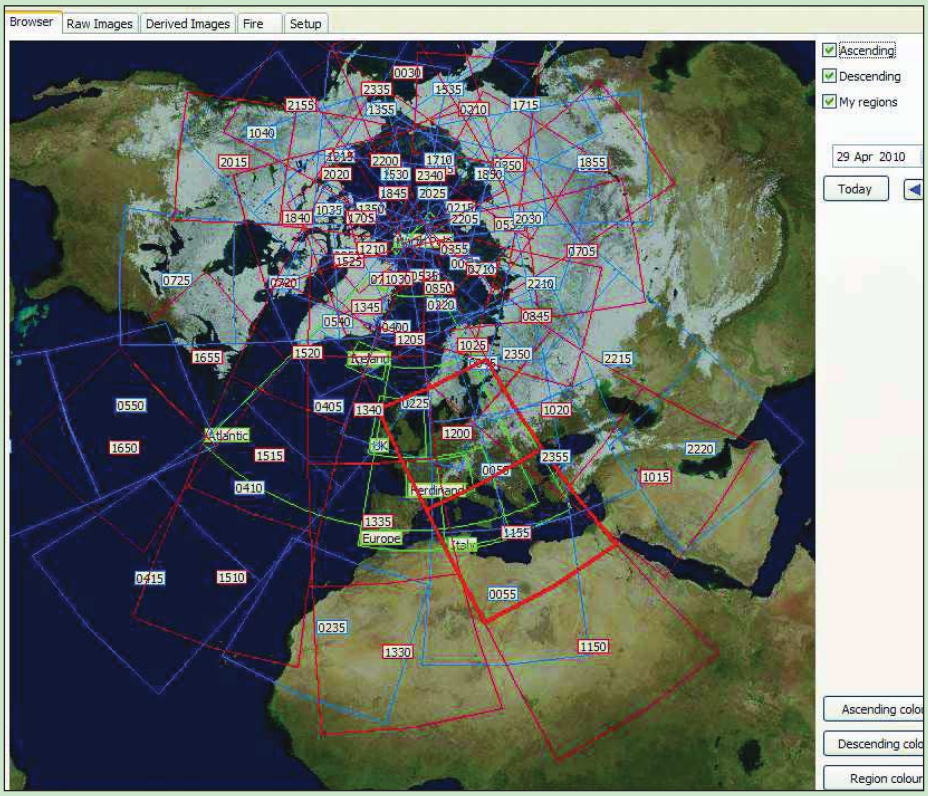


Fig 1:MODIS L1 Viewer browser screen

You need to register with EUMETSAT to get this data, but registration is free. There is help on completing the required form on the GEO Web site:

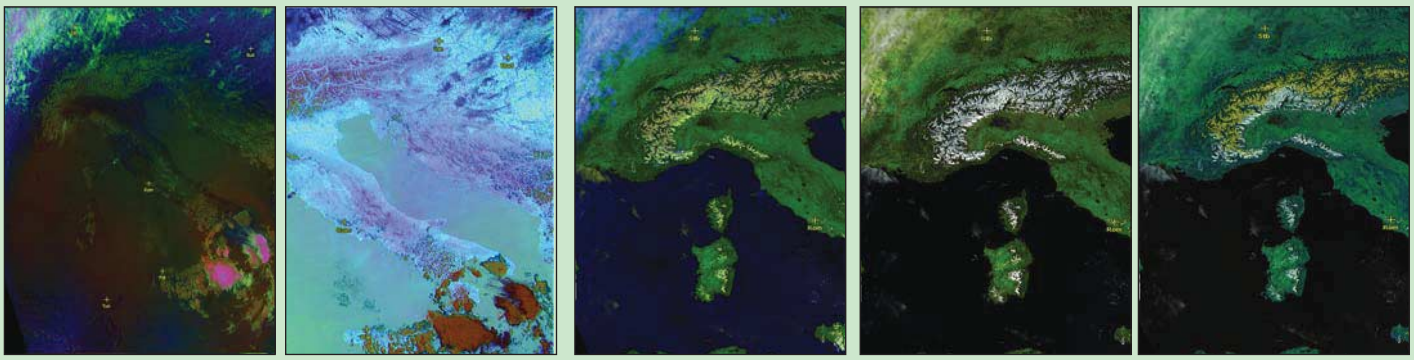
http://www.geo-web.org.uk/eumreg.html

You need to set your system to receive the [EUMETSAT Data Channel 4] data by editing your TelliCast recv-channels.ini file. You may have already set your system to receive the "hourly FSD" from EUMETSAT, in which case there is no further editing to do, but if not, you will need to add two lines to your recv-channels.ini something like:

[EUMETSAT Data Channel 4]

target_directory=received\Data Channel 4

The exact target location for the received data may be different on your particular system. It is EUMETSAT's recommendation that your FSY data is allowed 300MB, so increase your RAMdisk to 300MB, and alter the relevant line in your recv.ini file to read:



Air-mass | Ash | Classic "124" RGB | Vegetation Index | "125" RGB

[parameters]

file_database_size=300000000

What the MODIS L1 Viewer does

Once you have the data from EUMETCast, you may wish to use my MSG Data Manager software for help with organising that data by removing old data, placing the data in a year/month/day directory hierarchy, and deleting other unwanted data. On the Setup, Channel Selection, Other tab, you can enable management of MODIS L1 data, and choose whether to copy the image data alone, or the geolocation data as well. For the MODIS L1 Viewer program, the extra geolocation data isn't required, so you can save on disk space by leaving the "Copy M03 geo files" box unchecked. You can also choose how long the data should be kept on your system.

The data will then reside in a directory structure something like:

C:\Images\MODIS-L1\2010\04\28\
And with file names like: thin_MOD021KM.P2010118.0945.hdf

The file extension HDF shows that the data is in a standard HDF format, and in raw format may be viewed by programs such as the NCSA HDFView software:

http://www.hdfgroup.org/hdf-java-html/hdfview/

However, the MODIS L1 Viewer offers much more convenient operation, and many functions which make the data more useable such as removing the butterfly effect, joining segments of a pass, and the program can display the MODIS Fire data which is also available over EUMETCast.

Browser tab

The first screen you may use in the MODIS L1 Viewer is the browser screen:All the passes for a single day are presented graphically on a single screen for ease of selection. There is a calendar control for choosing the day to be displayed, together with a "Today" button for quick access to today's data. Should you start the program with no command-line parameters, today's data is displayed. You can also drag-and-drop HDF files from Windows Explorer onto the Browser view for processing. Within the browser, you can select to show either ascending (red) or descending (blue) passes alone, or both together. For daytime views, select the ascending passes. You can also display in a different colour the regions to which you wish to remap the data, shown in green here. Most likely you will want to run the program full-screen to provide the clearest display.

Using the mouse, you can select one or more five-minute sections of an individual pass to process. In the screenshot, you can see that the 1155 and 1200 segments have been selected providing coverage from North Africa and Italy to Scandinavia, and you get an impression of the coverage available. Once the data is selected, you can right-click the browser window to proceed to processing.

The MODIS L1 Viewer can display both raw and processed data, in both the native satellite mapping, and in remapping to user-defined regions and resolutions. The "raw" channels sent over EUMETCast include both the visible and thermal channels. Ferdinand Valk supplied a table showing how the channels may be used.

Visible channels

1 - 620-670nm – Land-cloud-aerosols extent

2 - 841-876nm – Land-cloud-aerosols extent

5 - 1230-1250nm – Land-cloud-aerosols properties

6 - 1628-1652nm – Land-cloud-aerosols properties (faulty)

8 - 405-420nm – ocean colour-phytoplankton-biochemistry

9 - 438-448nm – ocean colour-phytoplankton-biochemistry

10 - 483-493nm – ocean colour-phytoplankton-biochemistry

12 - 546-556nm – ocean colour-phytoplankton-biochemistry

15 - 743-753nm – ocean colour-phytoplankton-biochemistry

26 - 1.360-1.390µm – cirrus clouds water vapour

Thermal channels

20 - 3.660-3.840µm – surface/cloud temperature

23 - 4.020-4.080µm – surface/cloud temperature

27 - 6.535-6.895µm – cirrus clouds water vapour

28 - 7.175-7.475µm – cirrus clouds water vapour

29 - 8.400-8.700µm – cloud properties

31 - 10.780-11.280µm – surface/cloud temperature

32 - 11.770-12.270µm – surface/cloud temperature

33 - 13.185-13.485µm – cloud top altitude

By right clicking on any one of these channel images a number of options are revealed, and the particular options may depend on the particular channels being viewed. Should you wish to remap data to a particular region, just right-click the image and select the remapping region you want. You can change the name, location and scale of each region on the Setup tab.

What enhancements are available?

Even at this early stage of the program's development there are a number of enhancements available, although as more experience is gained the exact parameters may be tweaked to give the best results, and I hope that more enhancements will be added. All of the current enhancements rely on the combination of three channels, or channel differences, to produce a false-colour red-green-blue image.

The Classic RGB enhancement uses the visible channels 1 and 2 for the Red and Green components, and the inverse of the 11µm thermal data (channel 31) for the Blue component of the final image, producing an RGB composite which you will recognise from the AVHRR data from the NOAA satellites. This is a good general view image, providing a green display in well-vegetated areas, blue in night time areas, and clouds in yellow-white colours distinguishing low, warm cloud from cool high cloud.

The "125" RGB uses the same channels (1 and 2) for the red and green components, but substitutes channel 5 for the thermal component. Because snow and ice have different reflectivity at 1.24µm than in the visible wavebands, snow can be distinguished with this combination.

In the "Vegetation Index" composite, the normalised difference between channels 1 and 2 is used to display the amount of vegetation in a region. The presence of chlorophyll in vegetation enhances its reflectivity in the 0.8µm part of the spectrum compared to the 0.6µm region.

The "Air-mass" combination is one used with geostationary data, and is used to distinguish cold air mass from warm, and moist from dry. As only thermal channels are used, this combination works for both daytime and night time images.

The "Ash" combination utilises differences between some of the longer wavelength thermal channels to distinguish dust in the atmosphere. Careful use of colour can also help distinguish dust from ash, such as that from the recent Eyjafjallajökull eruption in Iceland.For more information visit:

http://www.satsignal.eu

The Envisat Data Dissemination System

How to receive data from the satellite

David Taylor

The information below is based on experiences at Francis Bell's station near Guildford UK and on notes and screenshots kindly provided by Arne van Belle. As this project is in its early stages, the information may be inconsistent or incomplete. Any comments or corrections will be welcome.

Setting up the Dish for Reception

Pointing

A 1.2 m dish or greater is required, pointing to the 10° east geostationary satellite position for *Eutelsat W2A*. There is a pointing calculator at

http://www.satlex.de/en/azel_calc.html

First select your country and city, then the satellite. Alternatively, you can use my *WXtrack* program [1]. A 1.0 m dish may work, but is very critical in alignment. Figure 1 illustrates the footprint of *Eutelsat W2A* while a frequency list for this satellite may be viewed at the *Lyngsat* website [2].

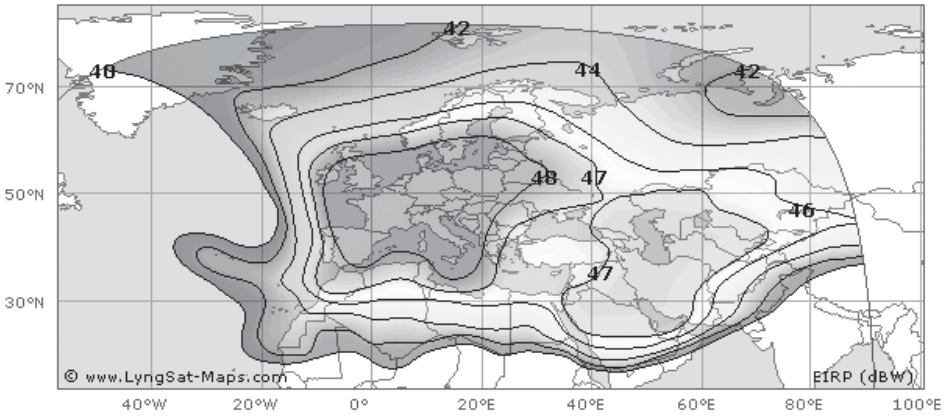


Figure 1 - Footprint for Eutelsat W2A at 10.0°E

Pointing the dish is extremely critical. At the time of writing, November 2009, the signal could vary by several decibels throughout the day, and may become undetectable during late morning or early afternoon (perhaps 5 dB down on its maximum value during the evening and early morning). Figure 2 is a plot showing the signal-to-noise-ratio (SNR / dB) and the Quality (%) as measured on Arne van Belle's *SkyStar* PCI card over a four-day period during November 2009.

There is a periodic nature to this variation: a sharp drop in the morning, between 09:00 and 11:00 UT, corresponding to a switch from one uplink station to another, which appears to have a much weaker and much more variable signal as received at the satellite, with a correspondingly weak downlink signal to us, the users.

Alignment

The easiest method is probably to align the dish first on *Eurobird-9A* (used for *EUMETCast*), located at 9°E then swing it one degree farther east. As seen from Edinburgh, the two satellites are just 1.18° apart. Note that there are many fewer signals on the *Eutelsat W2A* high-band, horizontal transponder, so the reading on an analogue meter will be very small. Worse, the dish may well experience significant pickup from the *Eurobird-9A* satellite so, by peaking with an analogue meter, you will most likely point your dish to 9°E and not 10°E. Using an analogue meter alone is almost impossible—you must drive the LNB so that 'high-band horizontal' is selected.

If you **must** use an analogue meter then, with your receiver tuned to *EUMETCast*, first locate the Eurobird-9A satellite at 9°E using your meter, and then retune to the ANB channel (see below for details) and very carefully align your dish to 10°E while using only the *Signal Quality* reading on your screen.

If you cannot get the data channel to start with, it may be better trying to align the dish on a TV transmission from 10°E. A suggested channel on 10°E is ANB (Arabic News Broadcast) on 11144 MHz horizontal polarisation, symbol rate 2442 kS/s, FEC 2/3. As it is on low band and uses more power, it will be easier to locate and check your system before tuning to Envisat DDS. However, readers should check the Lyngsat website [2] for current details, as channels do change quite frequently.

Now tweak the dish, either with a proper digital meter or with your DVB receiver set on the correct frequency. Remember to set the LNB position and skew as well as the dish azimuth and elevation for best signal quality.

Cables and Connections

It's important to note that, because the satellite transponder is right at the top of the higher-frequency part of Ku-band, the Intermediate Frequency (IF) is also very high at 2021 MHz. This means that the signals in the cable from the LNB to your receiver are at over 2 GHz which makes your selection of cable and connectors more critical in order to avoid losing too much signal strength. Keep the cable run as short as possible, use the minimum number of connectors, and use the best satellite TV cable you can buy. A weak signal will make it more difficult to get error-free reception. Also, use an LNB with the lowest noise figure you can get: aim for 0.2dB from a reputable manufacturer.

Changing from a '0.6 dB' NF LNB to a '0.2 dB' one increased the signal level, as measured at the LNB, from 62.4 dBuV to 64.9 dBuV (a 2.5dB increase), and a 1 dB improvement in both Noise Margin (from 1 dB to 2 dB) and MER (from 8.8 dB to 9.8 dB or better).

Our Test Setup

Figure 3 pictures David Simmons with cable, a temporary 1.0 m dish, 0.2 dB NF LNB and *Rover ST-4* analyser.

For initial alignment, the dish was pointed carefully at *Eurobird-9A* and a calibrated scale hammered into the grass. The offset between *Eurobird-9A* and *Eutelsat W2A* was calculated so that the dish could be

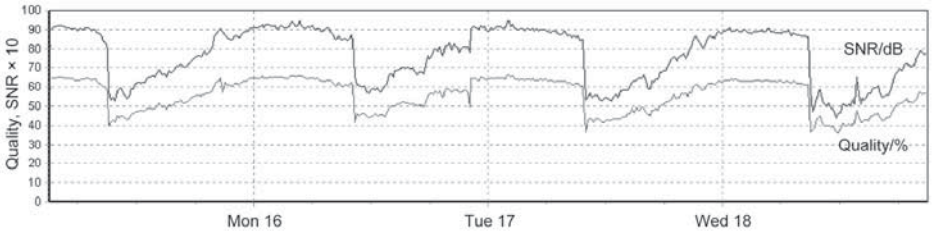


Figure 2 - Variations in SNR and Quality over a 4-day period during November 2009

Figure 3 - David Simmons preparing for EnviHam

sighted by eye to point at the 10° east orbital location. With great care, it *was* just possible to get a signal, but having the professional meter at the dish (or a PC receiving *Eutelsat W2A*) allowed finer adjustments.

Note: When this photo was taken, the LNBs had just been changed over and the skew angle was not correct. To calculate the correct skew, use a site like

http://www.dishpointer.com

Enter your location (latitude and longitude), and the satellite 10.0E Eutelsat W1. On *Firefox*, the street-finder didn't work for me (it did on MS Internet Explorer) and I had to drag the location marker over from the USA to Edinburgh). Also, please try to use less cable than David is holding in the photograph.

The Transponder Spectrum

The spectrum, and the list of frequencies on this satellite, revealed that the transponder is used in a rather different way to that used for *EUMETCast*, which carries a single digital signal, uplinked from a ground station at Usingen. The *EUMETCast* spectrum is nominally flat and all the data is multiplexed on to the uplink at the ground station.

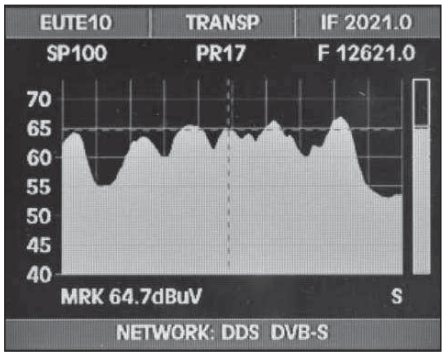


Figure 4 - The *Eutelsat W2A* bandwidth

With this transponder on *Eutelsat W2A*, you can see that the bandwidth is rather wider, the plot in figure 4 being some 100 MHz wide, and it carries a number of signals, some of which may be analogue, and some digital.

There are likely multiple uplink stations working on a frequency-division multiplex basis (sharing frequencies), each of which needs to control its transmission power levels and frequency to fit in with the other uplinks on the same transponder. The central marker is on the 12621 MHz frequency used by the Enivsat DDS service. You can readily see that this signal is not as strong as those from other users of the same transponder, adding to the difficulty of receiving that data.

There is no 12621 MHz transponder on the adjacent *Eurobird-9A* satellite, and the signals shown in figure 4 each changed in strength in exactly the same way while the dish was being tweaked: so it seems very unlikely that we are seeing a combination of signals from two satellites. In addition, the various channels listed for *Eutelsat W2A* around that frequency are listed with much less frequency separation than the usual ~38-39 MHz channelling. This information is ambiguous on the Internet, though (see the *Lyngsat* website).

