The GEO Quarterly

Group for Earth Observation

www.geo-web.org.uk

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

Number 21
April 2009

Inside this issue . . .

Wildfires are a perennial hazard in California. Ed Murashie describes a recent experience that came too close for comfort.

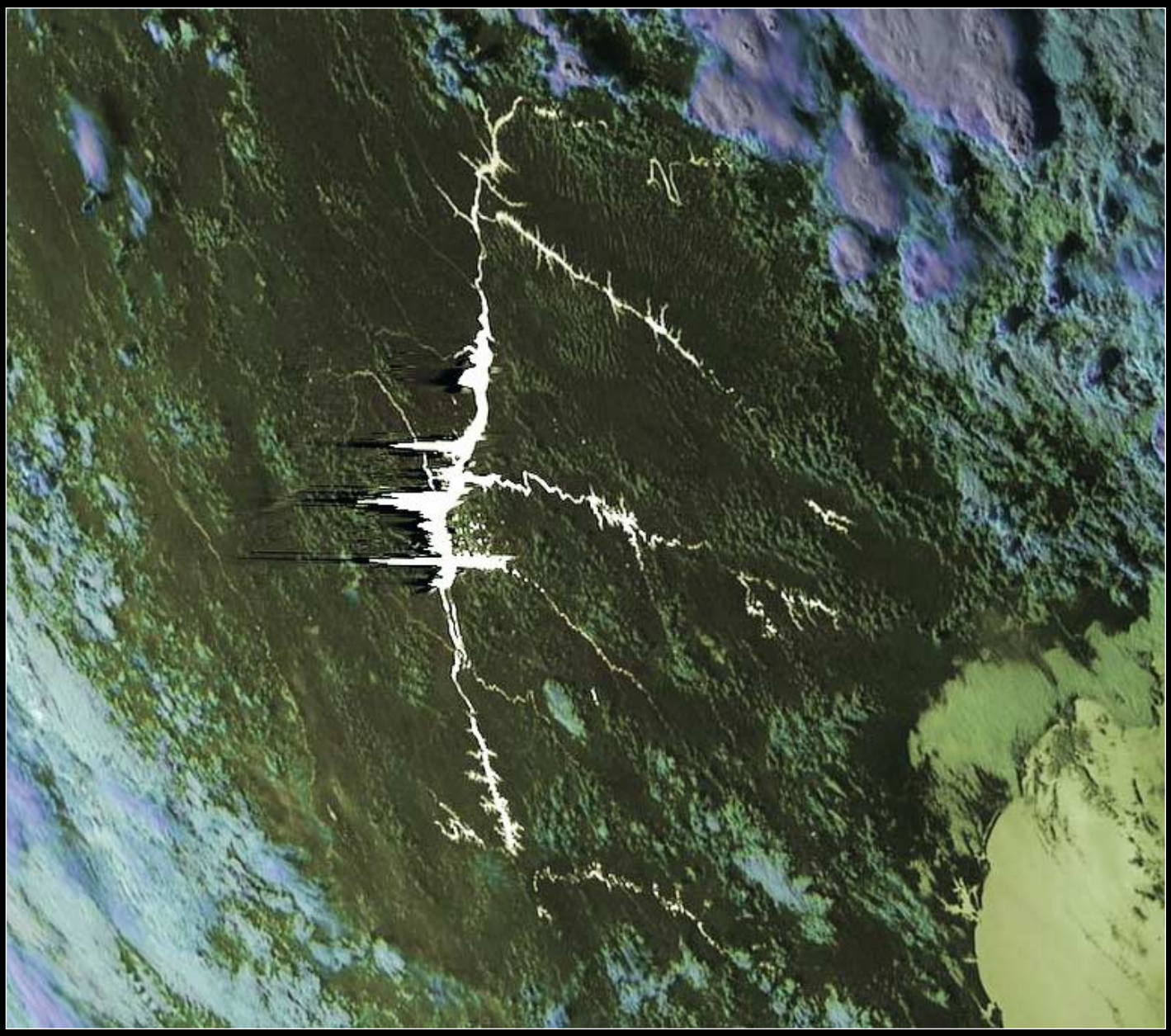
Dale Hardy explains how he uses geostationary satellite images, freely available on the Internet, to create composite images of the world's weather.

Francis Bell relates his experiences while attending the NASA Direct Readout Conference in the USA last December.

Fred van den Bosch has completely rewritten his 'Presentation Manager' software. You can learn how to utilise it to organise all your EUMETCast files and related products on your PC.

NOAA 19 is alive and well in orbit. Ed Murashie took a vacation to visit the launch site, and reports on his experiences.

Plus there's news of the 2008 Arctic summer ice-melt, GEO's visit to a Royal Meteorological Society meeting, Computer Corner, An encounter with Hurricane Omar, items to help improve your EUMETCast imaging and a feature on multitemporal radar inaging.



Sensor overload on an MSG-2 image: read more on page 10

Image © EUMETSAT 2008

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The GEO Quarterly

April 2009

Editorial: Les Hamilton

Welcome to the first issue of *GEO Quarterly* for 2009, albeit a month later than you expected. Time catches up with us all, not least myself. I have long been finding it difficult to fit in GEO work with my other activities (you may recall that I have been trying to relinquish the post for over two years) and a recent move from retirement back to work has not made life any easier. I notified GEO management last autumn that I would not be continuing as editor beyond the final issue of 2009; so, after close on a decade of editing both *GEO Quarterly* and its predecessor Journal, I will soon be calling it a day. Moves are already in place, liaising with a probable successor, and there will, hopefully, be a seamless transition into 2010 and beyond.

Also newly retired as a regular GEO author is Peter Wakelin, who wishes to devote more time to his own activities. We are all grateful to Peter for producing his regular Earth Imaging News every issue; our survey some months back indicated it to be one of readers' favourites. Now the door opens for others to contribute in his stead. We will not be losing Peter entirely however, as he will continue to wear his other GEO 'hat' as the *Quarterly* distribution officer.

For readers with a practical bent, Mario Brustia has come up with a novel approach to joining up his Metop image segments—creating the stunning view of Antarctica on our back cover. Situated out of range of the geostationary satellites, such an image of the southern hemisphere is not normally possible; but Mario shows how, with a little patience and application, the task can be accomplished. Perhaps members might like to try producing similar composite images centred over the North Pole—a cover image in a future GEO Quarterly will be the prize for the best entry received.

You will notice a 'new' email contact address, tech***@geo-web.org.co.uk***, for ordering items from the *GEO Shop*. Until further notice, David Simmons will be collating this side of the service to allow Clive Finnis to devote more time to his own business affairs. Clive will, however, continue to oversee the actual packaging and despatch of your orders from *GEO Shop*.

Finally, an appeal from Clive Finnis, who tells us that our current supplier of APT turnstile antennas has discontinued their manufacture. These antennas are a vital part of our 'accessory pack', so popular with newcomers to the hobby. We are trying to find a new source, but if any reader can recommend a supplier of suitable turnstile antennas it would be very helpful. Please contact Clive Finnis at ***shop@geo-web.org.co.uk*** with your suggestions.

Contents

Report on the

NOAA Direct Readout Conference

Miami: December 8-12, 2008

Francis Bell

This was the third *NOAA Direct Readout Conference* I had attended and the second one where I represented GEO and gave a presentation. My background planning started soon after NOAA announced the conference on the Internet in May 2008. As usual with these technical conferences, the organisers issue a 'Call for Papers' before they compiled an agenda. I responded by submitting an abstract for a potential presentation, with a request for a table to display our literature. I was pleased that, in due course, my submission was accepted and GEO was allocated a provisional slot in the conference agenda.

The conference was planned to take place between Monday and Friday, December 8-12, the time during the five days being divided between distinctive themes. In October 2008 a provisional programme was published and GEO was included in Session 5 '*Global User Perspectives*'. Of course, the conference was open to any individual who wished to register as a delegate but I accepted GEO's inclusion in the formal programme, together with a display space, as a compliment to our Group.

The venue for the conference was the Miami Hilton Hotel. This is a large modern hotel, close to Miami International airport, which has, in addition to several hundred bedrooms, a conference suite on the ground floor. This was the same venue that NOAA used for their 2004 conference, so I was relatively familiar with the locality.

Visitors to the GEO stand, from left to right: Christelle Ponsard (EUMETSAT), Michael Williams (Head of Control Centre Division EUMETSAT), Richard Francis (Satellite Data Processing Group, UK Meteorological Office), Jerome La Feuille (Head of Space-Based Global Observing System Division, WMO Space Programme).

In anticipation of the conference I had prepared GEO Information Packs, with enough copies for every delegate. The pack I prepared contained:

- A single page giving the background to GEO, its membership and philosophy,
- A leaflet from *Werkgroep Kunstmanen* detailing a their background and philosophy,
- A CD containing all 20 of GEO's Quarterly publications.