Figure 5 shows parameters measured on David Simmons' DVB analyser.

Configuring the DVB USB Box

Configuring a *Dexatek* or *DVB World* USB box is described at

http://www.satsignal.eu/wxsat/Dexatek/Dexatek.html#setup

However, you need to change certain settings as follows:

- Satellite: *Eutelsat W2A* (if you have an older installation, use *Eutelsat W2*)
- If the 12621 MHz, horizontal transponder exists, use it. Otherwise, click on 'Add TP' and enter the details as

  Frequency: 12621 MHz
  Symbol rate: 5732 KS/s
  Polarisation: Horizontal
  Punctured code: DVB QPSK 5/6

- Use the 'Lock TP' button to finalise your dish alignment (azimuth, elevation, LNB position, skew) for best signal quality.
- PIDs are 230 and 231. Pressing the Scan PID button should find these, but you can add them manually.

Early in the morning, at 06:40 UT, on the end of quite a long length of cable (11.2 dB loss at 2.1 GHz), I saw 56% strength and 61% quality. The very best I recall seeing was 71/74% quality.

On a newly configured *Windows 2000* PC, I needed to:

- Give the PC Internet access (this was actually not required, but I was trying to make the *Windows 2000* PC as close in configuration to the *Windows Vista* laptop which we knew to work).
- Put the *DVB World* USB Adapter network address into the 'Trusted' zone with *Zone Alarm*.
- Use the *Dexatek* software to talk to the *DVB World* hardware.
- Give both the *Dexatek.exe* and *WDDS-receiver.exe* programs full access in *Zone Alarm*.

Configuring a SkyStar PCI Card

The screen shots opposite, provided by Arne van Belle, take you through the appropriate steps for configuring your card.

First, select the *Eutelsat W2A* satellite (figure 6). Note that the 'DiSEqC' setting would normally be 'None'.

Now select or add a transponder on 12621 MHz, Horizontal, 5732 KS/s, 5/6 FEC (figure 7).

Next, scan for PIDs. If a scan function is not available, enter PIDs as decimal, with values 230 and 231 (figure 8). Note that your UC MAC address will not be blank, but has been obscured here.

Finally, once data starts flowing, the statistics screen should look something like figure 9. Although the data rate shows as being in excess of 7.1 Mb/s in the figure, this data may include files which are not available to the amateur user; so even though data is flowing, your Envisat DDS receiver software may not show an active file.

The screenshots can also be viewed on the Web at

http://www.satsignal.eu/wxsat/EnvisatDDS/rx-skystar.html

Installing the Envisat DDS software

Detailed notes are given in the ESA documentation. We noted however, that:

- We needed to create the RX directory manually
- The RX directory must not terminate with a backslash ('\') character
- It was necessary to set the IP address to match the *DVB World* box (could have altered the DVB box address but this would have stopped *EUMETCast* working).
- It may be necessary to open the security on the RX directory.
- Be sure that your PC is set **not** to turn off the hard disks after 20 minutes! This is the default for *Windows Vista*, but you need to set it to a much longer interval, or better, to '*Never*'.

How to do this for Windows XP

http://bucarotechelp.com/computers/wintips/93081403.asp

How to do this Windows Vista

http://www.docstoc.com/docs/29236235/Disable-Hard-Disk-Drive-Turns-Off

At the end of the official tests we had a situation where three PCs had been tested at Francis Bell's location. My *Vista* portable PC worked correctly, Francis's *Windows 2000* PC worked correctly, but Francis's *Dell Vista* PC worked only intermittently.

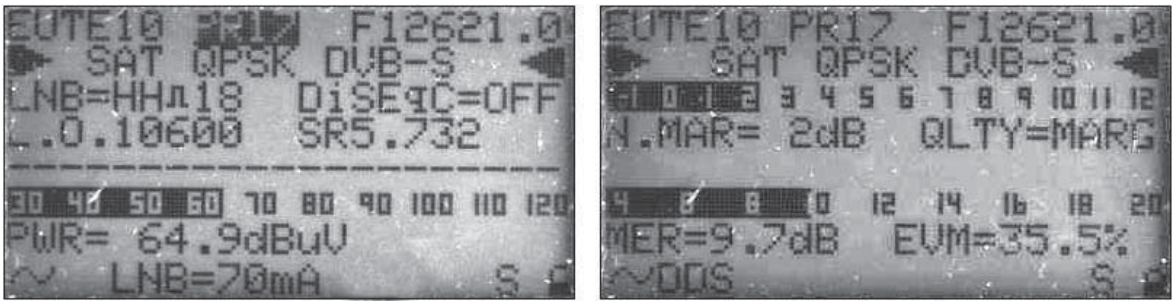


Figure 5 - Typical parameters displayed on David Simmons' DVB analyser

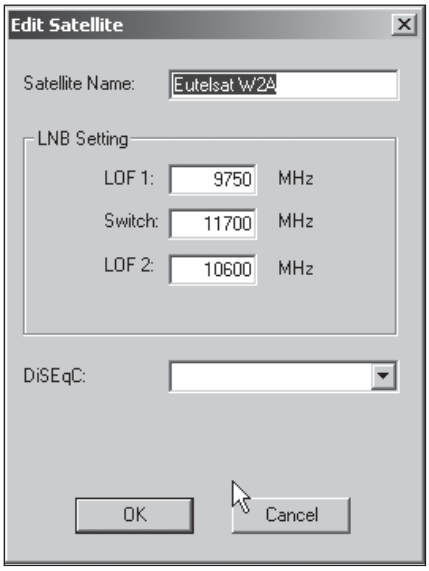


Figure 6 - The *Edit Satellite* Window

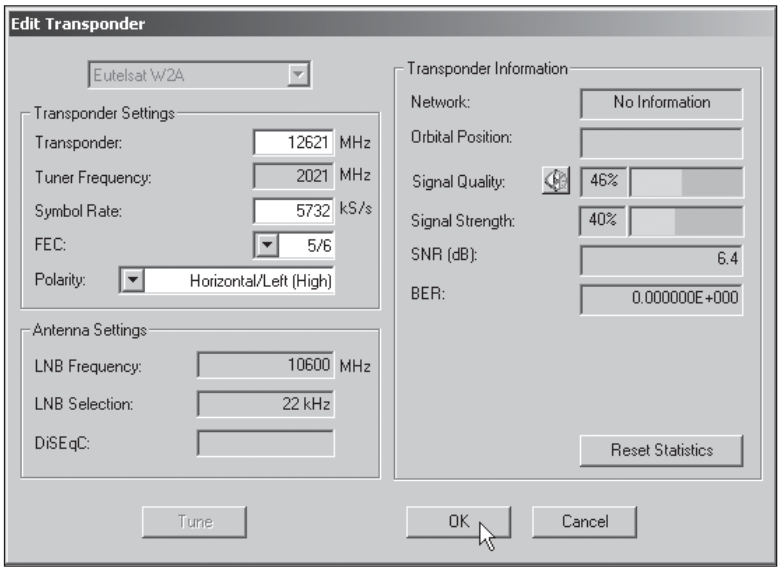


Figure 7 - The *Edit Transponder* Window

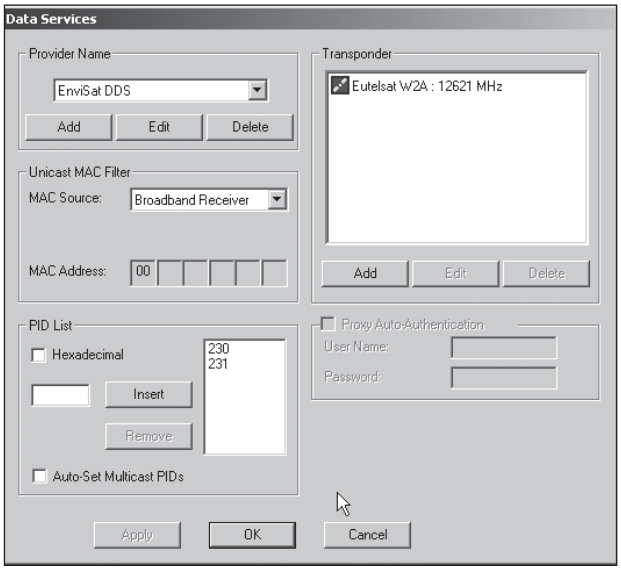


Figure 8 - The *Data Services* Window

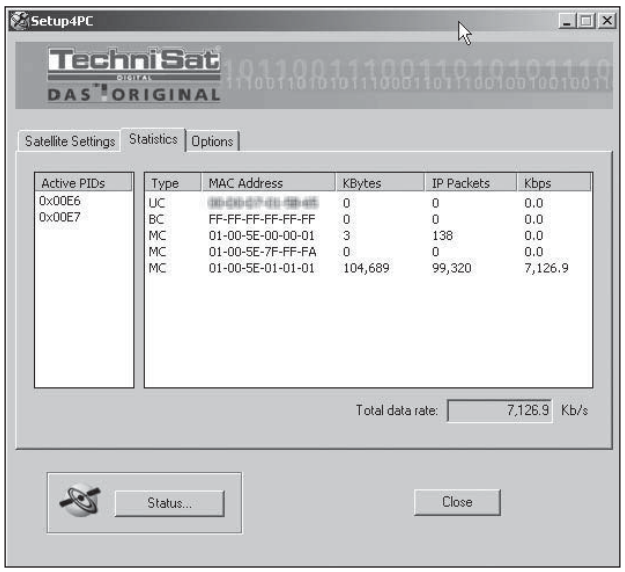


Figure 9 - The *Setup4PC* Screen

I did think I had resolved the situation when I turned off the IPv6 on the *DVB World* USB box and the system started receiving data. But shortly after, the system stopped again. It had had some errors due to missed data from the *Eutelsat W2A* satellite, but it also had errors which appeared to be permission errors. The log files have been sent to ESA for further analysis. I hope I'm missing something really simple which is stopping this PC from working!

During subsequent operation the system had been receiving only a very small number of image files—and then seemed to grind almost to a halt. Further work during March 2010 cleared unnecessary applications which were running in the background, deleted many old unnecessary files, deleted a suspect virus protection and installed Microsoft's latest virus protection, tidied everything and then defragmented the hard drive.

Now the really good news. The system now runs to near perfection with hardly a missing image.

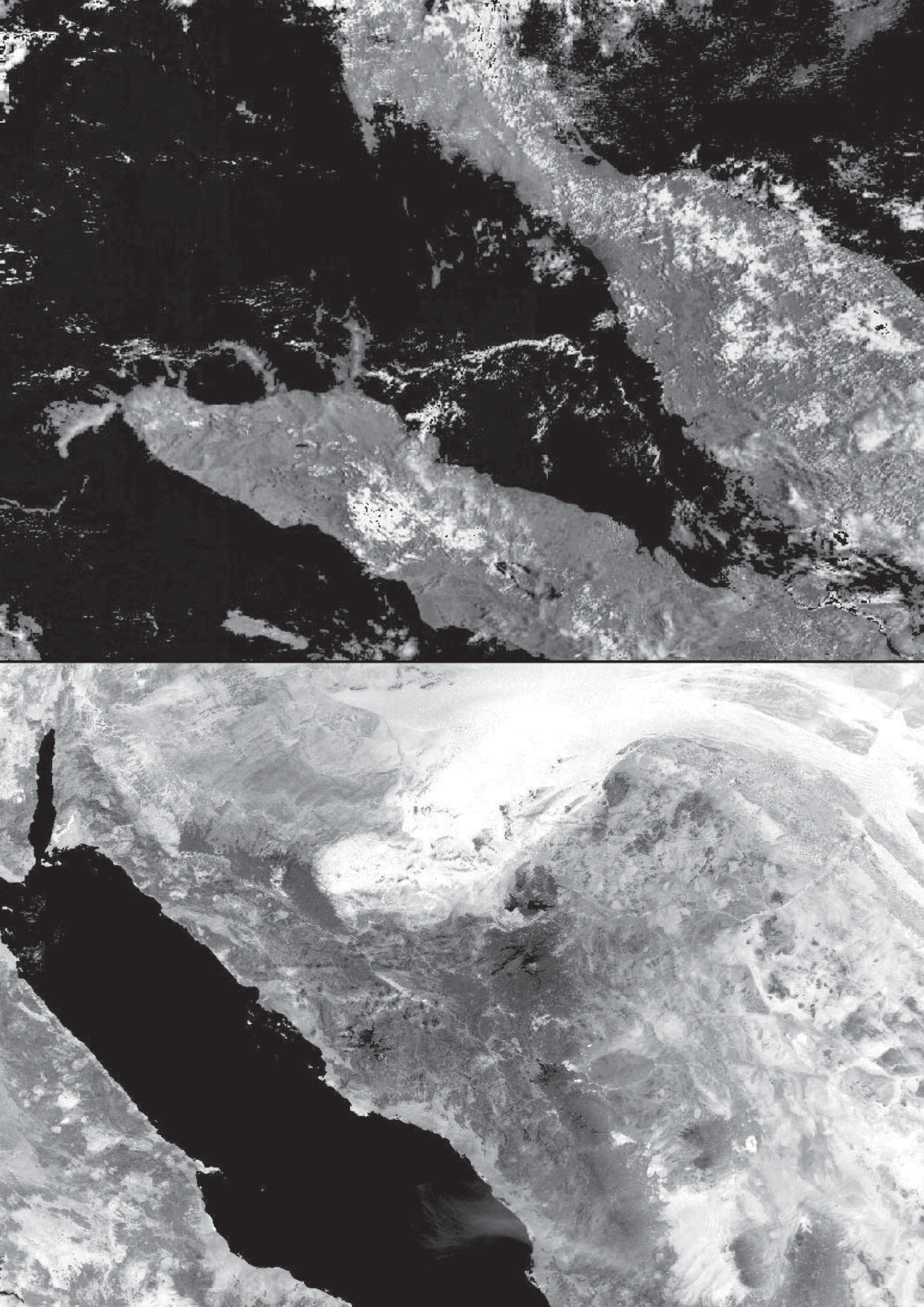
You will have seen the splendid images from the 300 m resolution data in GEO Quarterly 25, and here on the next 2 pages as well as page 37.

References

1 www.satsignal.eu/software/wxtrack.htm
2 www.lyngsat.com/ew2a.html

Acknowledgements

My thanks for Francis Bell, David Simmons, Arne van Belle and John Tellick for their facilities, help and expertise during the tests, and to Arne van Belle for valued input to this article.



GEO Shop

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

MasterCard VISA SWITCH SOLO PayPal

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

John Silver's Lightning Radar Board

This is a DIY kit for constructing the circuit boards needed to develop your own system to detect and track thunderstorms in your vicinity, using a computer and readily available free software. Full instructions (which appeared in an article in GEO Quarterly 17) are included.

UK members price - £55.00
UK non-members price - £65.00

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 - £60.00
UK non-members price - £70.00

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

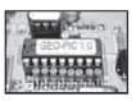
Universal Ku-band Satellite TV LNB 0.20 dB

(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 - £12.00
UK non-members price - £18.50

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
BNC Lead (0.25 metre)	4.75	5.50	6.00	6.75	7.50	8.00
UK Power Supply Unit (12 volt)	8.50	-	-	11.00	-	-
Dartcom High Quality QFH Antenna	269.00	349.00	-	289.00	369.00	-
John Silver Preamplifier (built)	35.00	36.00	37.50	40.00	41.00	42.50
John Silver Lightning Radar Board	55.00	68.00	61.00	65.00	68.00	71.00
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	60.00	65.00	-	70.00	75.00	-
Telestar 80 cm dish with LNB	69.50	-	-	76.50	-	-
Telestar Ku band universal LNB	12.00	13.50	-	18.50	20.00	-
Technisat Satfinder Alignment Meter	25.00	28.50	-	28.50	31.50	-
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

Payment by direct bank transfer can be arranged. Please email
francis@geo-web.org.uk
for BIC and IBAN bank details

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 - £25.00
UK non-member's price - £28.50

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 - £69.50
UK non-members price - £76.50

NOAA Satellite Predictions

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

Compiled by Les Hamilton

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

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

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

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

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@btinternet.com

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 27 is Saturday, July 31, 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 (e-mail attachment, CD, DVD).

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.

Group for Earth Observation

Membership Application Form

PayPal

Current Subscription Rates

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

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

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

I enclose my payment of ..... £

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

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

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

Payment by direct bank transfer can be arranged, please email ***francis@geo-web.org.uk*** for BIC and IBAN bank details

Name (please PRINT clearly)

Address

Town/City

Postcode/ZIP Callsign

Country

Telephone Number FAX

Email Address (please print **very** clearly)

Declaration

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

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

Signature

Date

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

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

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

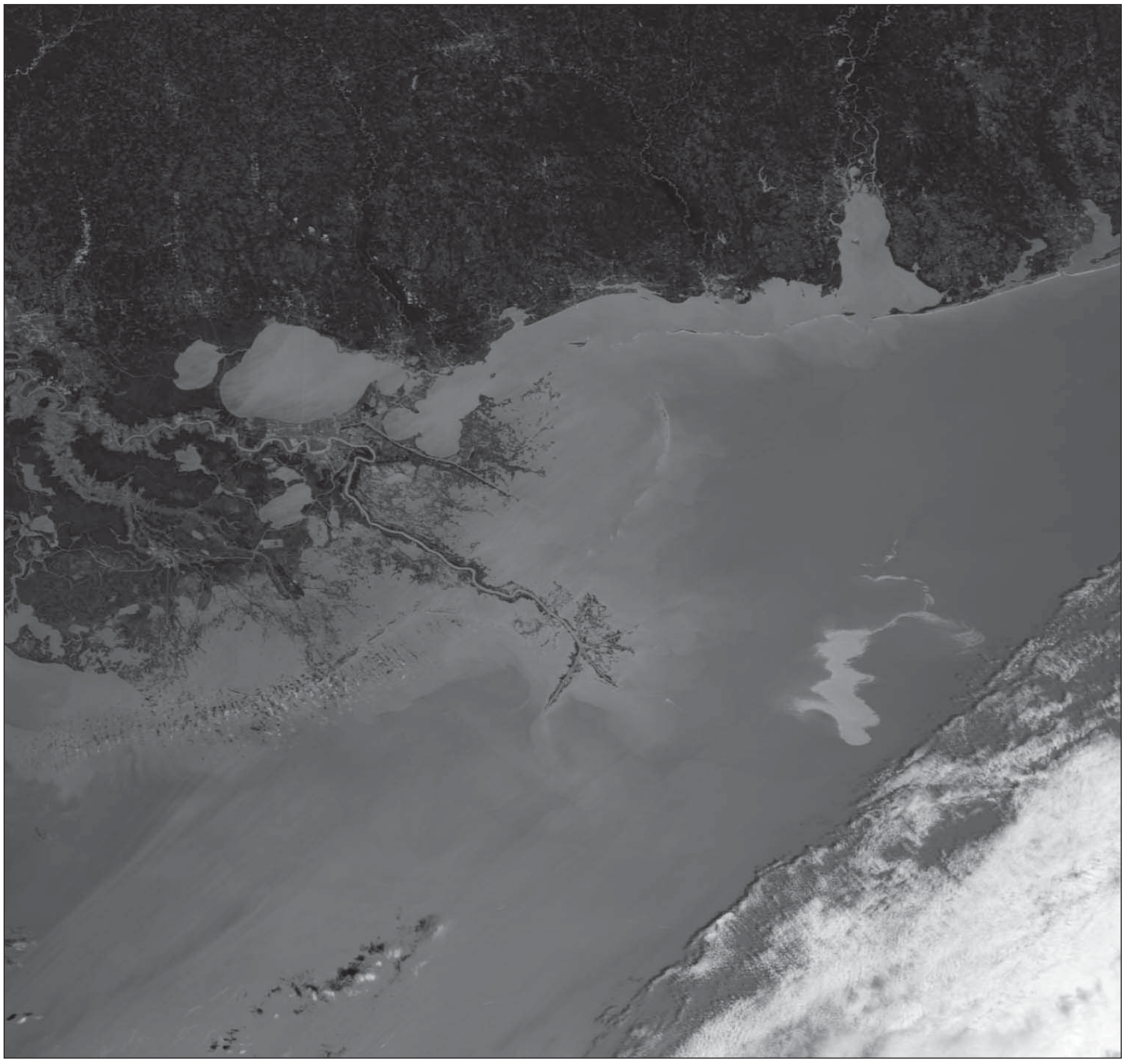
Please let us know how you learned about GEO
(Internet, Other Publication, from a Member etc...)