At registration, every delegate was given a welcome pack by the organisers and I ensured this pack also contained a copy of the GEO information pack. Whether our material was read by every delegate was beyond my control but at least everyone had the information about our Group.

The Exhibition Area

The exhibition area was located immediately outside the conference rooms and had displays from twelve organisations related to the US space industry. Although it was a last-minute decision, GEO's table was located in the middle of the exhibition area, just outside the conference room doors. During the course of the week, I think most of the delegates visited our stand, talked to me and took literature; some signed our visitors' book. When unable to answer questions directly, I had the resources to suggest an appropriate contact, either within GEO or Werkgroep Kunstmanen. By the end of the week, all the literature I provided on the stand (the limitation being my aircraft baggage allowance), had been taken by the delegates. I judged this to be very satisfying, with the knowledge that our literature was in the hands of active satellite users or providers.

Numbers

Although no conference statistics were published, I tried to establish delegate numbers. Judging by the information packs distributed at registration, name tags and a head count at the opening session, I reckoned there were about 170 delegates from 20 or so countries plus the conference organisers.

The Programme

The programme was split into distinct themes.

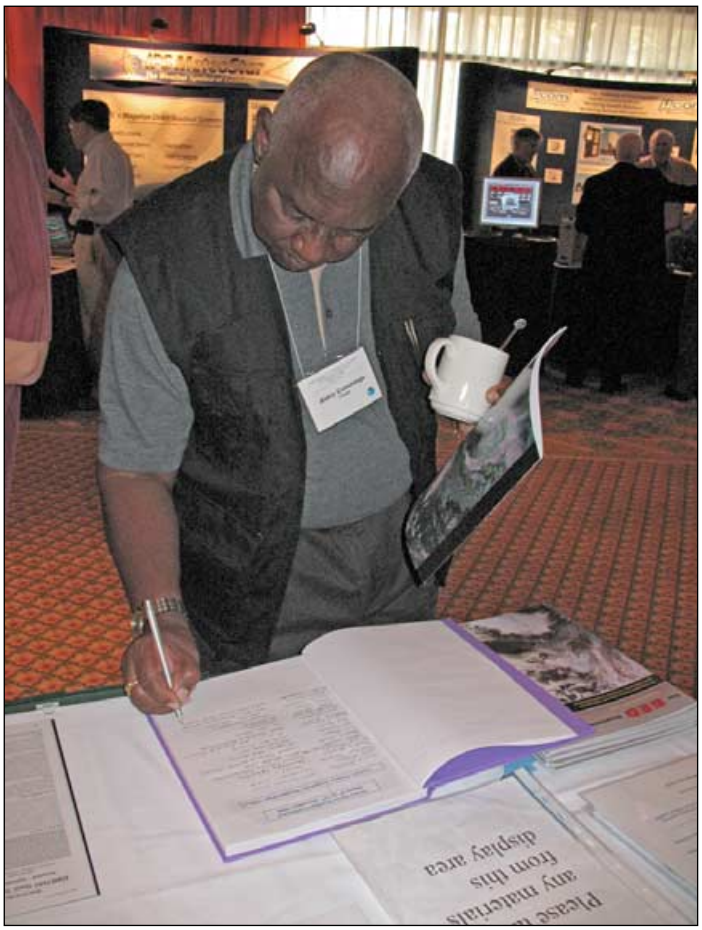
Day 1, Session 1 -	National programmes and information services: MO space programme; Global Earth Observation System of Systems (GEOSS) involving 56 countries.
Day 2 Session 2 -	Current satellite systems and instruments: GOES overview; EUMETSAT systems; Japanese MTSAT; POES overview; Satellite Operations Centre Wallops Island.
Day 2 Session 3 -	Current Direct Readout Workshop with experienced panel members representing 11 satellite data distribution systems.
Day 3 Session 4 -	Applications and Training: there were 16 diverse short presentations relating to applications which included material from EUMETSAT, the UK Met Office and GEONETcast.
Day 4 Session 5 -	A Global Perspective: GEO's presentation was included in this session together with others from six other countries / regions.
Day 4 Session 6 -	Future Direct readout: Presentations covered GOES-R and NPOESS
Day 5 Session 7 -	User Services and Impacts: this was mainly a facilitated discussion session followed by feedback from the individual groups.

During the week there were several 'Poster Sessions', where posters were displayed with, in most cases, someone on hand to explain the display material. I had not experienced this presentation method before but it was effective because, in browsing around, it was possible to be selective about who you spoke to, rather than the formal presentations which you either attended or not.

The GEO Presentation

I was allocated a 20 minute time slot in the programme. Recognising the time constraint and being sensitive to the fact that

many of the delegates might never have heard of GEO, I decided a broad brush perspective of GEO was required. I included a brief history of GEO: its membership and their geographical distribution; their resourcefulness; GEO's quarterly publication; the GEO shop; members' technical skills; the benefits of membership; co-operation with other groups, including Werkgroep Kunstmanen and our support of those space related institutions in the UK which are open to the public. I emphasised our relationship with EUMETSAT.



Aldric Cummings, Meteorological Services, Crown Point, Tobago West Indies, signing the GEO visitors' book

Very importantly, during my presentation, I thanked EUMETSAT and NOAA for their sensitivity to our problems in the UK with pager transmission—which cause serious interference with APT reception. I played an audio tape of interference-free NOAA 18 APT signals on 137.10 MHz followed by another one from 137.9125 MHz, which had severe audio interference. I also showed images illustrating the same problem. I publicly remonstrated with the UK's *Ofcom,* and invited WMO, NOAA and EUMETSAT to complain at the next International Telecommunication Union conference (ITU), relating to the UK's licensing agency allowing commercial intrusion into the internationally recognised satellite band. Judging by the supportive comments that came my way later in the day, all of my presentation was well received.

I have to say that, during some parts of the conference, I was overwhelmed with the detail of information being disseminated. I have to admit to being more attentive to those areas which I understood rather than trying to assimilate everything which was presented.

However, there is a compromise here because I have reference material for almost all of the presentations on two CDs, for digestion at leisure. The CDs contain approximately 50 presentations, most of which are in *PowerPoint* format. If any reader would like a copy of this material, note the reference at the end of this report. I am also making the file containing the conference agenda available. This document may be a valuable reference as it contains the names of those people giving presentations, together with those chairing sessions and the keynote speakers. It is almost a *Who's Who* for the NOAA satellite world.

I was very pleased to have made so many contacts during the week. In addition to NOAA staff and visitors from around the world, I became friendly with the EUMETCAST representatives and the delegate from the UK Met Office. There are some photographs of these people and one showing our busy Visitors Book which has a record of some of the people who visited the GEO stand.

I have recorded my copy of the conference proceedings on CDs. The total file space is 1.2 GB so it will not be possible to email these out to interested parties. If you want discs with the full proceedings, write to me and include £5 in some form: it could be a cheque, postal order, or the equivalent in postage stamps. At your own risk you may include a £5.00 note or a 5.00 Euro note. The charge is not for the content of the discs but just to cover my distribution costs.

If you want a copy of the agenda, which contains the conference presentations, titles and speakers, I have this on a separate file which I can email on request to anybody who wishes to have a copy of the conference details or use the contacts which it can provide. Email a request directly to me at

francis@francisbell.com

The size of the file is just 156 kB. I recommend anybody wishing to have a perspective on NOAA satellites and the data they provide to download this file and make a printed copy for reference. You can then browse through the conference proceeding at leisure.

At the conference, only a very small number of people joined GEO on the spot. However, I judge the real measure of GEO's successful attendance to have been the contacts, conversations and new or renewed friendships with people in the weather satellite world. A tangible measure of the organisers' and delegate interest in GEO's activities could be measured by the amount of literature taken from our stand and the willingness of people to sign our visitors book.

My thanks to NOAA for looking after our interests both before and during the conference.

Part of the exhibition area during a coffee break

The Conference agenda is directly available as a .doc or .pdf file from *http://directreadout.noaa.gov/miami08*

Arctic Meltdown

Revisited - One Year Later ...

Les Hamilton

This time last year, we reported how, during the summer melting season of 2007, the extent of Arctic ice fell to a record low. Following an unprecedented melting episode, the area of permanent sea ice had fallen to just 4.13 million square kilometres at culmination on September 16. The question left unanswered was whether this was evidence for an ongoing trend that would lead to further decreases in the area of permanent sea ice, year on year.

The Arctic sea ice reached its maximum extent on March 10, 2008 (figure 2). Though of slightly greater expanse than in recent years, at 15.21 million square kilometers, this was still well below average. New ice growth had been strong throughout the winter, but most of it was thin, first year ice. The reason for this was that the ice loss during the record-breaking summer of 2007 created extensive open-water areas where new ice could form. Winter winds also flushed much of the thicker, older ice out of the Arctic altogether, leaving the ocean with a greater coverage of first-year ice. Also, summer 2007's clear skies allowed for more intense melt of the multi-year ice, leaving it thinner than normal at summer's end.