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

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

Oil Spill in the Gulf of Mexico Nears the Coast

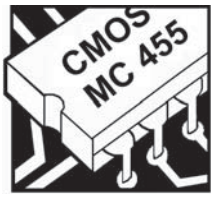
Peter Green/Arne van Belle



A massive oil slick in the Gulf of Mexico continued spreading on April 29, 2010, moving perilously close to shore, according to news reports. The U.S. Coast Guard attempted controlled burns on some of the oil to prevent its spread, but had to halt the process due to high winds. Meanwhile, the U.S. National Oceanic and Atmospheric Administration constructed a dome-and-pipe system to contain the spread of oil at the sea floor.

This EVNVISAT image captured by Arne van Belle shows the oil slick just off the Louisiana coast. The image shows a wide-area view of the oil slick.. The oil slick appears as dull gray interlocking comma shapes, one opaque and the other nearly transparent. The northwestern tip of the oil slick almost touches the Mississippi Delta. Sunglint—the mirror-like reflection of the Sun off the water—enchances the oil slick's visibility.

The oil slick resulted from an explosion that occurred on April 20, 2010, on the Deepwater Horizon rig, in which 11 people lost their lives. Two days after the explosion, the rig sank to the ocean floor.



Build your own DIY ATOM NVIDIA Ion System for EUMETCast

Harry H Arends

This article originally appeared in the December 2009 issue of the Dutch publication *De Kunstmaan*

During our September 2009 meeting, Arne van Belle showed us a package containing a new ASUS motherboard (figure 1). The small size (17 cm square by 3 cm high) and low power consumption appealed to me. Similarly, my eye was immediately taken by the numerous connectors at the back: as well as the standard PS2, VGA and Ethernet, there were also eight USB 2.0 ports, S/PDIF, HDMI, *SurroundSound* and *eSATA* connections. Additionally, the board also possessed two USB ports and audio connectors on the front panel.

A maximum of 4 GB RAM can be installed on to this motherboard. The type of memory used is DDR2-667/800. Be aware that a Windows-32 system can address only 3 GB of RAM. If using Linux there is no such restriction. The video chip integrated into the board is the *NVIDEA GeForce 9300* and is Windows-7 compatible. If you have an old computer housing lying around, you can use this, along with its existing ATX power supply.

To connect storage media, the board possesses three *SATA300* connectors, making it possible to install either three hard drives or two hard drives plus an optical drive. The optical drive could even be a *Blu-Ray* player as drivers are available. The operating system I will be using is either *LINUX-UBUNTU* or *VISTA-Ultimate*.

The current shopping list, with prices from April 2010, is:

ASUS AT3N7A-I Motherboard	£ 98
Kingston HyperX 4GB memory (KVR800D2N6K2/4G)	£ 90
Samsung Spinpoint 500GB	£ 60
Samsung SN-S083B slimline	£ 22
Antec ISK 300-65 Housing	£ 54
Total cost	**£324**

Figure 1 - The motherboard, hard drive and optical drive

The total cost could well be reduced by up to £50 if you make use of an old PC case, reduce the RAM to 2 GB and decide on a smaller hard drive. To complete the system, you will also need a keyboard (PS2) and mouse which, after installation, could be replaced by a *Bluetooth* version using the integrated BT. A screen is also needed. These are not included in the table because the system will be used for unattended reception and processing of EUMETCast imagery. Most people will have these items lying around somewhere, anyway. It doesn't have to look pretty as long as it is functional.

Construction

The housing I used was an *ISK300-65* from *Antec* with an external 19 volt DC power supply (figures 2, 3).

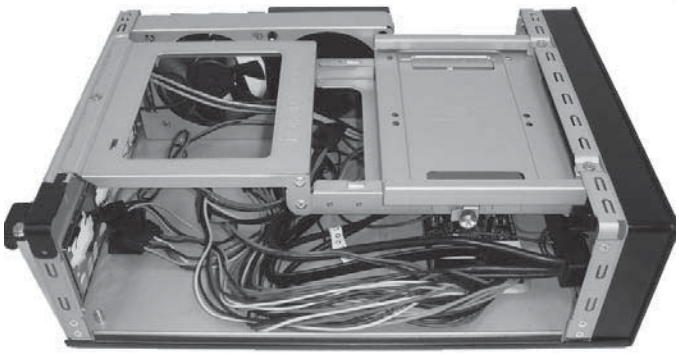


Figure 2 - The empty casing

A DC/DC convertor was installed within the housing to provide all the different voltages to the ATX power connector; it is located in the upper part of the housing shown in figure 2.

The connector on the right hand side of figure 3 is, despite its small size, capable of delivering 12V, 3.6A; 5V, 2A; 3.3V, 1A and -12V, 0.5A; a total of 65 watts. Before positioning the motherboard, remove the optical and hard drive mounting plate by undoing two screws on the front and one at the back. The upper part of the plate has space for two 2.5-inch hard drives while the lower part can be used to house a *Slimline* optical drive (figure 4).

Before I positioned the motherboard, I first stuck a couple of strips of plastic tape on to the metal where the board was to be mounted to prevent a possible short-circuit between board and the case.

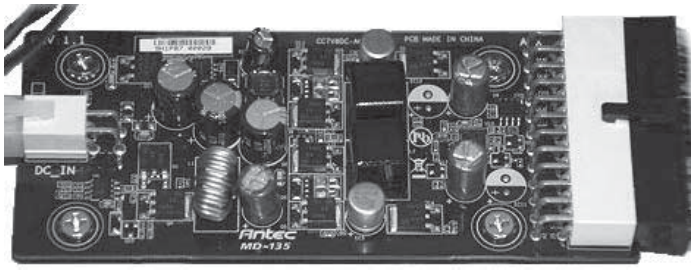


Figure 3 - The DC/DC converter

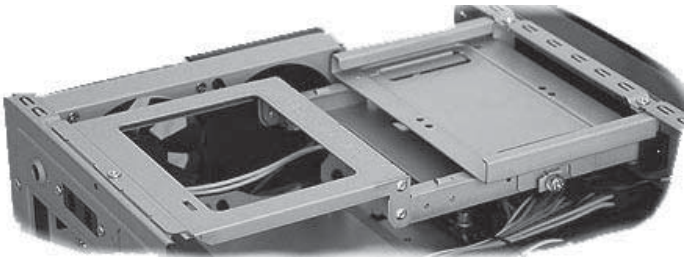


Figure 4 - Optical and hard disc drive mounting

Figure 5 - The rear end-plate viewed from inside the housing

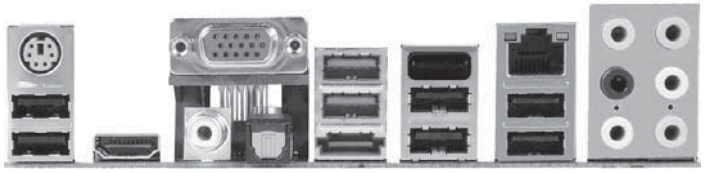


Figure 6 - Rear end connectors

The next step is to prepare the motherboard for fitting out. The board comes with a new panel for the back of the case (figure 5). Be careful not to damage or bend this and fix it in place. Take care following the assembly that all the 'strange' projections are bent slightly inwards. This ensures that all connectors make good earth contact with the body of the case (figure 7).

Before you go further, check first that the CPU fan feed is linked to the connector labeled **CPU-FAN** on the motherboard. If this is forgotten, there's a chance that the processor could overheat and die.

After sliding all cables aside you can fit the board in place, after which it is secured by means of four screws. Don't turn these too hard as there is the possibility that they could break off or the board could be damaged.

The next cable to be mounted is the housing fan connecter, which goes to **CHA-FAN**. If required, a third fan can be connected to **PWR-FAN**.

The next step is fitting the RAM. Depending on your system, values from 512 MB to 4 GB are possible, where 512 MB is the absolute minimum. To get a reasonable performance, a minimum of 1 GB of RAM should be installed. Windows-7 32-bit needs a minimum of 1 GB and the 64-bit version at least 2 GB to get a working system. Using a Linux OS, 512 MB of RAM memory could be enough.

However, if the PC is going to be used for receiving and handling EUMETCast data, one should follow these guidelines:

- Receiving data only 512 MB
- For receiving and handling MSG data, 1 GB is required
- For the above plus AVHRR/Metop, 2 GB is the absolute minimum

Figure 8 shows the 2 × 2GB memory from Kingston that I used, providing a total of 4 GB. Unfortunately 533 MHz memory cannot be used; the minimum speed should be 667 MHz but for best performance 800 MHz is recommended. Place these in the two orange coloured slots at the lower side of the board. First take care that the brackets on either side of the connector point outwards, position the modules so that the indents line up and then firmly

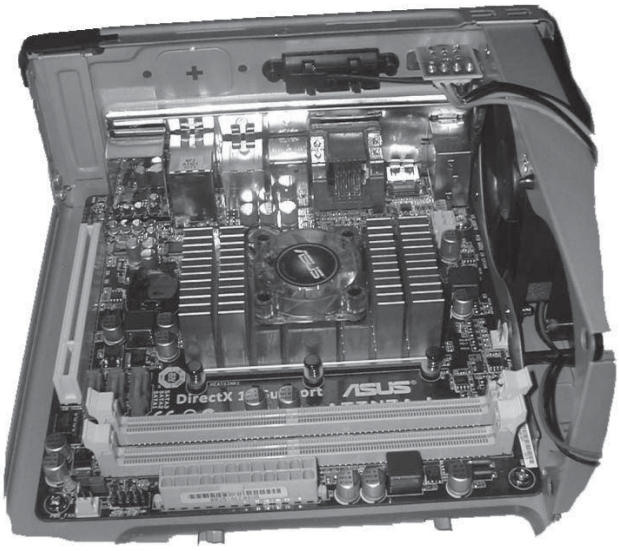


Figure 7 - The mounted motherboard

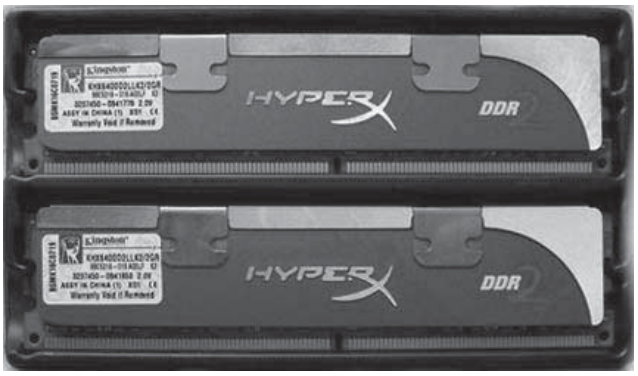


Figure 8 - The Kingston DDR RAM

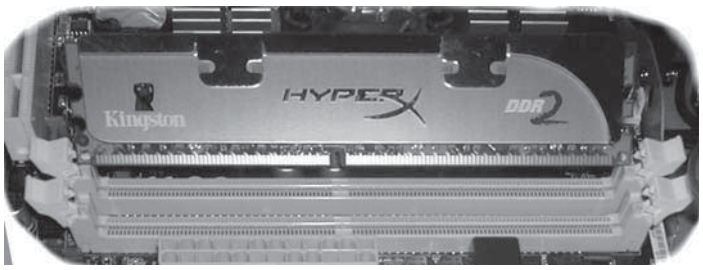


Figure 9 - DDR RAM slots

push them down. If inserted correctly, the locking brackets should move into place. See figure 9 and the following URL

www.kingston.com/installmemory

for more information. Repeat this for the second module, if used.

Now connect the two power supply cables. The large one inserted into **EATXPWR** and the smaller second one into **ATX12V**. Next all the front panel cables are installed. The two extra USB connectors fit on to **USB910B**. The connection for the power-reset knob and the various lamps are connected to **F_PANEL**. All audio connections go to **AAFP**.

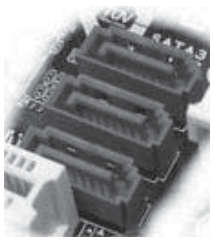


Figure 10
SATA300 connectors

The front panel also has an *eSATA* connector but the motherboard doesn't have one. To use the connector as a standard *SATA*, put the cable into *SATA3* for the time being (figure 9). The next step is preparing installation of the optical and hard drive. Place the two *SATA* cables into **SATA1** and **SATA2**. If not used for the front *SATA* connector **SATA3** could be used for a second hard drive.

Figure 11 - HD mounting plate screw

Figure 12 - Mounted optical drive

Now detach the hard drive mounting plate by removing the screw indicated by the arrow (figure 11), insert the optical drive and secure it with four screws (figure 12). Test fit it into the housing to check for correct alignment before screwing the drive firmly into place.

After this, assemble the hard drive mounting plate and reattach the two units, place inside the housing and secure with the three screws, two at the front and one at the rear. Don't forget to guide all the SATA and power cables to the top (figure 12).

Then, as a final step, connect all the cables to the drives. During all your work, try to ensure that cables are arranged neatly. Not only will it look good, it will make it much easier for you should you later have to correct a fault if something goes wrong. Carry out a final check that all cables are pressed firmly in place and all screws are tight. Leave the top off the system for the moment.

Now's the time to fire up the system for the first time, but first connect a screen and switch it on to ensure that you can see the

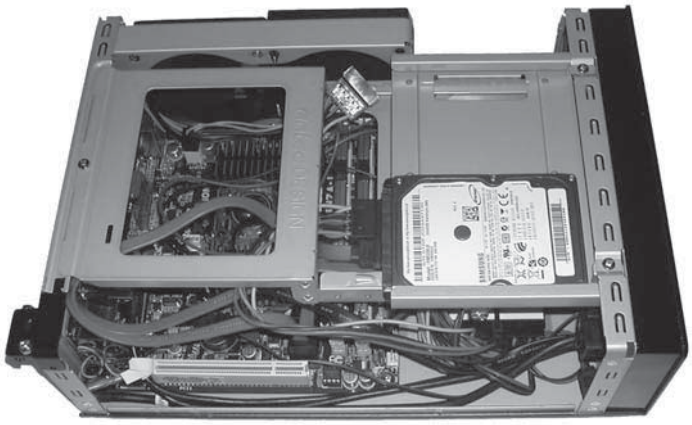


Figure 13 - The completed built system

computer's power-up display and react to it. Connect a keyboard to enter the BIOS and apply power to the system—and watch out that no smoke signals appear. If all goes well you'll see a message from the motherboard manufacturer.

I was interested in the unit's power consumption and therefore inserted a watt meter between the mains outlet and the power supply. With the system on standby, consumption was approximately 7.5 W but after applying power the reading rose to slightly under 24 W. During installation of the OS, using both drives, the consumption never became more than 33 W.

Harry H. Arends is Editor in chief, Werkgroep Kunstmanen

Windy EU?

Anthony Lowe

Is the image on the left showing local noise or have NOAA started putting the Isobars on when transmitting the image from the satellite?

Here at my location in Haydock, St Helens, Merseyside I am using an R2ZX fed by a crossed dipole at around 18 feet above ground. I have experienced this several times and images have been totally wiped out for 6-8 minuets at a time.

Unfortunately Anthony we believe you have a very active DIYer near you. Les Hamilton believes this to be a case of the phantom electric driller!

STOP PRESS

GEO has added a further rally to our forthcoming events

Newbury Radio Rally

20th June Newbury Radio Rally. This is a large and popular radio rally and GEO will be exhibiting for the first time. The location is the showground close the M4 Junction16. For details contact rally@nadars.org.uk or visit

www.nadars.org.uk

We have been contacted by a lady from the Weston-Super-Mare area who is wishes to dispose of a large satellite dish (5' diam) plus framework. A Quadrifillar Helix antenna, another small antenna and a directional antenna which is still mounted on the roof of her house.Plus various bits and pieces, connectors etc. If you are interested please contact the editor. geoeditor@geo-web.org.uk

Hunting for Volcanic and man made gasses

Part one David Painter

There are an unknown number of active volcanoes on earth today, some estimates put the figure at about 1500 classified and "active" sites that are known to have some form of current, or very recent activity, it is very important to note that the most dangerous volcanoes may be those not yet recognized as volcanoes. The definition of an active volcano or even "recent" depends upon your point of view; recent is referred to in volcanological terms as "Holocene" or as having had volcanic activity within the last 12,000 years. And the definition of "activity" is some form of measurable volcanic emission within a "recent" period. The simplest volcanic definition is "A volcano is an opening, or rupture, in a planet's surface or crust, which allows hot, molten rock, ash, and gases to escape from below the surface."

Emi Koussi (Image1page 29) volcano is located at SE end of the Tibesti Range forms the highest summit of the Sahara. The volcano contains three calderas, it is an impressive example of a volcanic complex containing 100's possibly 1000's of volcanic sites.

The Smithsonian (National museum of natural history-United States) is home to the Global Volcanism Programme (GVP), and it puts the number of currently erupting volcanoes as between 100 to 160 per decade, or roughly 20 or so observable volcanoes erupting at any one time; the definition of an "eruption" varies depending upon the volcanic site, and the scale of eruptions depends upon the type of volcano. Volcanoes whilst not by definition "erupting" still normally produce volcanic gasses at sometimes massive volumes, the best known volcanic gasses are CO2 (Carbon dioxide) and SO2 (Sulphur dioxide), other common gasses are Hydrogen sulphide, Methane and Carbon monoxide; more exotic gasses include Helium and Neon. Many volcanoes erupt and go unobserved or unreported, some like Stromboli (Italy) have never stopped erupting in recorded history, so there are a massive variety of magnitudes and types of volcanic sources contributing to our atmosphere.Volcanoes are not the simple "cone shaped" structures as seen in children's books, but are usually very complex and interacting structures that occupy vast areas of the worlds crust; both above and below the earth's oceans where the actual scale of volcanic activity is simply unknown and unmonitored, an estimated ¾ of the Earth's magmatic output is produced at undersea vents and oceanic ridges, which also produce vast quantities of volcanic gasses that are dissolved into the worlds oceans and rivers; some of these gasses do find their way into the atmosphere.

Classic woodcut print of Mt Fuji (C1930), Rainstorm Beneath the Summit Sanka hak?

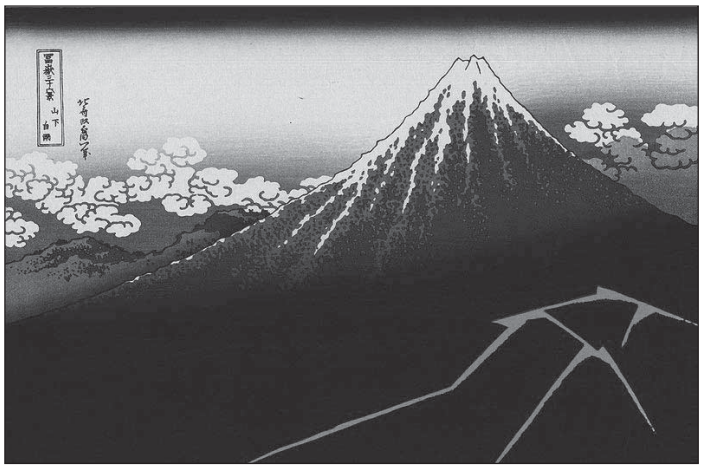


Image 3 Fuji Lightnings below the summit

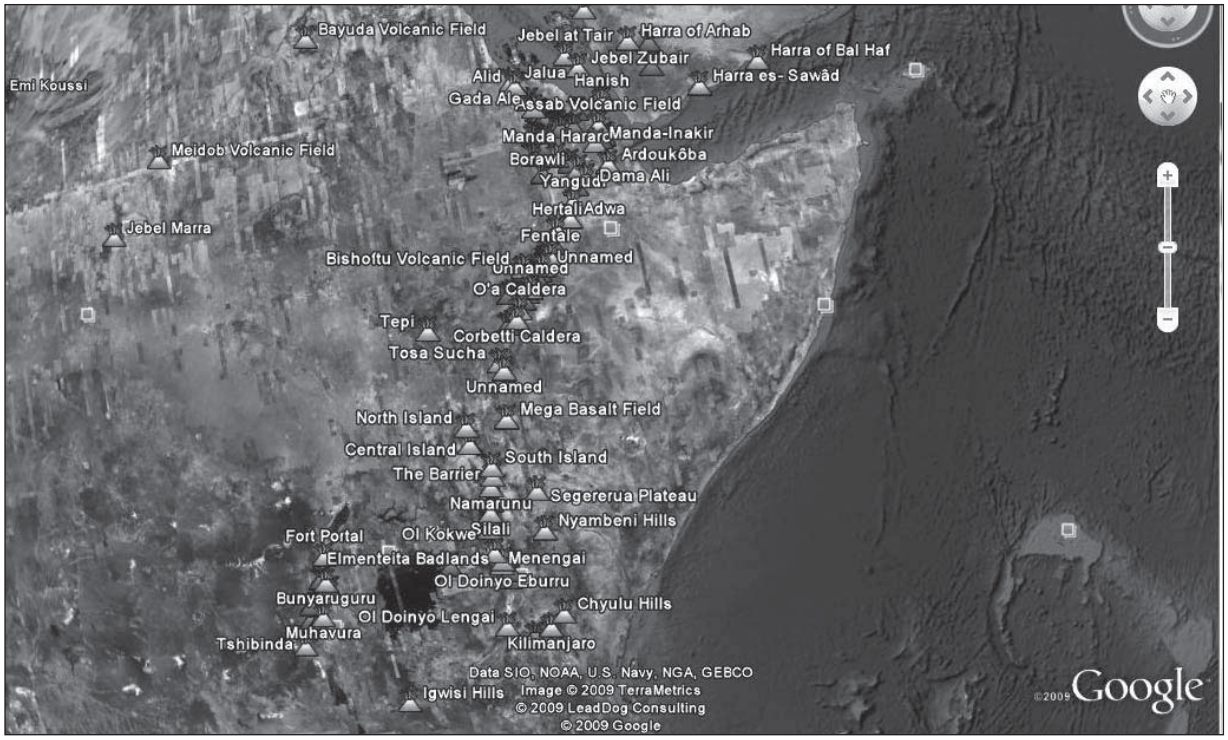


Image 2 Some of the worlds volcanoes represented on Google Earth *(Copyright Google)*

The effects of this unknown number of volcanic sites on our planets surface and oceans is being researched, but is hampered by the lack of reliable data and the difficulty of actually getting near an active volcanic site. Not only the terrain of some of these sites makes them difficult to visit, but various other political and physical hazards combine to make some of these sites almost impossible to visit for any length of time; not to mention the fact that the object of your attention may try to kill you while you are there. Many volcanologist's have died trying to understand this part of our planets ecosystem and many apparently well known sites are still little understood,making sense of the data is a real challenge, the main objective being to safeguard life and limit damage to property.

Image 4 Gas capture this shows how the volcanic gases are sampled in the active crater of Oldoinyo Lengai.

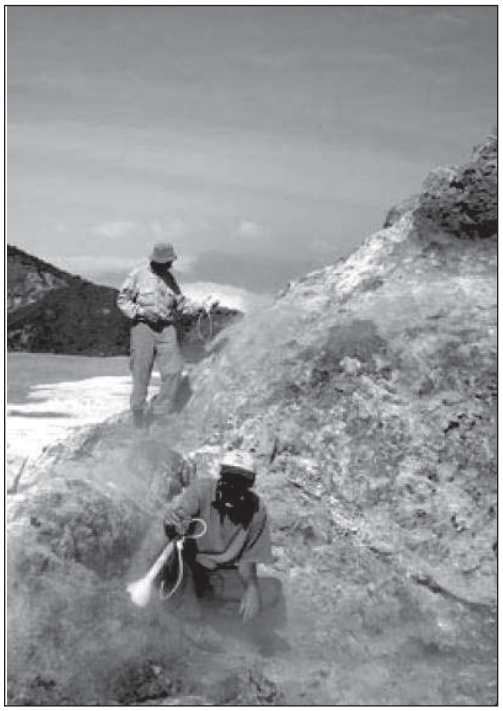


Image 4 Gas capture (Credit: University of New Mexico)

The basic method of monitoring volcanic activity is using seismography and the "physical" sciences, listening to a volcanoes seismic signature and observing changes in an individual volcanoes seismology; monitoring lava and gas output and temperature in an attempt to predict what state the giant enigma is presently in. Generally speaking the basic physical methods for monitoring volcanoes haven't changed since man first encountered one, only the instruments have; It is still very hard and potentially dangerous work. This means that relatively few volcanoes are comprehensively monitored, the Hawaiian Islands are an example, they are easy to get to, it's a nice place, and as a result the USGS seems to carry out a tremendous amount of research at Mauna Loa volcano observatory, rather than some-where more inaccessible like Erta Ale (Ethiopia) or Bouvet Island (South Atlantic).

Volcanic remote sensing

I initially thought I would find it easy to find evidence that remote sensing is being used to continuously to monitor volcanoes, as it provides a global and safe way to monitor volcanic activity 24hours a day, but I was to be disappointed. It seems there is much evidence to show remote sensing is only rarely used for general study of volcanic emissions, the main applications of remote sensing are when there is a major newsworthy event, after a volcano has increased it's activity levels to a point where a wider audience notices. The recent activities of Redoubt (Alaska), Kilauea (Hawaii), Chaiten (Chile), Galeras (Colombia) are some volcanoes that have hit the headlines; but there are many other volcanic sites that are hardly, if ever mentioned outside volcanology circles. Newsworthy and spectacular images of erupting gas clouds and ash plumes are the "classic" view of volcanoes most people see, but if you notice when you next look, without exception they all seem to be "daylight images". The recent events of Eyjafjallajokull volcano (image 4 below opposite) in Iceland have proved the point nicely, lots of daylight footage, not many ash images and no publicly available infra-red imagery.

Augustine Volcano (image 5) is a 4,100-foot-tall, 7-mile-wide stratovolcano. This eruption was captured by NASA's Terra satellite in 2006. Augustine's dome collapsed in 1883, during its largest historical eruption. It has been erupting for at least 40,000 years.

Image 5 Augustine Volcano captured by NASA's Terra satellite in 2006 (Copyright NASA)

Volcanic weather

Volcanic eruptions and volcanic weather effects have been noted in very ancient texts, although these effects have not been named as "Volcanic" until the Sicilian Island Vulcano gave it's godly name to the phenomena at an unknown juncture in Roman History. Evidence of major volcanic weather events are not hard to find in human history, and not surprisingly it's not good news when volcano's make the news.

Many readers may have seen real volcanoes up close, or at least seen the classic cone shapes of Mt Fujiama (Japan), MT Ruapehu (New Zealand), Kilimanjaro (Tanzania), Mt Etna or Stromboli (Italy); all of these names are famous for being volcanoes. But what is the other thing they are infamous for? They are all infamous for affecting our climates weather. In more modern times; air transportation due to the fear of ash ingestion into the engines of passenger aircraft.

A pyrocumulus is a cloud (Image 6)that is formed through intense convective lifting of gasses and air and ash, it rises in an unstoppable column that de-stabilises the local meteorology and can cause intense lightening and rain, as well as blanketing vast areas in ash deposits.

Before the invention of aircraft in april of 1815 a cataclysmic eruption of Tambora Volcano in Indonesia occurred, noted as the most powerful eruption in modern

Image 1 Norm-Emi Koussi C5C4C1 19.80 N, 18.53 E ; summit elevation 3415 m ; Stratovolcano Copyright NOAA

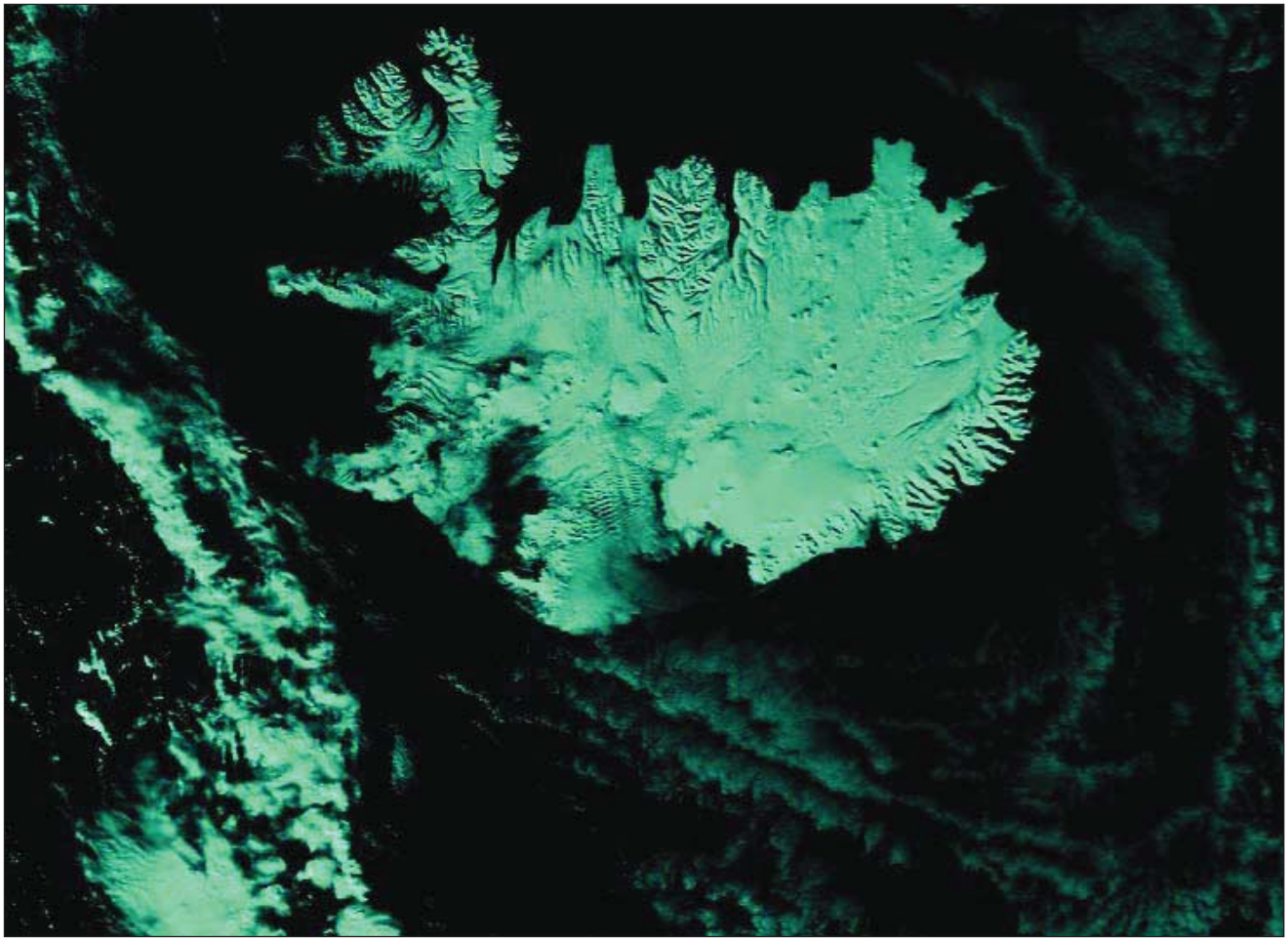


Image 4 This false colour Image shows Iceland during daylight hours prior to the Eyjafjallajokull volcano eruptions

Image 6 Pyrocumulus cloud. Picture Wikipedia

recorded history (yet). Weather records indicated that Tambora's volcanic cloud emissions (image 7) lowered global temperatures by as much as 3 degrees C, this was due to the large volumes of gas, ash and water vapour. Even a year after the eruption, most of the northern hemisphere experienced sharply cooler temperatures during the summer months and in parts of Europe and in North America 1816 was known as "the year without a summer." The red Norwegian sunsets caused by this are said to have inspired Edvard Munch's famous painting "The Scream"

Simulation of the effects of the 1815 Mount Tambora eruption, an estimated release of energy equivalent 20,000,000 MT of TNT . The circles on the maps show the thickness of volcanic ash fall.
A more recent event was in June 1991, the eruption of mount Pinatubo (Indonesia), slightly cooler than usual temperatures were recorded worldwide and the brilliant sunsets and sunrises have been attributed to this eruption that sent fine ash and gases high into the stratosphere, forming a large volcanic cloud that drifted around the world. The sulphur dioxide (SO2) in this cloud, estimated at about 22 million tons combined with water to form droplets of sulphuric acid, blocking some of the sunlight from reaching the earth and thereby cooling temperatures in some regions by as much as 0.5 degrees C. Another eruption the size of Mount Pinatubo could affect the weather for years and cause widespread disruption not yet seen in our life-times. And much more recently the Eyjafjallajokull volcano has caused massive disruption to air traffic due to airborne ash deposits.

Volcanic Age?

Some sources put the oldest known currently active volcano as Mt Etna Italy (Image 8), it's exact age is unknown but some sources say it is between 500,000 - 700,000 years old, and it has been affecting the Earth's weather every single day, in one way or another for all that time. There is strong evidence that Stromboli (Italy) has been continuously erupting for several thousand years at a low level, all the while producing volcanic gasses. In contrast one of the most short lived volcanoes yet recorded was "Paricutin" in Mexico, it started eruptions in 1943 in front of a farmer and his wife, and became extinct in 1952 after reaching a height of 423metres, three people were killed during it's short life all by lightening during eruptions.

Volcanic destruction

More severe weather in the form of volcanic ash caused the demise of Pompeii (Italy), an eruption of Mt Vesuvius (Italy) in AD79 wiped out vast areas of the Mediterranean covering them in thick layers of ash and pumice. Krakatoa (Indonesia) in 1883 exploded during a volcanic eruption with such cataclysmic force that it was distinctly heard as far away as Perth in Western Australia, about 1,930 miles away, and the island of Rodrigues near Mauritius, about 3,000miles away. According to official records, 165 villages and towns were destroyed and 132 seriously damaged, at least 36,417 people died in the aftermath, and many thousands were injured by the eruption, mostly from the tsunamis that followed the explosion. The eruption

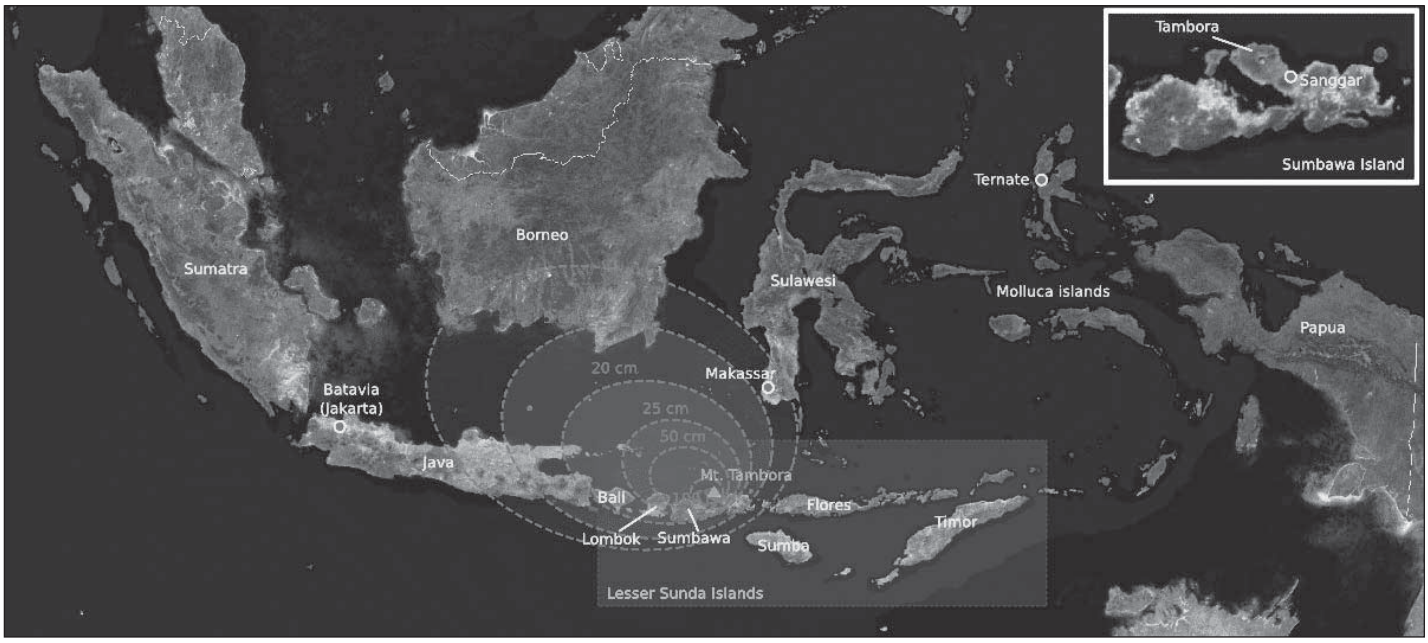


Image 7 Tambora-explosion (Image courtesy of NASA and Clive Oppenheimer)

destroyed two-thirds of the island of Krakatoa in the process. It is unknown what secondary volcanic activity was caused by this eruption or the volume of gasses that were released as there are no records.