Mid July 2008

By July 16, the Arctic sea ice extent stood at 8.91 million km^2, well below the long term mean (see figure 1) but 1.05 million km^2 greater than on the same date in 2007. The pattern of sea ice retreat was noticeably different too, with some areas showing less ice and others showing more. In 2007, a large area of the southern Beaufort Sea north of Alaska remained under ice. In 2008 it was already ice-free. In 2007, large areas along the Siberian coast had melted out by mid-July yet the Siberian sector remained largely ice-covered in 2008.

Mid September, 2008

The Arctic sea ice cover reached its minimum extent for the year, 4.52 million km^2 and the second-lowest extent recorded since 1979, on September 14, 2008 (figure 3). Despite an overall cooler summer in 2008, this minimum extent was only 390,000 km^2 (9.4%) greater than the record-setting 2007 minimum; but it is still 15% less than the next-lowest minimum extent of 2005 and 33% below the long term mean, reinforcing the perceived long-term downward trend of sea ice extent.

Mid November 2008

As is normal at this time of the year, ice extent increased rapidly through most of October. This season, however, the increase was particularly rapid. Sea ice extent for October averaged 8.40 million square kilometers, attaining 9.27 million km^2 at month's end to more than double the previous month's minimum. This ice growth was triggered by the waning sunlight and shorter days as autumn and winter took hold in the Arctic. In each of the past five years, the Arctic has shown a pattern of strong low-level atmospheric warming over the ocean during autumn as the ocean returns its summer heat gain to the atmosphere. Climate models project that this atmospheric warming, known as Arctic amplification, will become more prominent in coming decades and extend into the winter season. As larger expanses of open water remain at the end of each melt season, the ocean is expected to return ever more heat to the atmosphere.

2008 Arctic Sea Ice from AMSR-E

Sea ice is frozen seawater floating on the surface of the ocean. Some of this ice is semi-permanent, persisting from year to year, while some is seasonal, melting and refreezing from one season to the next. When sea ice cover reaches its minimum extent at the end of each summer, the remaining ice is called the perennial ice cover.

The AMSR-E microwave scanning radiometer carried aboard NASA's *Aqua* satellite acquires high resolution measurements of the 89 GHz brightness temperature near the poles. Because this is a passive microwave sensor which is not so sensitive to atmospheric effects, it can observe the entire polar region every day, even through clouds and snowfall. The false colour of the sea ice, derived from these brightness temperatures, highlights the fissures in the sea ice cover by warm brightness temperatures, shown in blue; cold brightness temperatures are depicted as brighter white and represent consolidated sea ice.

The sea ice edge is defined by the 15% ice concentration contour in the three-day moving average of the AMSR-E 12.5 km sea ice concentration data.

Record ice loss over the 2008 melt season

Consideration of minimum and maximum ice extent figures does not paint the full picture, however. Taking the total extent of ice lost between the March maximum and the September minimum, 2008 did in fact set a new record for *total ice loss over an entire melt season*. During this season, Arctic sea ice declined by 10.58 million km^2, slightly more than the previous record for loss over an entire melt season, set in 2007 (which was 10.51 million). The graph below shows the yearly seasonal sea ice variations.

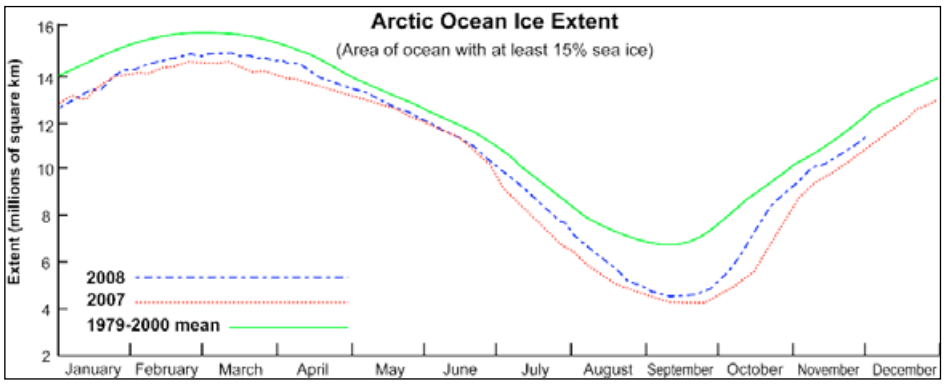


Figure 1 - Sea ice extent variation throughout 2008

Figure 2 - Sea ice cover in the Arctic Ocean reached its maximum extent on March 10, 2008
The AMSR-E sea ice data has been overlain on a *Blue Marble Next Generation* image of the region.
Blue Marble image courtesy Reto Stockii (NASA/GSFC)
AMSR-E data courtesy NASA/Goddard Scientific Visualization Studio