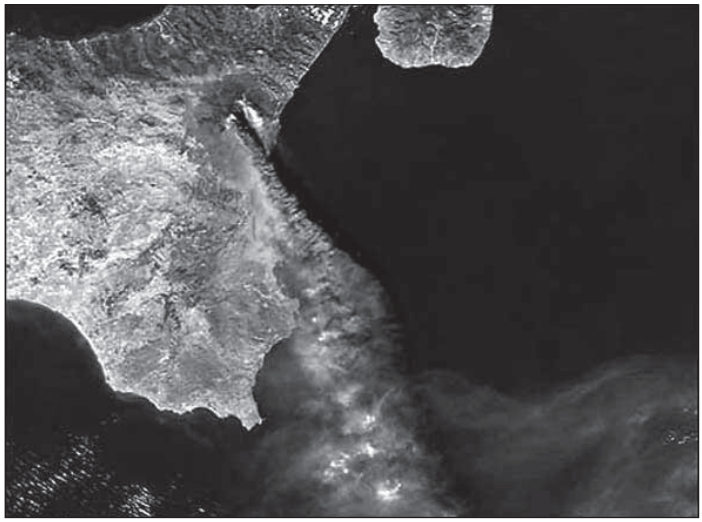


Image 8. The eruption of Mt. Etna was overflown by the MODIS instrument on the NASA Aqua satellite on 28 October 2002. (NASA)

Lake Nyos (west of Cameroon) released several cubic kilometers of volcanic CO2 from the depths of the lake in 1986, this killed every air breathing animal and human, an estimated 1800 people within it's vicinity. Some victims were found as far away as 25km from the lake in an event now called a "lake overturn" or phreatic eruption. Large volcanic gassing events like this are still a real threat today to those living near lakes Nyos, Monoun and Kivu (image 9); and it is suspected there maybe other as yet undiscovered volcanic lakes that may be prone to "Lake overturn" in Africa ,and other places worldwide. Although the understanding of these "Lake overturns" is improving they, in volcanic terms are a relatively newly discovered phenomena; they are being monitored currently by ground based means and attempts are being made to de-gas the lakes.

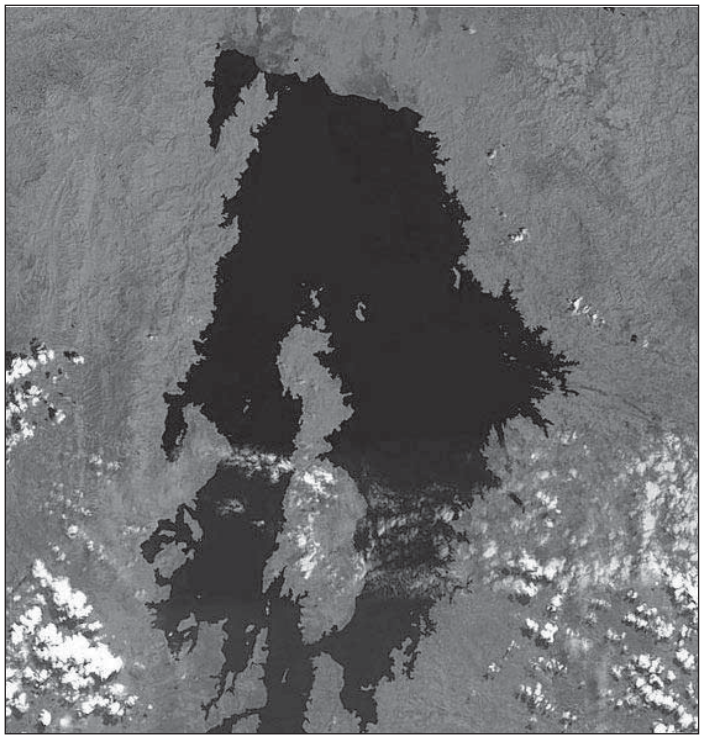


Image 9 View of Lake Kivu and Idjwi island from Landsat 7 satellite imagery (1999-2003) (Copyright NASA)

The massive eruption of the Laki volcano in 1783 caused one of the greatest disasters in living history (Image 10)

Volcanic gasses are sometimes a major threat for months or years, rather than in a single event; in 1783 Laki or Lakagígar in southern of Iceland erupted, the previous eruption between 934-940AD released an estimated 219 million tons of Sulphur dioxide gas, one of the largest ever estimated gas releases from a volcano to date. The 1783 eruption was to be different, during the first six months it spewed an estimated 14km3 (3.4cu/mi) of basalt lava, it then changed to releasing massive amounts of gas. Again estimated quantities are 8million tons of hydrogen fluoride and 120million tons of sulphur dioxide before it ended eruptions in 1785, approximately equivalent to three times the total annual European industrial output in 2006. The human effects were devastating, the "Laki haze" travelled across Europe and a reported 23,000 people died in the U.K as a result of the Sulphur dioxide poisoning in August/September 1783. Iceland suffered terribly, an estimated 20-25% of the population died in the famine and fluorine poisoning after the fissure eruptions ceased, around 80% of sheep, 50% of cattle and 50% of horses died because of dental and skeletal fluorosis from the 8million tons of hydrogen fluoride that was released. 1783 still ranks as one of the most unusual weather events ever recorded, and the disruption and loss of life was widespread across the world, it has been suggested it contributed to the French revolution in 1789. The Laki eruption illustrates that low energy, large volume, long duration basaltic eruptions can have climatic impacts greater than large volume explosive silica-rich eruptions, most of us are familiar with images of.

Today, a I look at the news I see that our volcanic planet is really making the news again as Iceland shows us what our modern age has yet to learn to cope with, in less than a week Europe has been paralysed by an event outside our control. The reason to "monitor remotely" the activities of our volcanic planet cannot be overstated; and as I investigate the various resources available on the internet I am disappointed by the lack of fresh data and the lack of infra-red images from satellite sources, this I will explore in Part 2.

Volcano Live - Probably the best and most up-to-date global coverage website on the internet about volcanoes.

http://www.volcanolive.com/volcanolive.html

Smithsonian Institute - Global volcanism programme – numbers of volcanoes
http://www.volcano.si.edu/faq/index.cfm?faq=03

USGS Volcano Hazards program - Mainly US volcanoes (Hawaii, Alaska)
http://volcanoes.usgs.gov/

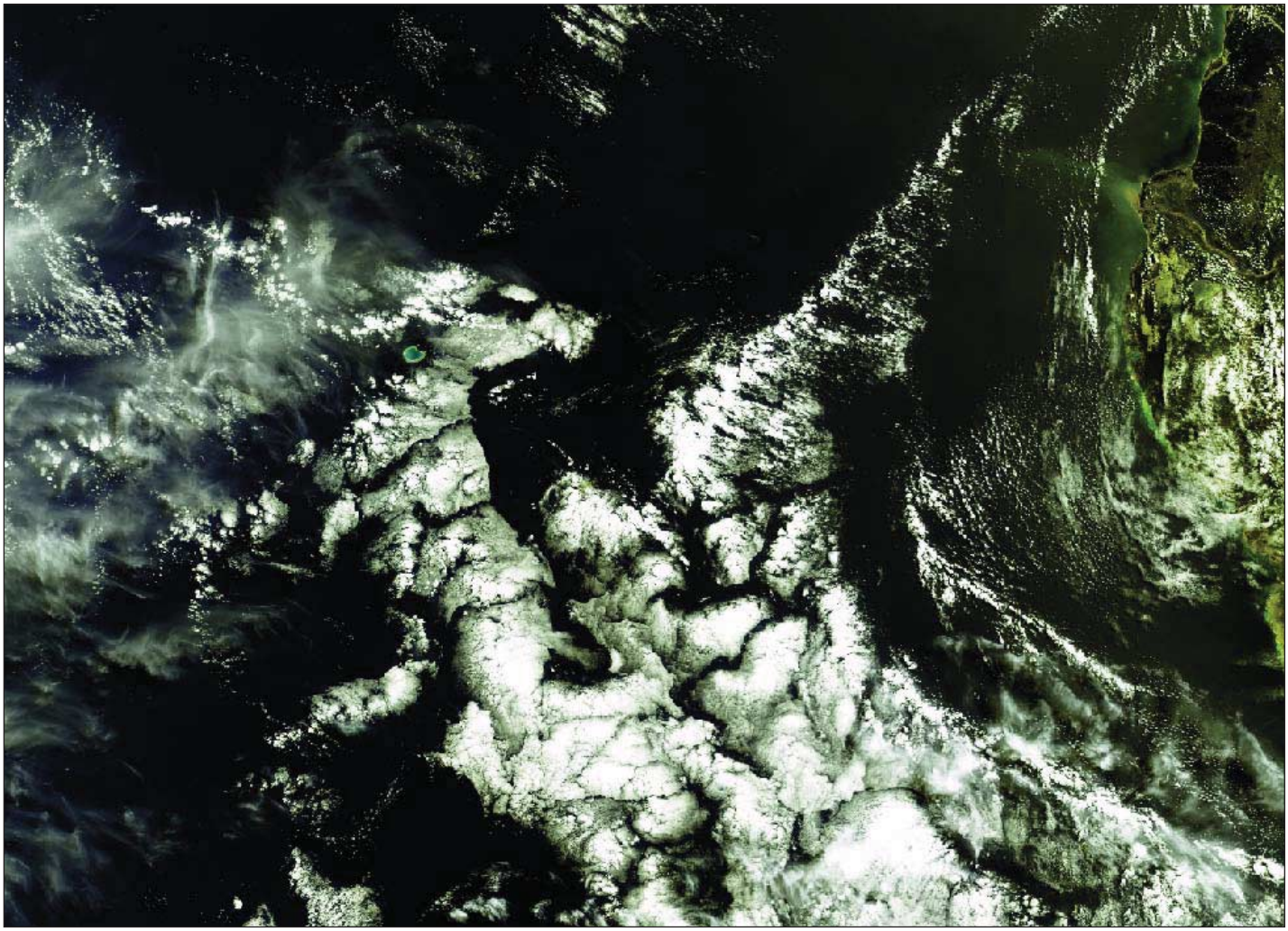
USGS Volcanic gasses
http://volcanoes.usgs.gov/hazards/gas/index.php

European volcanological society - Europes volcano website.
http://www.sveurop.org/gb/menu/fr_menu.htm

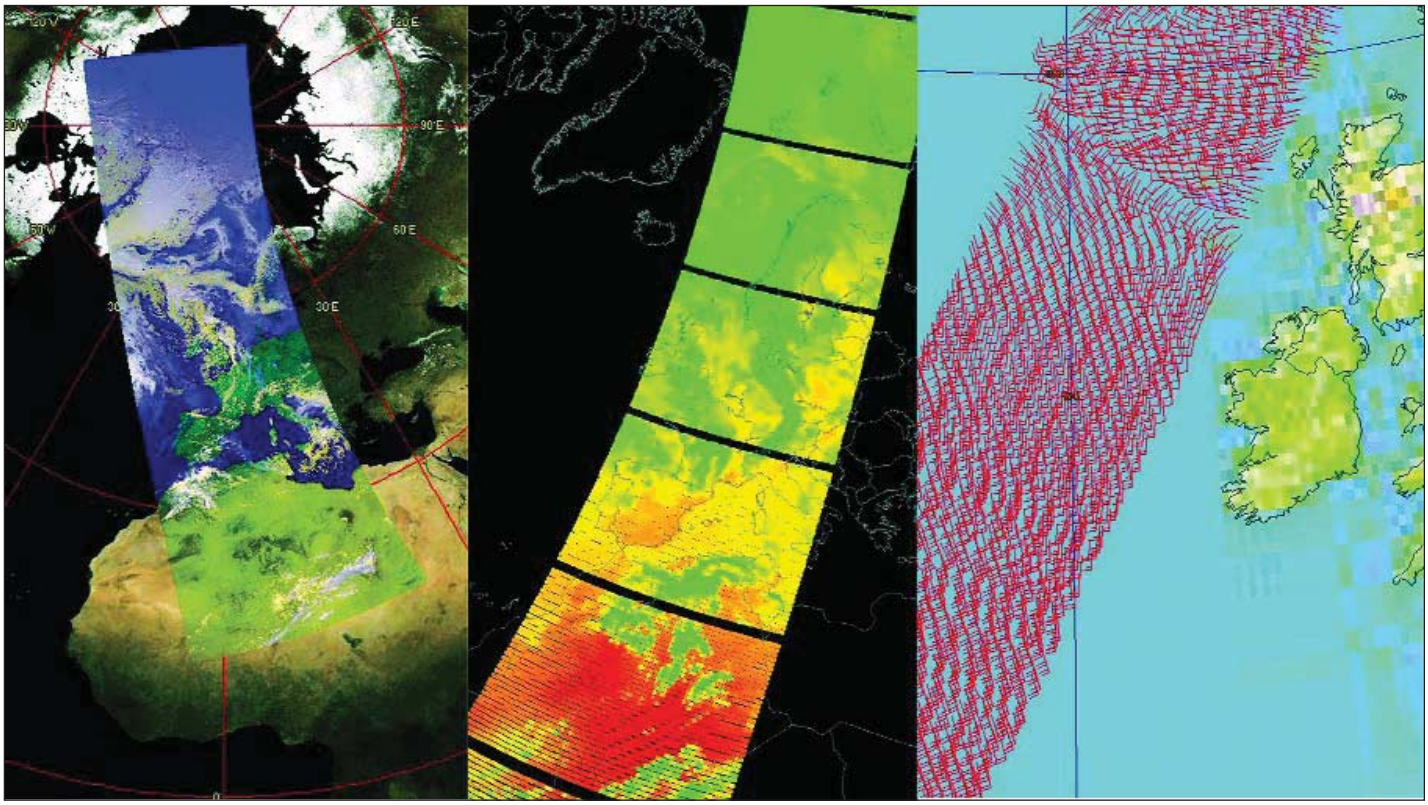
World organisation of Volcano observatories – Organistation for volcanic observatories
http://www.wovo.org/

Oregon state – Volcano world
http://volcano.oregonstate.edu/volcanoes/index.html

Continued on page 33



This is an Envisat image received by Francis Bell. It shows the southern part of the Mozambique Channel with part of Madagascar on the right. The small isolated island to the west of Madagascar which appears as a light blue circle is the subject of this issue's Quarterly Question.



Left image :- EARS AVHRR image Centre image :- EARS ATOVS image Right image :- EARS ASCAT image

For full details of these images see Dougkas Deans Computer Corner page 42

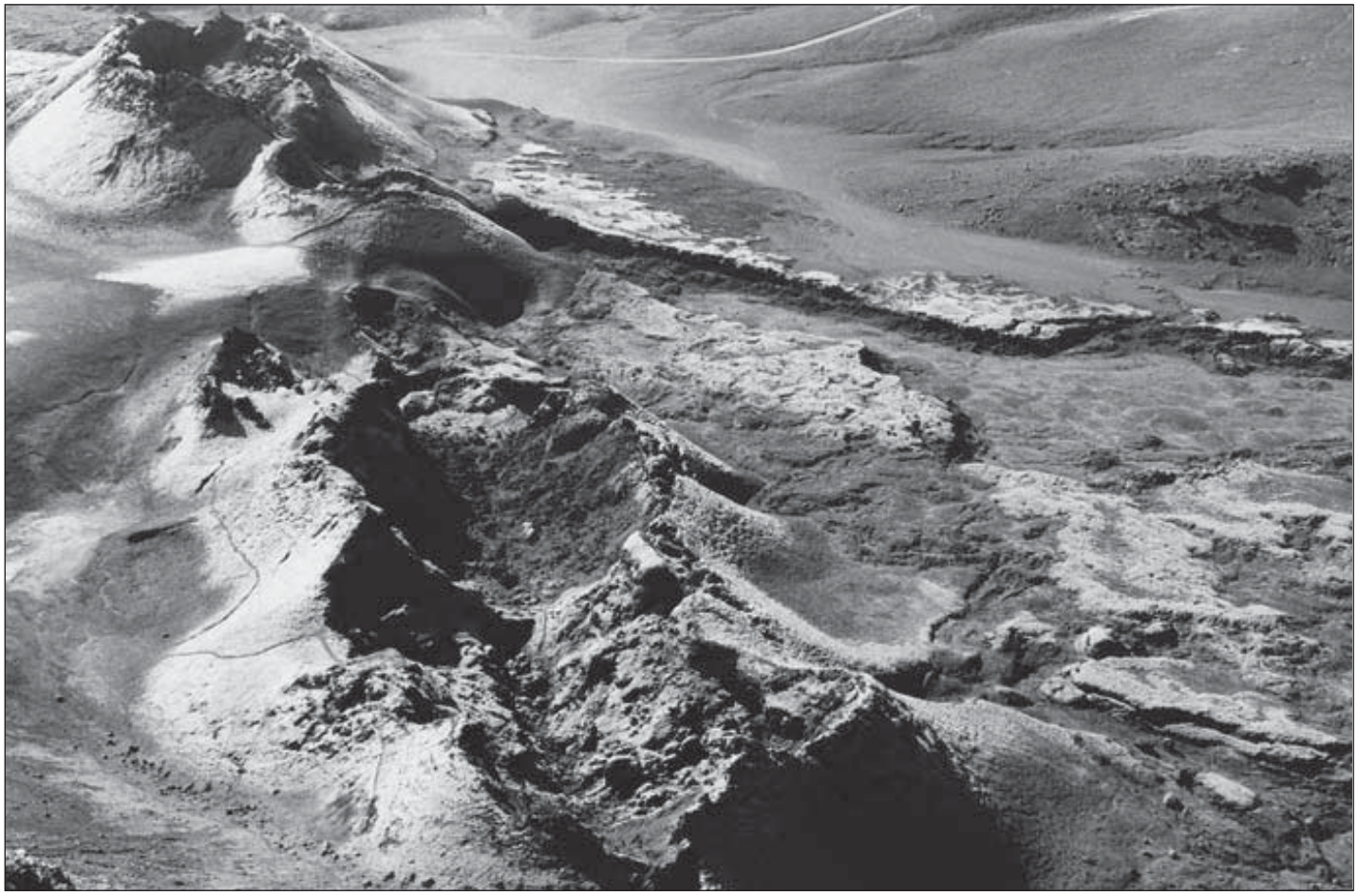


Image 10 Laki or Lakagígar (Craters of Laki, estimated to have killed over two million people globally, making it the deadliest volcanic eruption in the history of mankind."*(Wikipedia)*

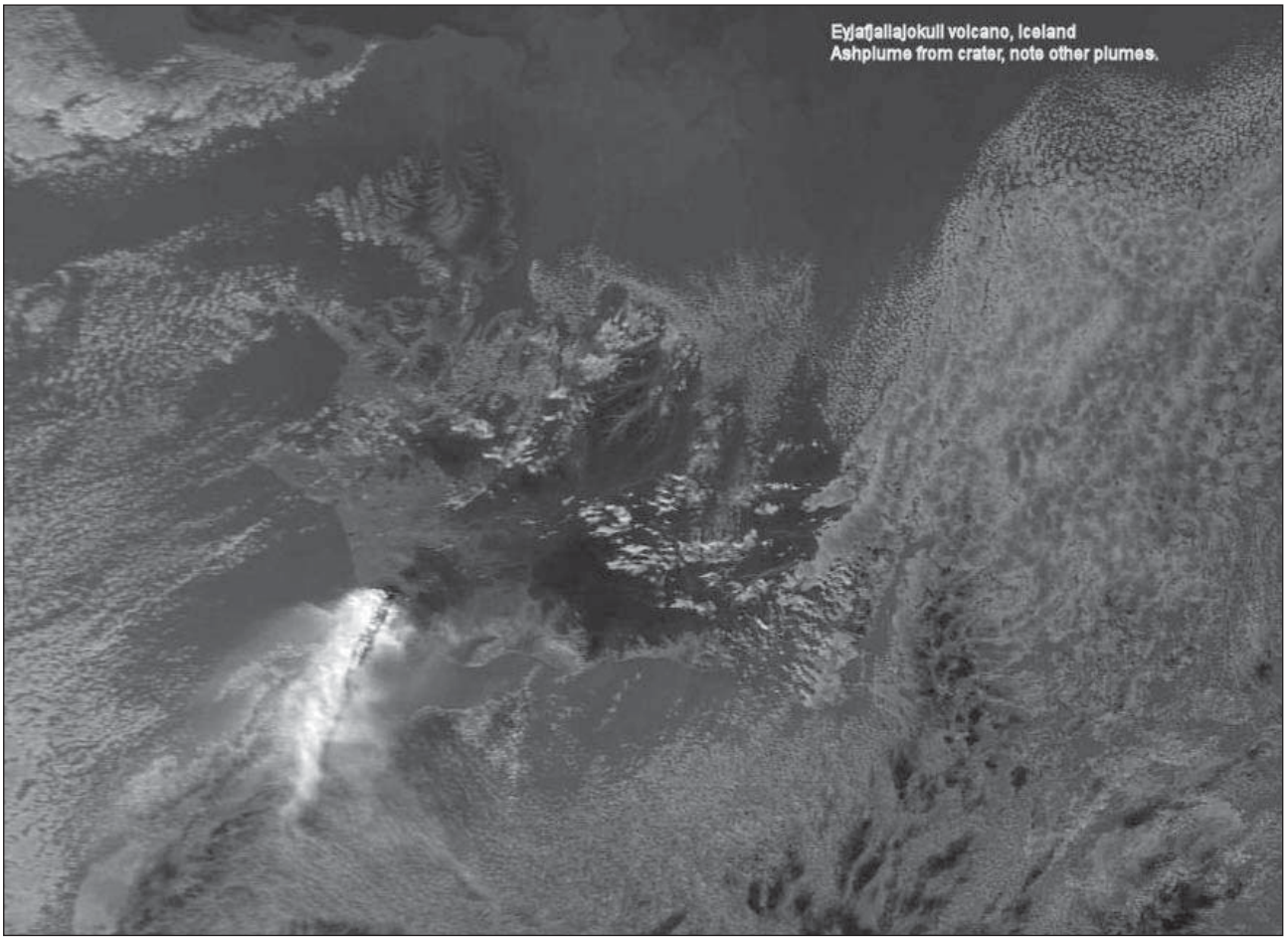
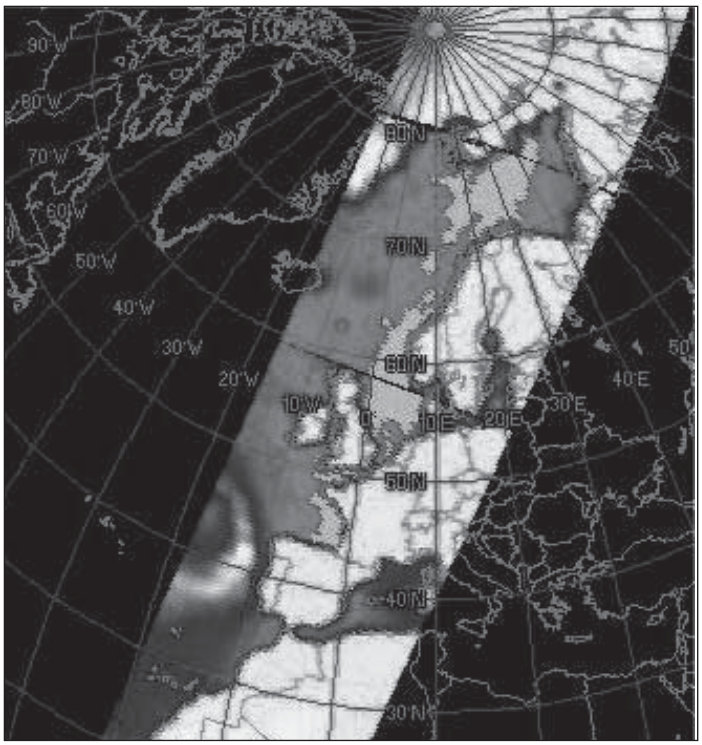
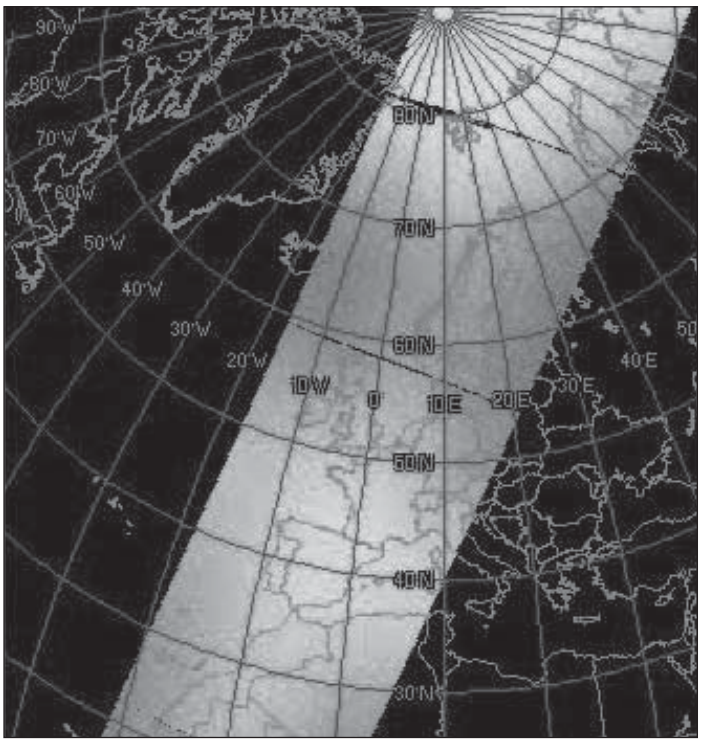


Image 11 Infra-red Channel 3 NOAA19, shows ash plume from volcano and other plumes from other volcanic sites.(Copyright NOAA)

ATOVS Data

Robert Moore





Since ATOVS data first became available through MSG-1 and MSG-2, I have received them, and occasionally viewed them, using David Taylor's *ATOVS Reader*. But I have never used the data. My reading of the email lists suggests that few if any of the amateur fraternity in GEO do use ATOVS data. This is frustrating because the data are obviously very rich. From the EUMETSAT website we learn that 'ATOVS data include temperature and humidity profiles, cloud top temperatures and pressures, and much else. Thus these data can provide a three dimensional view of the atmosphere.

> *'More specifically, AMSU-A channel 1 at 23.8 GHz provides information from the surface. Clearly, the high variability of surface emissivity in the microwave region allows discrimination between different surface types. AMSU-A channel 8 at 55.5 GHz provides information of the atmospheric state in the region of 120 hPa (at approximately 15 kilometers altitude)'*

But is any of this data accessible to the amateur user? In fact my first question would be whether all these data are already assimilated into products that we can use without ourselves having to engage in any processing? For example, we might expect these data to contribute to the production of the SATREP models which we can use at

http://www.satreponline.org/

or, perhaps, to the basic weather charts produced by meteorological offices across Europe and beyond.

Secondly, is it possible for the amateur user to process the data in order to understand it (e.g. what is the temperature or humidity at a given altitude?) or to produce three-dimension models of the atmosphere covered by the ATOVS imagery? I suspect that the software needed to do the latter would be highly complex and perhaps superfluous because I am sure the professionals are more interested in numerical inputs to their models than in pictures.

David Taylor has produced fine software which enables us to visualise the data. We can see the various channels (20 for HIRS, 15 for AMSU-A and 5 for AMSU-B) and we can read off the temperature at any given position: but not the altitude. So how do we read altitude, and interpret the images, some of which differ only by a subtle change of shade? It may be that to produce sensible output we need to combine data from the different ATOVS sources. For example the NASA website says of AMSU-A that:

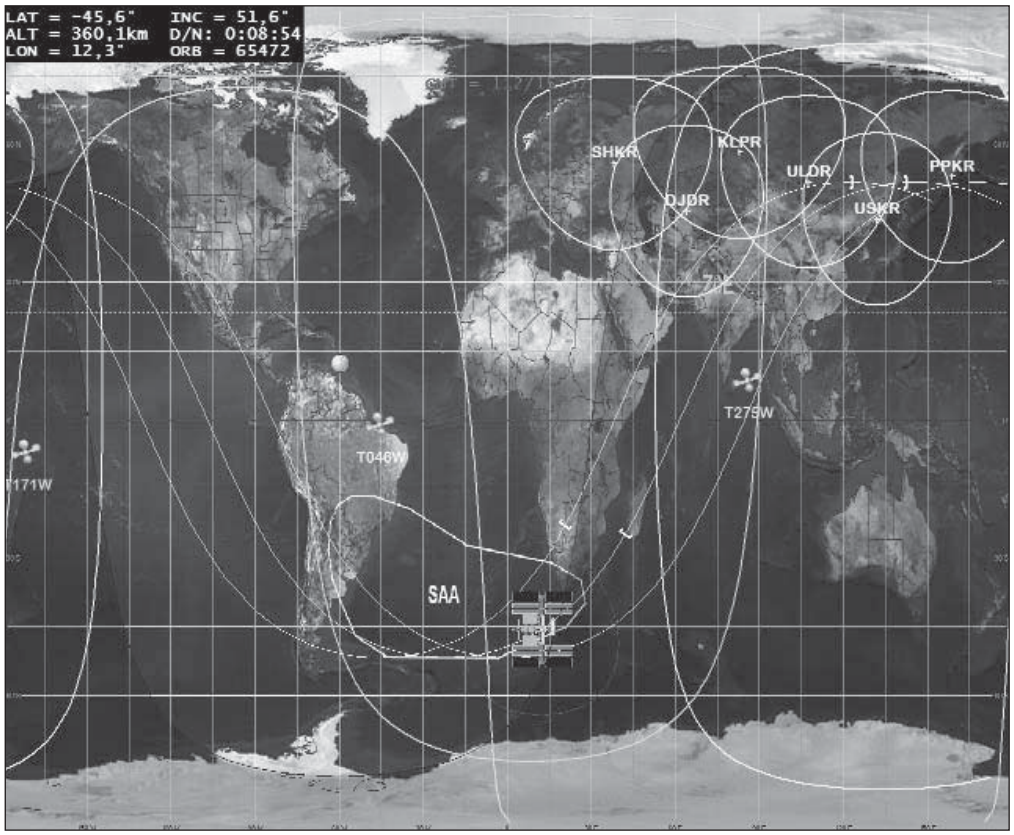
> *'The data from this instrument are used in conjunction with the HIRS to calculate the global atmospheric temperature and humidity profiles from the Earth's surface to the upper stratosphere, approximately a 2-millibar pressure altitude (48 kilometres or 29.8 miles). The data are used to provide precipitation and surface measurements, including snow cover, sea ice concentration, and soil moisture.'*
>
> ***http://goespoes.gsfc.nasa.gov/poes/instruments/amsu_a.html***

This strikes me as being well beyond the capacity of an amateur meteorologist sitting at home at his or her PC. The descriptions of the functions of the other instruments indicate equally complex usage.

So, I suppose thirdly, I am bound to ask whether or not it is useful for the average GEO member to receive and process ATOVS data? If anyone can answer 'Yes' to this question, I hope they will write for a future issue of GEOQ and explain how they use the ATOVS data.

WXtrack ISS Mode – Houston Mission Control on your PC!

David Taylor

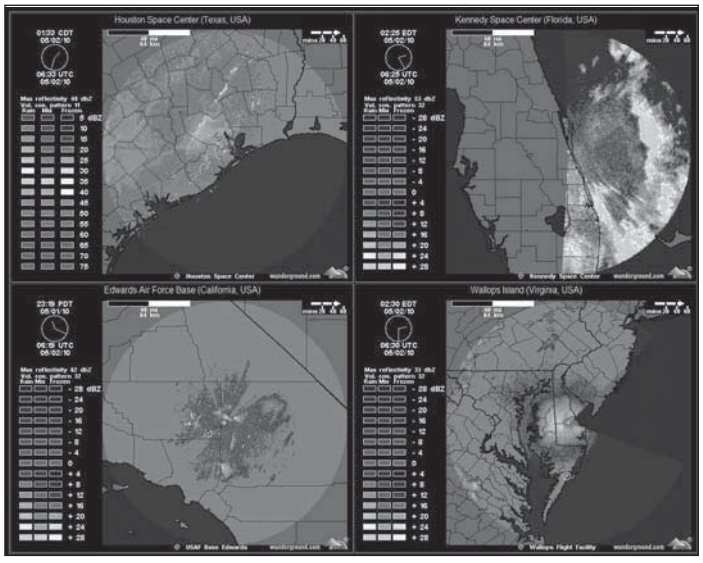


- With the TDRSS satellites, you can rename them from the name in your Kepler data, and the program can display the names and footprints in separate colours. Rather than the sloping presentation of typical geostationary satellites, renamed satellites are displayed with horizontal text (as only three will typically be displayed).
- Michel Casabonne's background map includes the South Atlantic Anomaly – a higher radiation region.
- The ground track of a satellite can be displayed with +/- 1.5 orbits, and entry and exit markers to solar-eclipse periods can be added. These are the white square brackets "[" and "]" in the screen-shot above.
- You can overlay country and state boundaries on the standard map projection.

WXtrack has been a very popular satellite tracking program over the last decade, with a lot of input from the users being used both to enhance the program and to meet today's needs. You will find WXtrack used in schools and universities, in both amateur and commercial installations, and at space centres across the world, particularly the free version. Following an exchange of ideas with Michel Casabonne over the last few months, WXtrack has been developed to include options to allow you to have a display very similar to that seen on the NASA Mission Control Center wall display. This has involved quite a bit of programming, so you will find that some of the enhancements are only available in the registered version of the program. Here's what's new or special for the ISS/STS missions – you can turn these features on or off to suit your own needs.

- There is a "blackboard" display of the status of the selected primary satellite. This can be any satellite you choose, not just the ISS or current Space Shuttle flight. The blackboard can be in either the one-column or the two-column format seen at the control centres, and located at either the left or right side of the image.
- A display of GMT (i.e. UTC) at the top centre of the screen. You can set the colour and vertical location of this display.
- Display of Mission Elapsed Time (MET)
- Michel Casabonne has kindly provided the custom icons for the International Space Station (ISS), Shuttle (STS), and TDRSS communications satellites. These icons can be downloaded from the WXtrack Web page: ***http://www.satsignal.eu/software/wxtrack.htm***
- F11 provides a near full-screen display (or you can use the right-click pop-up menu). Press F11 again to revert to the standard display size.
- There is an extra item in the Tools menu, to display the weather in real-time at selected ISS locations, such as Shuttle landing sites.

May I say "thanks" to all who have helped with these developments, either by suggesting enhancements, by beta testing, or by registering the program to support its continued development.



Neyriz Lakes Iran

John Tellick

Lakes Bakhtegan and Tashk (together known as the Neyriz Lakes) in the Fars Province in southern Iran are featured in this image acquired by ALOS – Japan's four-tonne Earth observation satellite.

Lake Bakhtegan (centre) and Lake Tashk (top), situated in the Neyriz Basin, are salty lakes in the south eastern Zagros Mountains with fluctuating water levels according to rain and snowfall in the mountains.

Lake Bakhtegan, Iran's second largest lake, is fed mostly by the Kur River, while Lake Tashk is fed by overflow from the marshes at its west end and by a large permanent spring in the northwest.

Although normally separated by narrow strips of land, during years of heavy rainfall they may join to form a single lake. Likewise, after years of low rainfall, such as in 1934 and 1971, the lakes may dry out completely except in the area near the springs.

Supporting more than 20000 waterfowl during the migration seasons and in winter, the lakes are extremely important for breeding of a wide variety of species and helping to maintain the genetic and ecological diversity of the region.