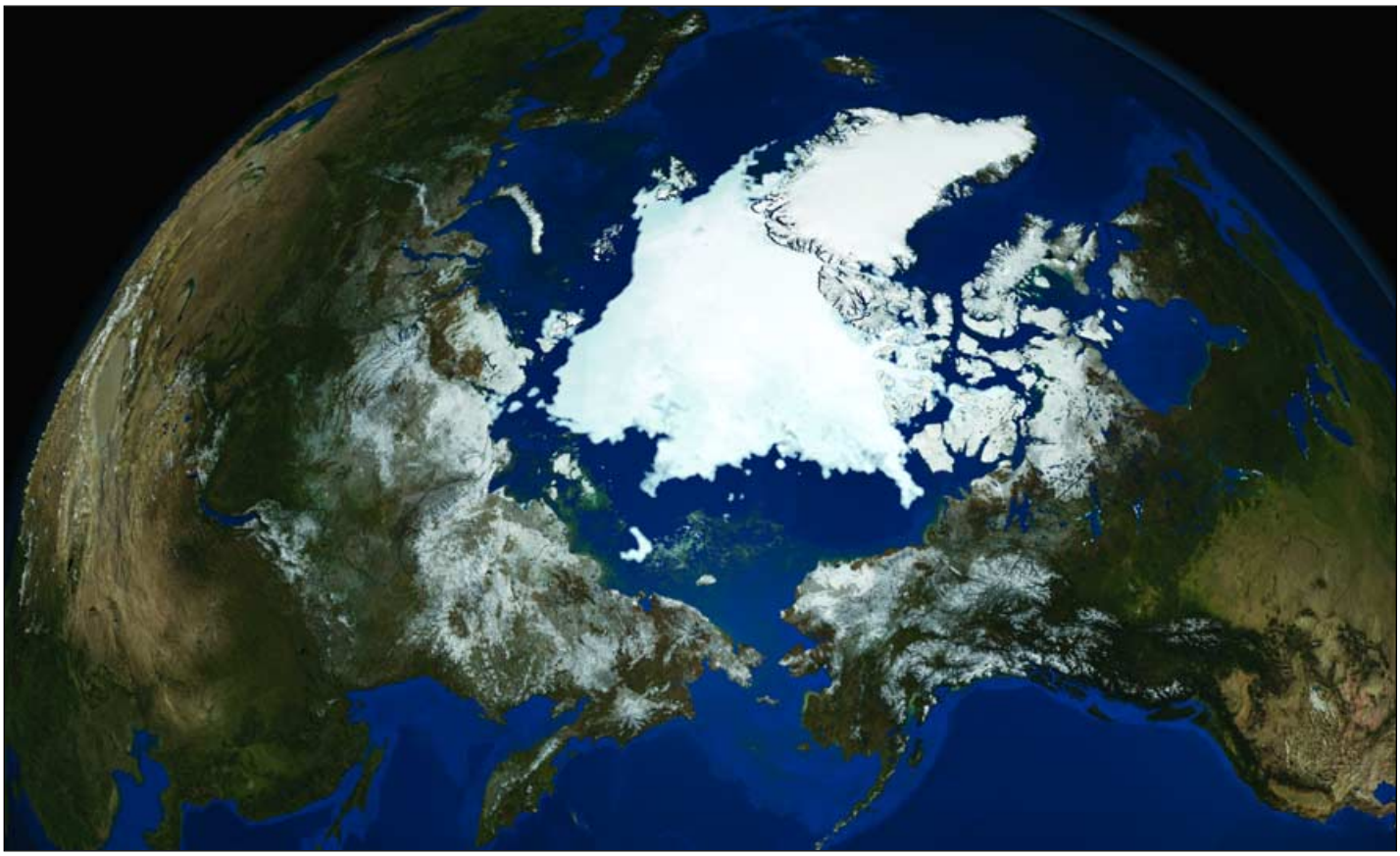


Figure 3 - Sea ice cover in the Arctic Ocean fell to its minimum extent on September 14, 2008
The AMSR-E sea ice data has been overlain on a *Blue Marble Next Generation* image of the region.
Blue Marble image courtesy Reto Stockii (NASA/GSFC)
AMSR-E data courtesy NASA/Goddard Scientific Visualization Studio

The GEO Report

Francis Bell

In my last report I commented about the inability of the RSGB's mobile exhibition unit *GB4FUN* to receive weather satellite signals because of lack of funding for a new APT receiver. I was pleased with our members response and two receivers have been offered to the station. I have not spoken recently to Carlos Eavis who manages the unit but hope he is now able to receive and demonstrate APT weather signals at the many venues GB4FUN visits.