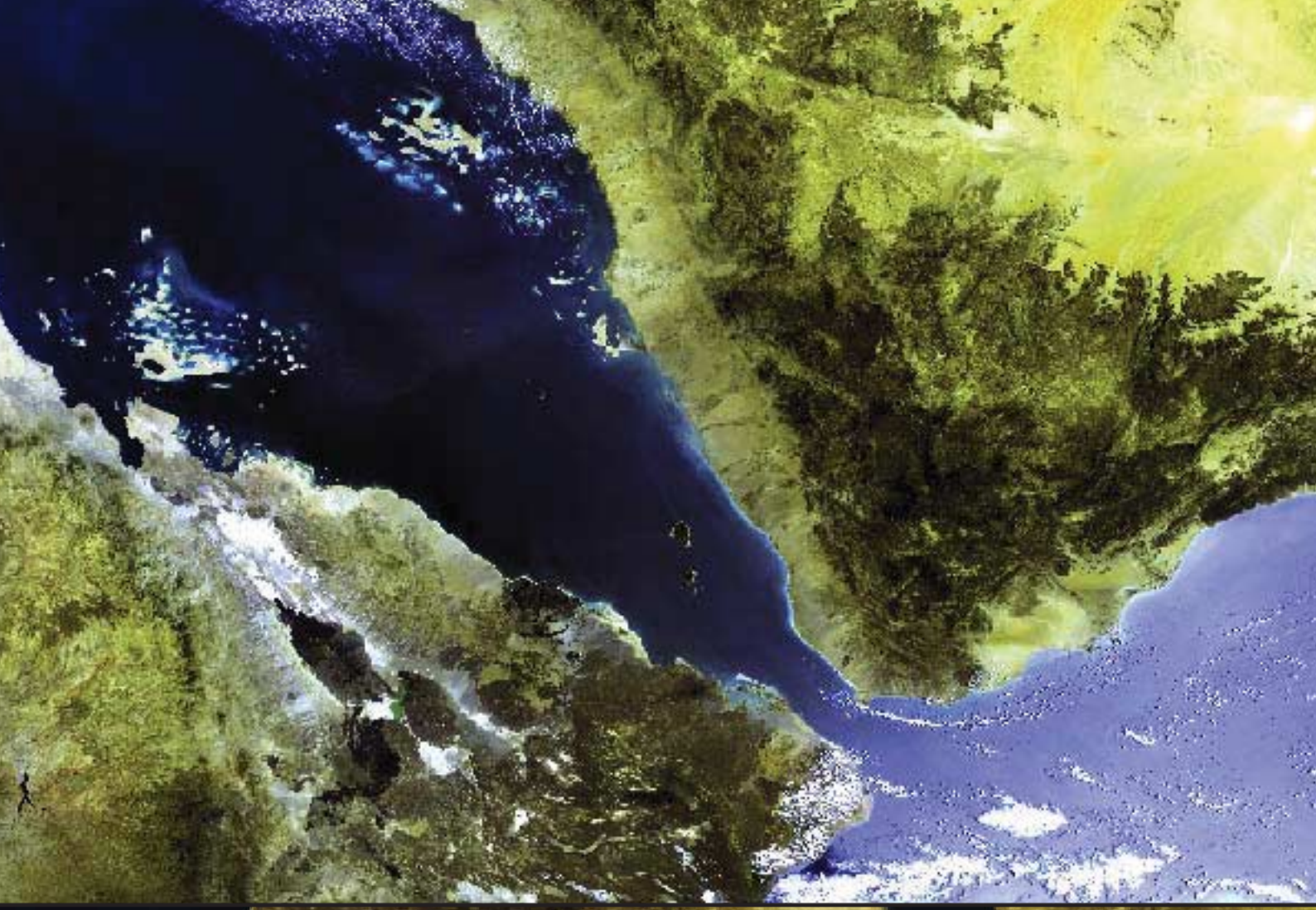
The two lakes, their delta and spring-fed marshes are designated as Wetlands of International Importance by the Ramsar Convention on Wetlands. The Ramsar Convention on Wetlands is an inter-governmental treaty established in 1971, establishing a framework for the stewardship and preservation of wetlands.

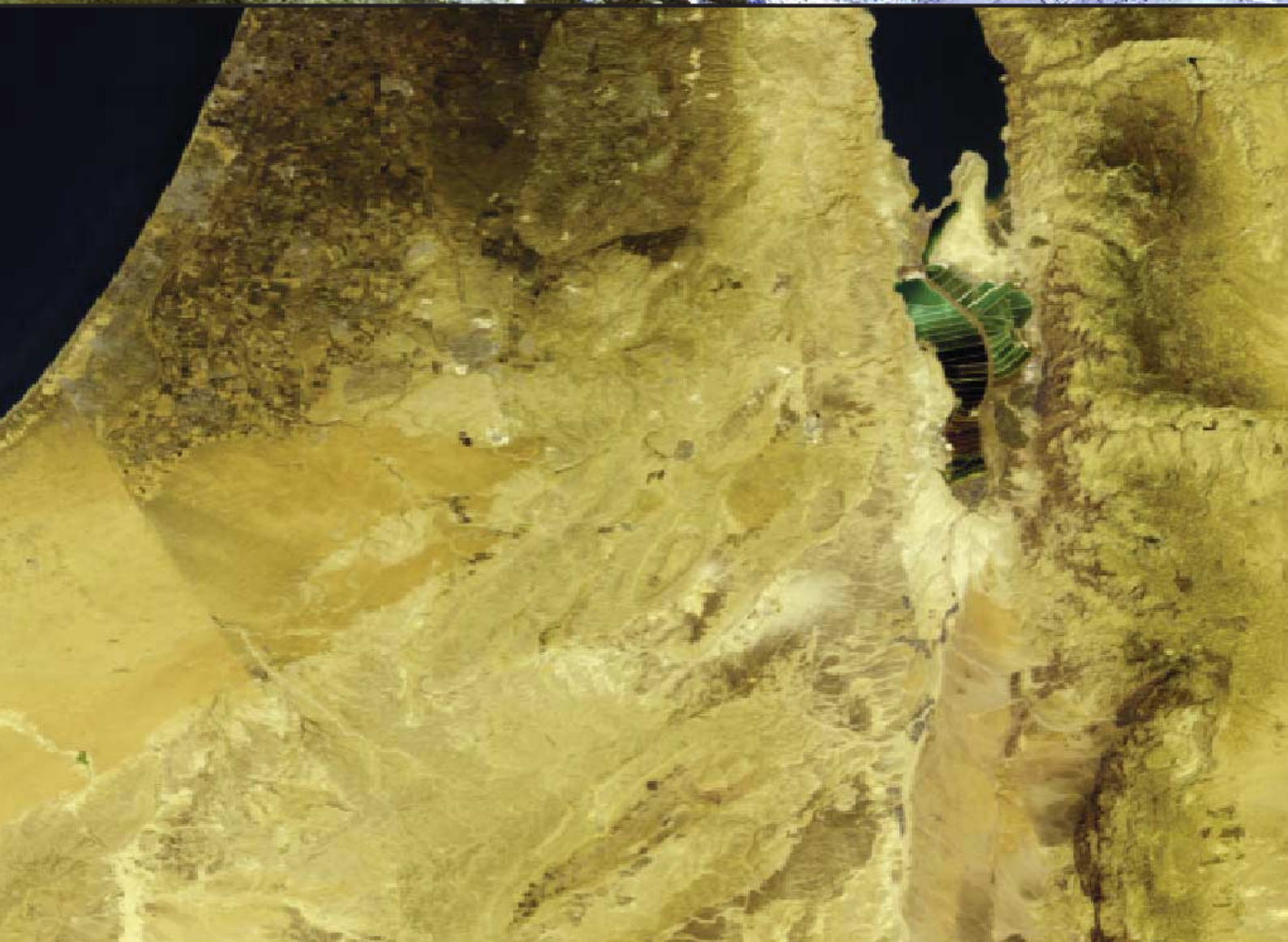
The Bakhtegan National Park, a wildlife park, sanctuary and reserve, is visible in the top centre of the image above Lake Bakhtegan.

ALOS (Advanced Land Observing Satellite) captured this image on 6 March 2009 with its Advanced Visible and Near Infrared Radiometer type-2 (AVNIR-2) instrument, which is designed to chart land cover and vegetation in visible and near infrared spectral bands with a resolution of 10 m.

In addition to AVNIR-2, ALOS also carries the Phased Array type L-band Synthetic Aperture Radar (PALSAR) instrument – a microwave radar instrument that can acquire observations during both day and night and through any weather conditions – and the Panchromatic Remote-sensing Instrument for Stereo Mapping (PRISM), which can observe selected areas in three dimensions, down to a 2.5-m spatial resolution.

ESA is supporting ALOS as a Third Party Mission, which means ESA utilises its multi-mission European ground infrastructure and expertise to acquire, process and distribute data from the satellite to its wide user community.





50 years of weather satellites: Celebrating the launch of TIROS-1

John Tellick

On April 1 1960 NASA successfully launched TIROS-1 (Television Infrared Observation Satellite) on a Thor Able rocket at Cape Canaveral. TIROS-1 was the first in a series of early weather satellites.

TIROS-1 orbited some 700 km above the Earth at an inclination of 48° to the equator, in an approximate polar orbit. It spun at 12 revolutions per minute, producing images of 500 lines at 500 pixels/line.

TIROS-1 functioned for only three months but returned nearly 23,000 images in that time, and was soon followed by other satellites in the same series. For the first time meteorologists could actually see the distribution of weather systems over the surface of the Earth and no longer had to rely on inferences from widely scattered conventional observations.

At the time of launch the suitability of a satellite to monitor weather was as yet unproven. TIROS-1's objectives were to test observation technologies, with the long-term aim of developing a global meteorological information system.

The satellite was fitted with two television cameras (one with a wide angle lens, the other a telephoto) which captured some of the first images of earth from a low polar orbit (see image left). Both cameras were attached to magnetic tape recorders which stored photographs while the satellite was out of range of the ground station network.

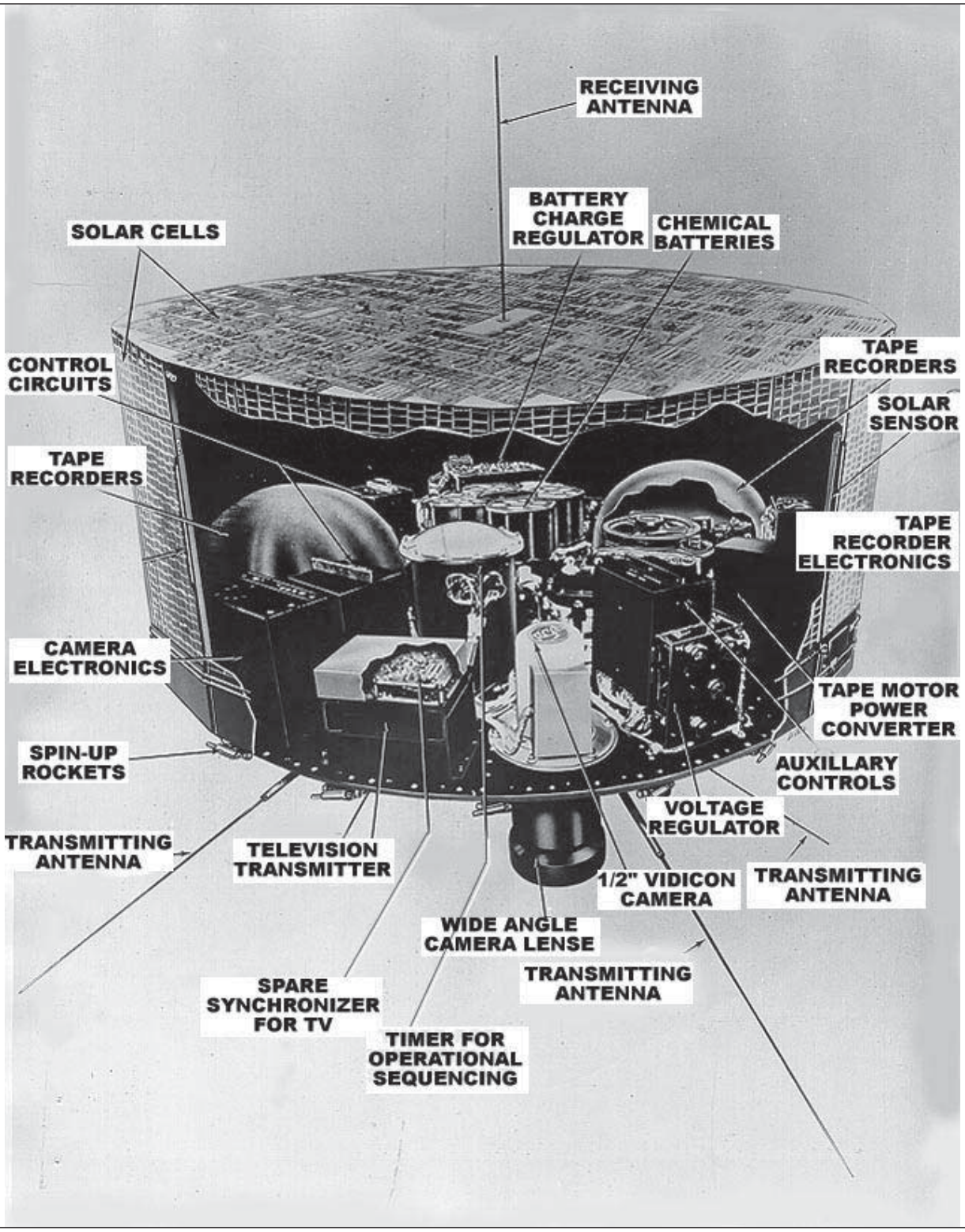
TIROS-1 came to a premature end when the satellite suffered an electrical fault on June 15 1960. However, the TIROS programme went on to launch another nine satellites and decisively proved the usefulness of weather observation from space.

The USA also pioneered the first geostationary weather satellite when it launched the experimental ATS-I on 7 December 1966. This combined communication / meteorological satellite was also the first of a series. It operated initially over Ecuador, but was allowed to slowly drift westward, reaching 151°W by 1978. The satellite included two meteorological experiments on board, providing half-hourly full earth disc images at a resolution of 3.2 km, and also relaying weather facsimile (WEFAX) data. Over its twelve-year life span, ATS-I provided useful data for the first six years, up to 1972.

Within a decade the USA had established - and demonstrated the value of - the two classes of meteorological satellites forming the basis of the systems which have been in operation ever since. TIROS-1 was a forerunner of today's polar-orbiting satellites such as the USA NOAA series and EUMETSAT's Metop.

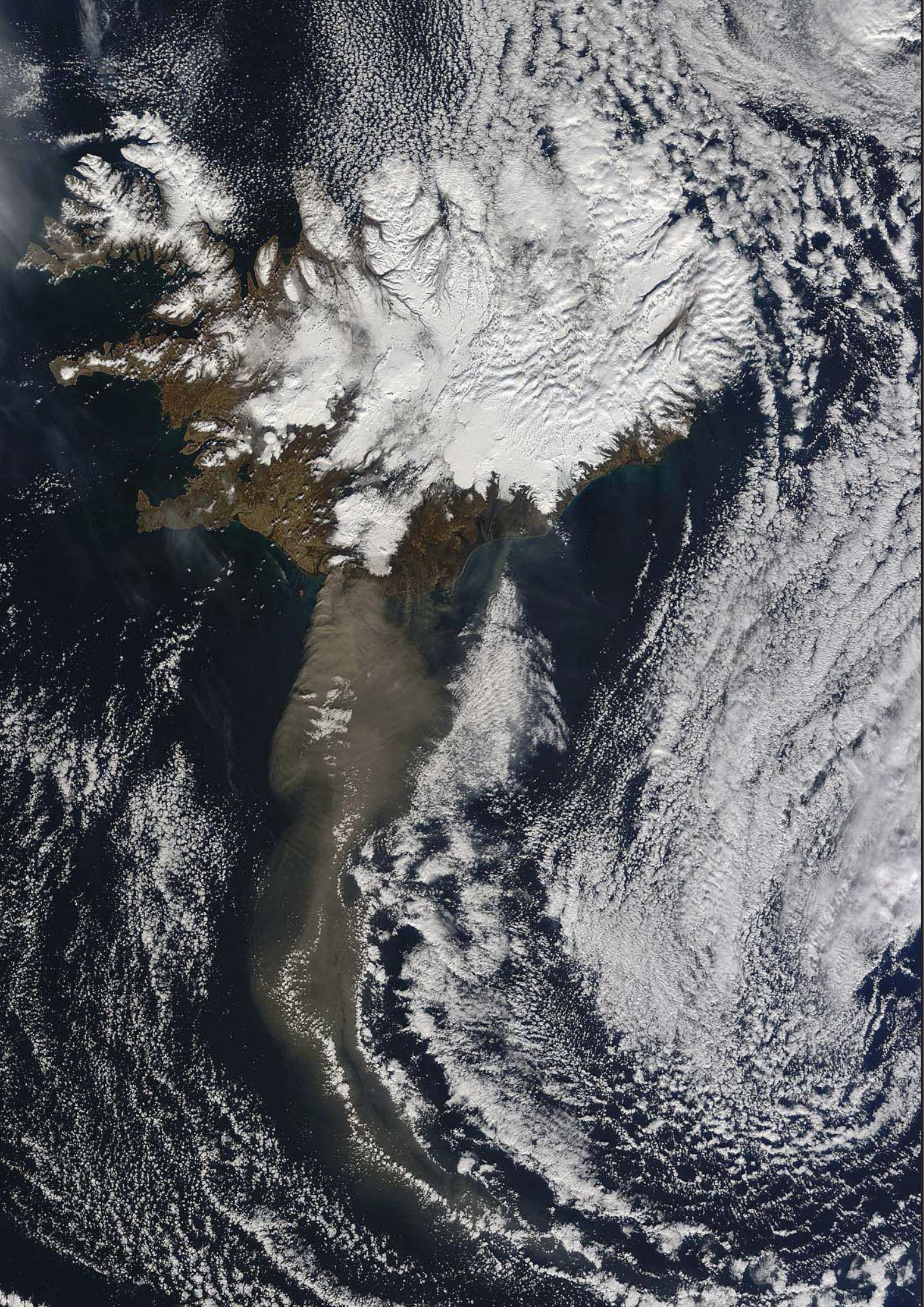
Information courtesy EUMETSAT

TIROS 1 (Television and InfraRed Observation Satellite), the first weather satellite, was designed to test the feasibility of obtaining and using TV cloudcover pictures from satellites. The spin-stabilized satellite was in the form of an 18-sided right prism, 107 cm across opposite corners and 56 cm high, with a reinforced baseplate carrying most of the



subsystems, and a cover assembly (hat). Spacecraft power was supplied by approximately 9000 1- by 2-cm silicon solar cells mounted on the cover assembly and by 21 nickel-cadmium batteries. A single monopole antenna for reception of ground commands extended out from the top of the cover assembly. A pair of crossed-dipole telemetry antennas (235 MHz) projected down and diagonally out from the baseplate. Mounted around the edge of the baseplate were five diametrically opposed pairs of small, solid-fuel thrusters that maintained the satellite spin rate between 8 and 12 rpm. The satellite was equipped with two 1.27-cm-diameter vidicon TV cameras, one wide angle and one narrow angle, for taking earth cloudcover pictures. The pictures were transmitted directly to a ground receiving station or were stored in a tape recorder on board for later playback, depending on whether the satellite was within or beyond the communication range of the station. The satellite performed normally from launch until June 15, 1960, when an electrical power failure prevented further useful TV transmission.