GEO recently provided a live display of weather satellite reception at a Royal Meteorological Society meeting in London and I would like to record thanks to John Tellick who devoted much time and effort into successfully providing live weather satellite signals for the benefit of those attending (see page 31).

I recently attended the NOAA Direct Readout Conference in Miami in December 2008. This was an important event for us and I am satisfied that NOAA and the conference delegates know about GEO with its worldwide membership. You can read a report on the event on page 2.

The Quarterly Question

You may recall the previous Quarterly Question, relating to the full name for the acronym GERB, an instrument carried on MSG satellites. The answer is *Geostationary Earth Radiation Budget*. Those who attended our 2008 symposium will recall the outstanding presentation given by Dr John Remedios about GERB and the preliminary results it is generating. Only three members, Andreas Lubnow (Germany), Rob Denton (Bulgaria) and Ian Leitch (UK) submitted correct answers. My thanks to them for taking an interest in the question.

You will recall that the Quarterly Question in GEO Q18 related to the instrumentation on the Jason 2 satellite. All entries were submitted to EUMETSAT and I understand that the authors of the best answers have been sent Jason-2 information packs by EUMETSAT.

Quarterly Question 21

This Quarterly Question relates to weather satellites in geostationary orbit and was prompted by my reading a technical document from NOAA and NASA. Several years ago, I gave up quoting the altitude for a geostationary satellite's orbit in statute miles; I now use only the figure using kilometres as the unit. In common with many others I usually quote a figure to the nearest 100 km but this is only approximately correct. Taking Earth's radius to be 6,373 km. the question is this: 'What is the altitude above Earth's equator of a geostationary satellite orbit?'

The answer should be given to the nearest whole kilometre but I will accept plus or minus 10 km. I am taking as a reference figure the one quoted twice in the recent NOAA / NASA publication *GEOS N-Series*.

Only if you wish to, a secondary question is: 'If you have established the orbital altitude, what is the speed of a satellite in this orbit?' And if you are really persistent, is this faster, slower or the same as a weather satellite in a sun-synchronous polar orbit? Use a typical polar orbit of 817 km above the Earth's surface and an orbital period of 101 minutes when determining the satellite's speed. Answers by email to

francis@geo-web.org.uk

by Saturday, May 2. A correct answer chosen at random will receive free entry to our July symposium.

It would be great if members submitted their own material for publication, thus generating a more diverse pattern of questions—as I'm running out of ideas.