Information courtesy NOAA website.



FEEDBACK

The Column for Readers' Letters and Queries

email: geoeditor@geo-web.org.uk

Dear Sir,

I was most interested in the article in the March issue of *GEO Quarterly 25,* page 10, about the earlier days in Dundee and I can indeed answer your request at the end of that article for some information about the first days of APT.

As an amateur meteorologist, I first became interested in the subject in 1965 when working for the Civil Aviation Authority in Stranraer. I had already built a fax receiver with *Meccano* for copying the weather charts on HF—which at that time used to be broadcast by all the main weather bureaux—and when I read up the bare bones of APT I decided this was for me. My *Meccano* machine used a home made tuning fork for its frequency standard, and produced a chart on electro-sensitive paper called *Teledeltos*, about 8 inches by 6 inches is size, but purely in black and white. The full technical details of this were published in several issues of *Short Wave Magazine.* The rotating drum ran at 60 or 120 rpm and it seemed to me that, with some modification, this would reproduce the satellite pictures—although the shades of grey might not be true to life. Running at 120 rpm I would get a half-size picture, but that was OK, at any rate to start with.

Getting going was not as easy as I had hoped. The fundamental details of APT took some finding as there was little in the press about it and an enquiry to *Wireless World* magazine only suggested that I leave the subject safely alone in case I got arrested! By managing to get some American publications, I finally found out that the frequency was around 137 MHz and so a receiver was built up, using valves of course. It was necessary to use a steerable aerial with a fair amount of gain, or so one was led to believe, so an eight turn helix was constructed. Movement in elevation and azimuth was steered with ropes driven by old car starter motors and controlled by switches and relays from indoors.

After about six months of hard labour the first pictures were received—the very first was from one of the ESSA satellites (I think it was No 6 or No 8), and it was possible to make out the Norwegian peninsula quite clearly as it was covered in snow. These first attempts were 'negatives' because I simply applied the 2400 Hz tone to the writing stylus; so the stronger signal marked as black. No matter, here was the first picture from space.

Numerous improvements and modifications were made over the next year, which took time, because there was only one pass I could receive every 24 hours from one satellite. At that time the pictures were transmitted as individual frames, like a fax, and it was with the *Nimbus* series that the first continuous scanning was started. The simple system I was using finally produced very creditable results and came to the notice of NASA and the *General Electric Company* in the USA, who were the makers of the *Nimbus* spacecraft—and this resulted in their very generously giving my wife and myself a two week tour of the American Space Programme in May 1968. Details appeared in *CQ Magazine* in 1969.

The publicity in the United States and here (short TV programs were made by BBC and ITV) resulted in the very kind offer of an old Muirhead photo facsimile recording machine from a newspaper office in Carlisle. After this length of time, I cannot remember their name unfortunately. This machine, commonly known as *The Fish Fryer* because of its size and appearance, enabled me, after considerable modification, to produce really high grade pictures on photo printing paper. I took one of these in to the London Met. Office, probably in 1969, and when I showed it to one of the forecasters his comment was: 'Where the h*** did you get that?' When I said I received it at home he took me in, introduced me to various other forecasters, and gave me a cup of tea!

In 1970, following promotion in my job, I was posted from Stranraer to CAA's head office in Edinburgh. As I had discovered by this time that the 8-turn helix could be replaced by rather simpler arrays of crossed dipoles, I gave my helix to the Dundee University, who had visited me many times previously for demonstrations of a working system.

I am pretty sure the helix shown in the picture accompanying the article about Dundee University is my old one; if not, it is a Chinese copy, but the mounting and the drive will have been upgraded considerably!!

In 1976 I gave up APT for a number of years and it was not until the mid nineties that I restarted with a computer. There was then a lapse between 2000 and the present day, when I have just taken it up again. It was, of course 'more fun' in the beginning—most things are. There were many many hours of trial and error. As far as I know, I was the first to copy APT in the UK and certainly the night time pictures with the IR transmissions. The earliest ones used a different line speed, some very strange figure which I can't remember now but which meant I had to construct a special standard frequency generator; but by this time I was using crystals and dividers, though the fork went on for many years with the original *Meccano* machine which I still used for the fax charts.

I also remember that, at that time, there was one geostationary satellite transmitting on 137 MHz, though its name eludes me. I did copy some pictures of the complete hemisphere from it, and in spite of being a bit noisy they were interesting and good going for that era.

Like many elderly folk, I don't find using a computer the easiest thing in the world, but there are so many things you can do with the pictures these days that it is worthwhile persevering. Much more sensitive receivers means aerials can be quite simple, and quite reasonable results can be achieved even indoors. So I hope to go on doing APT for a while yet.

Yours sincerely

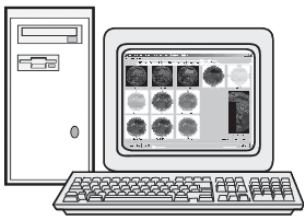
John B Tuke GM3BST

Editor

Thankyou John for your very interesting letter and article, from all at GEO we wish you a very happy 90th birthday.

More letters page 44

Computer Corner



Douglas Deans - dsdeans@btinternet.com

I did say a number of columns ago that with the pre and post launch excitement of Windows 7 now over, I would try and use more of the column space for topics directly related to our hobby interests. I know that many of our group are now registered for Eumetcast and enjoying the gigabytes of high quality digital data not only from Europe but indeed from all over the world. An example of this is the global 6 channel 1km HRPT data from Metop ..... simply outstanding. However with all this image and meteorological data comes other issues such as keeping up with just what data is available and what each channel is now carrying. There is a wealth of knowledge available from Eumetsat's Product Navigator but the very comprehensive search facility does not allow you to search on a per channel basis, something that would be very useful to our hobby. It is more related to products and sub-sets of products. With this in mind and some feedback from a few members I have decided that it might be worthwhile to provide information on what data, files etc., are sent on each of the Eumetcast channels. This is obviously a huge undertaking as there are now more than 40 channels on the system, some carrying both high volumes of data and a heady mix of data and file types. What I hope to do, time allowing, is to look at a channel or perhaps a group of channels in each of my columns. Members can keep a note of the information and build up a comprehensive package of the full Eumetcast system, channel by channel. Of course with only 4 journals per year this may take a little time but I do hope it will prove to be useful. Again I welcome any comments on this. It is your magazine and it really is up to the membership to provide feedback so that contributors can adapt to what the majority want. I had considered doing a separate series of articles on this but the Editor of the magazine has allowed me extra column space as needed to include this additional work.

Can I just point out to readers that this is not a tutorial on how to set up a Eumetcast system, or an explanation of the data itself. Those facts are covered in many other articles in this and previous GEO journals and I can also recommend David Taylor's web site for a huge range of useful information and FAQs on setting up a Eumetcast system and how to troubleshoot problems. I strongly recommend you check this out. David's web site is accessed at :-

http://www.satsignal.eu

This will be a simple factual account of the data type and file types sent on specific channels, information not readily available elsewhere. As I said before I hope readers will build this up to a useful reference as indeed I am now doing !

Where more appropriate to start this quarter than Channel 1 or [EUMETSAT Data Channel 1] as it should appear in your recv-channels.ini file.

As usual in my column there is information on program updates and I have some brief information on a new program from the pen of David Taylor, our personal weather satellite computer programmer.

Eumetcast Data channel 1.

In many ways Channel 1 is quite straight forward in that it carries the EARS system (Eumetsat Advanced Retransmission Service) and nothing else. Not too many channels have this privileged arrangement. Perhaps in this instance a quick description of the EARS service and its objectives will help you better understand the file types. Put simply the aim of the service is to provide polar satellite data from the Eumetsat satellite Metop and the NOAA satellites with a timeliness suited to the needs of European operational short range regional numerical weather prediction models.

EARS comprises three separate polar satellite instrument data services. These are the existing EARS-ATOVS and the EARS-AVHRR and the pilot EARS-ASCAT. Each of the EARS services retransmits observations from an instrument or an instrument group and aims at providing a homogeneous service across the NOAA and Metop polar orbiting satellite platforms.

Traditionally polar satellite data from the NOAA satellites has been received via two methods.

The once per orbit data download from the spacecraft to the central NOAA ground station and the direct transmission from the satellite to a High Resolution Picture Transmission (HRPT) station on ground.

The first mechanism provides global coverage data to end-users, but with delays of three to six hours after the time of measurement. The second mechanism provides the data virtually at the time of measurement, but the geographical coverage is limited to the region around the HRPT reception station. EARS provides improvements on both of these methods by offering a large geographical coverage combined with timely retransmission. This is achieved by establishing a network of existing HRPT stations around the Atlantic and Arctic Oceans and rapid distribution of the collected instrument data to end-users.

The network of HRPT/AHRPT stations acquires and processes the Metop and NOAA satellite HRPT/AHRPT telemetry data and forwards the generated meteorological products to Eumetsat. These products are then disseminated to the users via Eumetcast and the RMDCN/GTS.

Problems with the direct readout AHRPT service from Metop have resulted in a reduced EARS service but this issue has now been resolved. There is now partial use of the AHRPT direct readout service on south bound passes and to cover for the missing readout on North bound passes Eumetsat have set up a Fast Dump service. A description of this follows but first an explanation of what caused the problems with the AHRPT direct readout system. For those who may be considering future AHRPT stations please note that this problem will be corrected for the launch of the next

two Metop satellites.

Investigations into the failure of the Metop-A AHRPT side A concluded that the root cause was heavy ion radiation causing the failure of a component of the AHRPT Solid State Power Amplifier (SSPA). To minimise the risk of failure of the Metop-A AHRPT-B unit whilst still offering the User community a service, Eumetsat has implemented a partial AHRPT service in those areas where the risk of damage from heavy ion radiation is reduced. For southbound passes, AHRPT side B is activated for all orbits over the North Atlantic and European area starting at around 60°N. The AHRPT is then switched-off before the spacecraft reaches the Southern Atlantic Anomaly region, at around 10°N. The switch-on of the AHRPT service for the descending passes over Europe and North Atlantic region, will allow ASCAT, ATOVS and AVHRR data to be available from the EARS network of stations.

To complement the partial Metop-A AHRPT-B service, a Fast Dump Extract service (FDES) is being implemented. This service utilises the most recent part of the X-band global dump received at Svalbard from the northbound passes. The ASCAT, ATOVS and AVHRR data streams can thus be provided with high timeliness for regional data. At present ASCAT and ATOVS services are being provided with the AVHRR FDES to follow on.

For those interested there is a wealth of knowledge available about the EARS system with considerable information about the incorporated stations, at the Eumetsat web site. Please go to the following address for more information on the EARS system :-

http://www.eumetsat.int/Home/Main/What_We_Do/Satellites/EARS_System

Now let us consider what is sent on Channel 1.

Below is a comprehensive list of the file names and types you will find being sent on Channel 1. Obviously there will be a range of mixes of satellites and stations but the list contains all the data file types you can find on the channel. For clarity I have split the files under the three EARS headings I referred to earlier in the column.

EARS-ATOVS file examples :-

amsua_20100403_0743_metopa_17924_sva.l1c_bufr
amsua_20100119_2107_noaa19_04900_edm.l1a.bz2
amsua_20100119_2113_noaa19_04899_gil.l1b.bz2

amsua_20100119_2107_noaa19_04900_edm.l1c.bufr
amsub_20100120_1131_noaa17_39368_mas.l1c.bufr
amsub_20100120_1150_noaa15_60772_edm.l1a.bz2
amsub_20100120_1312_noaa17_39369_wal.l1b.bz2

hirs_20100119_2043_noaa18_24052_sva.l1d.bz2
hirs_20100119_2107_noaa19_04900_edm.l1a.bz2
hirs_20100119_2107_noaa19_04900_edm.l1c_bufr
hirs_20100119_2113_noaa19_04899_gil.l1b.bz2

mhs_20100119_1926_noaa19_04899_edm.l1a.bz2
mhs_20100119_1938_noaa19_04899_sva.l1c.bufr
mhs_20100119_2027_noaa18_24051_mon.l1b.bz2

EARS-AVHRR file examples :-

avhrr_20100119_194600_noaa19.hrp.bz2
AVHR_HRP_00_M02_20100403081600Z_20100403081700Z_N_O_20100403082024Z.bz2

EARS-ASCAT file examples :-

ascat_20100119_195800_metopa_16879_ear_o_125_ovw.l2_bufr
ascat_20100119_195800_metopa_16879_ear_o_250_ovw.l2_bufr
scatt_20100120_200939_er2__0000_ear_o_250_ovw_l2_bufr

I have included a composite image showing an example of each of the three data types sent on Channel 1. You can see this on the inside back cover.

MODIS L1 and Fire Viewer.

For many months new MODIS Aqua radiance data from Eumetcast has been on test and in preparation for the release of the data to all registered users, David Taylor has written a program to view the new files. As I write this column and after many months of testing, the data has now been made available to all who wish to receive it. Simply contact OPS and register for the data. As well as the radiance (image) data, Geolocation data has also been provided although David's program does not need it.

So once again David has made a viewing program available from day one of the new data. … no mean feat.

The datas are aggregated to 1km resolution and are both spatially thinned by only retaining those values north of 25 North between 60 West and 45 East and north of 65 North elsewhere and spectrally thinned by only retaining values from channels 1, 2, 5, 6, 8, 9, 10, 12, 15, 20, 23, 26, 27, 28, 29, 31, 32 and 33. The files are in HDF4 format and are sent on Eumetsat Data Channel 4.

Files are sent in 5 minute data blocks and the areas they cover are shown on the program's browser tab. To view simply click on the sector and the relevant image will open. As well as viewing the images in their 18 available wavelength tabs, there are a number of additional options including false colour splitting further into RGB, Vegetation, Air Mass and Ash. For those familiar with the GeoSatSignal remapping facility there is a similar tool provided with the viewer including some pre-defined areas. Many other useful features, too numerous to mention in this brief introduction, have been provided. A note of caution for Eumetcast users. Many of the MODIS image files are large, often in excess of 80 MB, so RAMdisk sizes should be increased accordingly. For those taking Meteosat, Metop and some EARS products, I would now recommend an absolute minimum of 250 MB.

In addition the program also provides an option to view possible fire locations from MODIS fire data sent on Eumetsat Data Channel 12. You can select one of the files and if there are either possible or probable fires those are shown on a world map or a zoomed in location which can be chosen by a simple right click on the screen.

Possibly the best initial option is to select the auto facility as some files can include very few or no pixels.

David Taylor's programs (latest releases).

Just a reminder that the list below is for fully tested releases and does not include the latest beta (or alpha) versions currently on test. Those can also be downloaded from David's site. I have included the new MODIS L1 and Fire Viewer (reviewed above) although there is not a fully tested release yet available.

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

http://www.satsignal.eu

(continued on page 44)

David Taylor's programs (latest releases) continued from page 43

ATOVS Reader	v 1.2.0
AVHRR Manager	v 2.0.2
BUFR Viewer	v 1.1.4
CMA Viewer	v 1.2.0
DWDSAT HRPT Viewer	v 1.1.2
GeoSatSignal	v 7.1.4
GRIB Viewer	v 2.3.6
GroundMap	v 2.0.6
HDF Viewer	v 1.4.4
HRPT Reader	v 2.9.4
Kepler Manager	v 1.3.2
MapToGeo	v 1.1.6
Metop Manager	v 1.4.4
MSG Animator	v 2.5.32
MSG Data Manager	v 2.5.38
PassControl	v 3.2.4
SatSignal	v 5.2.2
Sea-Ice & Viewer	v 1.4 .2
Wxtrack	v 3.4.8
MODIS L1 and Fire Viewer	v 1.02

Letters continued from page 41

Dear Francis,

I can't remember if I've mentioned this to you before, but I will be retiring from the Met Office at the end of July this year.

I have very much appreciated receiving your regular GEO Quarterly publication - as the images are distinctly different to the operational ones we see here! I put your Quarterly out for general use after I've read it.

However, I thought I had better let you know that you could save sending me a copy, but if you wish you could send one to the National Met Library here directly for their interest and Library users, which include the general public as you know. If you would like to carry on sending the magazine, please let me know and I will let them know to expect it from the next quarter issue.

The address is the same as below - you just need to address it to National Meteorological Library instead of my name.I wish you and all GEO members the best for the future - I'm sure EUMETSAT will continue to look after you well!

Kind regards

Colin

Colin Cuthbert Data Manager

Met Office FitzRoy Road Exeter
Devon EX1 3PB United Kingdom

http://www.metoffice.gov.uk

Editor
I expect many GEO members will remember Colin Cuthbert from the early days of the EUMETCast service when receiving stations had to register with their national meteorological office. Colin looked after the UK licenses for several years until the registration system was streamlined using EUMETSAT's web site. We wish Colin well in his retirement.

Hi Francis,

A short message from Haarlem, Holland.

I have now started an automatic weatherpage (WxtoImg) on my site which I run when I am at home! From the beginning I have liked APT and experimented to get the best results possible. I use my R2FX receiver now and my collapsible PITA137 antenna without a pre-amplifier. The PITA137 location is "under the roof". See the pictures on my weatherpage.

As you can see I receive images from Nova Zembla_Caspian Sea in the east to the Canary Islands, Azores, Canada and Greenland in the west.

I have added some images to show what is possible with simple equipment.

Regards,

Rudd - PA0ROJ

N.B The direct way to my weatherpage is:
http://www.jendela.nl/web/weather.html

Editor
Thank you for your email Rudd. I have looked at your web site and recommend that others do the same. Your 'shack' with all its equipment is very impressive (now this is a 'real' shack) not to mention the APT images you display on your web site.

Dear Peter

Just a short note to congratulate you on another excellent magazine. I can assure you that page 35 being inserted as a loose page in no way detracts from the enjoyment of reading the magazine. Many thanks for all the hard work from you and the team.

Sincerely
Paul J Letters
Carrickfergus
Co Antrim

Dear Francis,

Thank you for the 'MSG In Orbit In Use' publication, it is very interesting, informative and of high quality. Thanks also for taking the time to answer my questions regarding MSG reception and including the CDs.

My Skycard II is set up to receive the data streams from 9 Deg. east ENVISAT and 10 Deg. east EUMETCast: the signal and quality levels on both satellites are high. I have also read about the Rob Alblas software which gives control over the Tellique software, with the occasional user in mind: ideal for my intended purpose.

I do not have Internet access or an Email address but I did get on the web recently whilst on holiday in Gibraltar. Attempting to download the Tellique software without registering proved impossible.

GOES-P was launched from Cape Canaveral on a Delta IV rocket on Thursday night 4th March 2010. I followed the proceedings on 10 Deg. East W1 10970 vertical 4167 5/6: this is the UP feed and carries NASA TV at times of activity. The recent STS 130 mission was shown as was the L-Cross mission.

Thank you for your recent letter and the time and effort you all put into GEO. It is appreciated.

Regards
Kevin Hewitt
Chatham
Kent