Future Events

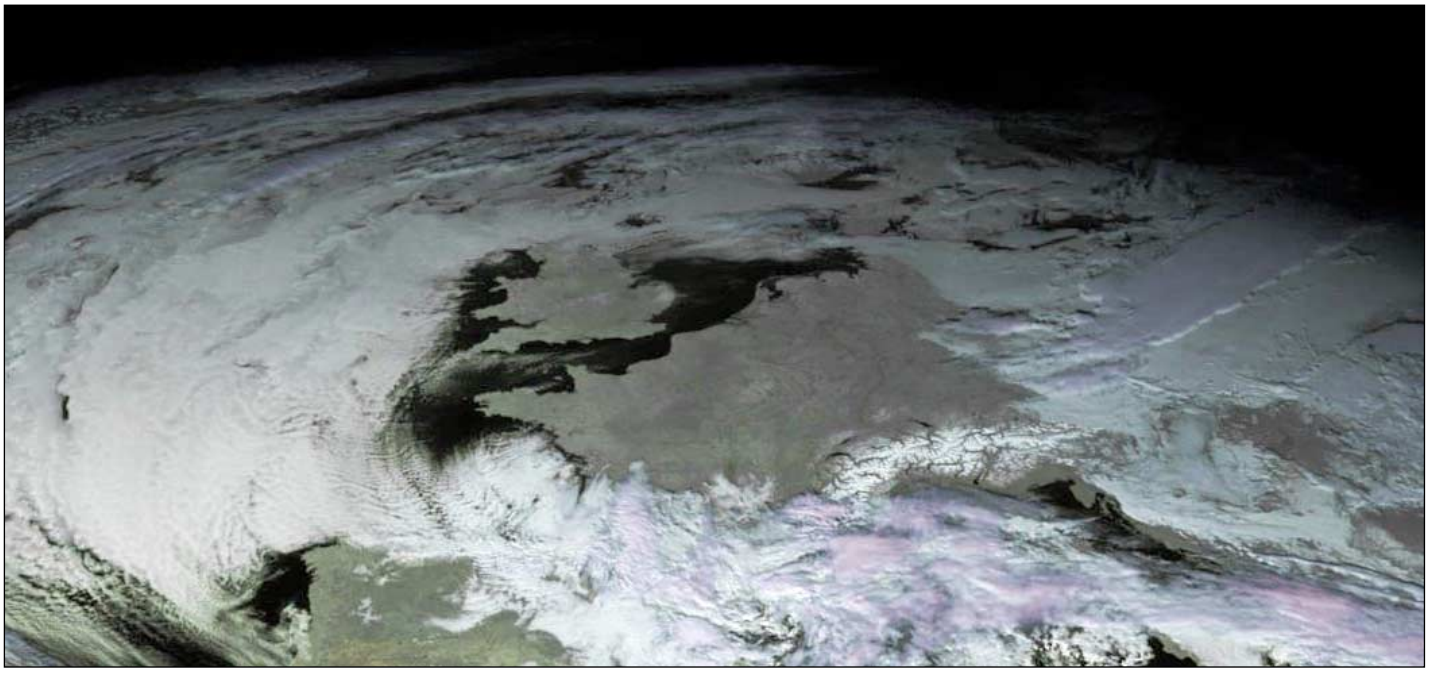
April 19	West London Radio and Electronics Show, Kempton.
July 18	GEO Symposium: see page 11.
July 24/6	AMSAT-UK's annual colloquium being held in Manchester University. GEO hopes to have a display with live weather satellite reception. For more information, visit he AMSAT-UK's web site at ***www.amsat-uk.org.uk***
Sept 13	Telford Hamfest. This is an established event but will be a new venue for GEO. We will do our best to attend.
Sept TBA	Leicester Amateur Radio Show (LARS), Donington. The date will be confirmed shortly
Sept 27	West London Radio and Electronics Show, Kempton.

Werkgroep Kunstmanen

Our friends in the Netherlands, Werkgroep Kunstmanen, have meetings in Utrecht on the following dates: March 21, May 16, September 12 and November 14.

You can visit their web site for more information about their activities

www.kunstmanen.net



Eric Dean sent us this clip from a Meteosat-9 channel-2 image dating from 12:45 UT on December 26, 2008 and received from EUROBIRD-9. A large part of Europe is experiencing clear skies, as is a large part of the UK. A striking feature is the amount of snow on the Alps.

Skew - Askew

John Tellick

Televes Uni LNB 7475

Inverto Silver Tech.

MTI AP8-XT2EBL

Look carefully at the three LNBs illustrated above. What is common to all of them? Well, believe it or not, all three have been skewed (angled) to produce best performance of *EUMETCast* from the *EUROBIRD-9* satellite.

You will have seen skew mentioned often on the user groups and in *GEO Quarterly*, and its importance cannot be overemphasised: it is the key to 'signal quality.' You may have plenty of signal strength but that is not much good without clean and maximised signal quality.

Most Ku-band satellites utilise both vertical and horizontal transmissions, although there are a few which transmit with circular polarisation. The reason why skew is so important is this: to maximise the number of channels a satellite can transmit, the vertically and horizontally transmitted channel frequencies must overlap somewhat—a feature known as frequency offset. To achieve this, your LNB must be adjusted to maximise reception of the signal with the wanted received polarisation while at the same time minimising any unwanted signals of differing polarisation.

The other consideration is that only a satellite located on the same meridian as your location will exhibit 'true' vertical and horizontal signal polarisation.

Satellites located to the east and west of your meridian will appear to have both their V and H axes of polarisation skewed (i.e. tilted).

So, unless you skew your LNB to match this apparent tilt of the satellite, you will be picking up slightly less of the polarisation you do want plus a little of the polarisation you do not want—and this will reduce your signal quality.

For satellites located to the east of your meridian the satellite exhibits an increasing amount of tilt towards the east the further from your meridian: and vice versa for satellites located to the west of your meridian—they tilt towards the west.

This results in a corresponding tilt to the V/H transmitted signal from the satellite which must be compensated for by adjustment of your LNB-skew.

If you live in Bremen or Stuttgart in Germany, for example, which lie on the same meridian as *EUROBIRD-9*, then your LNB requires no skew.

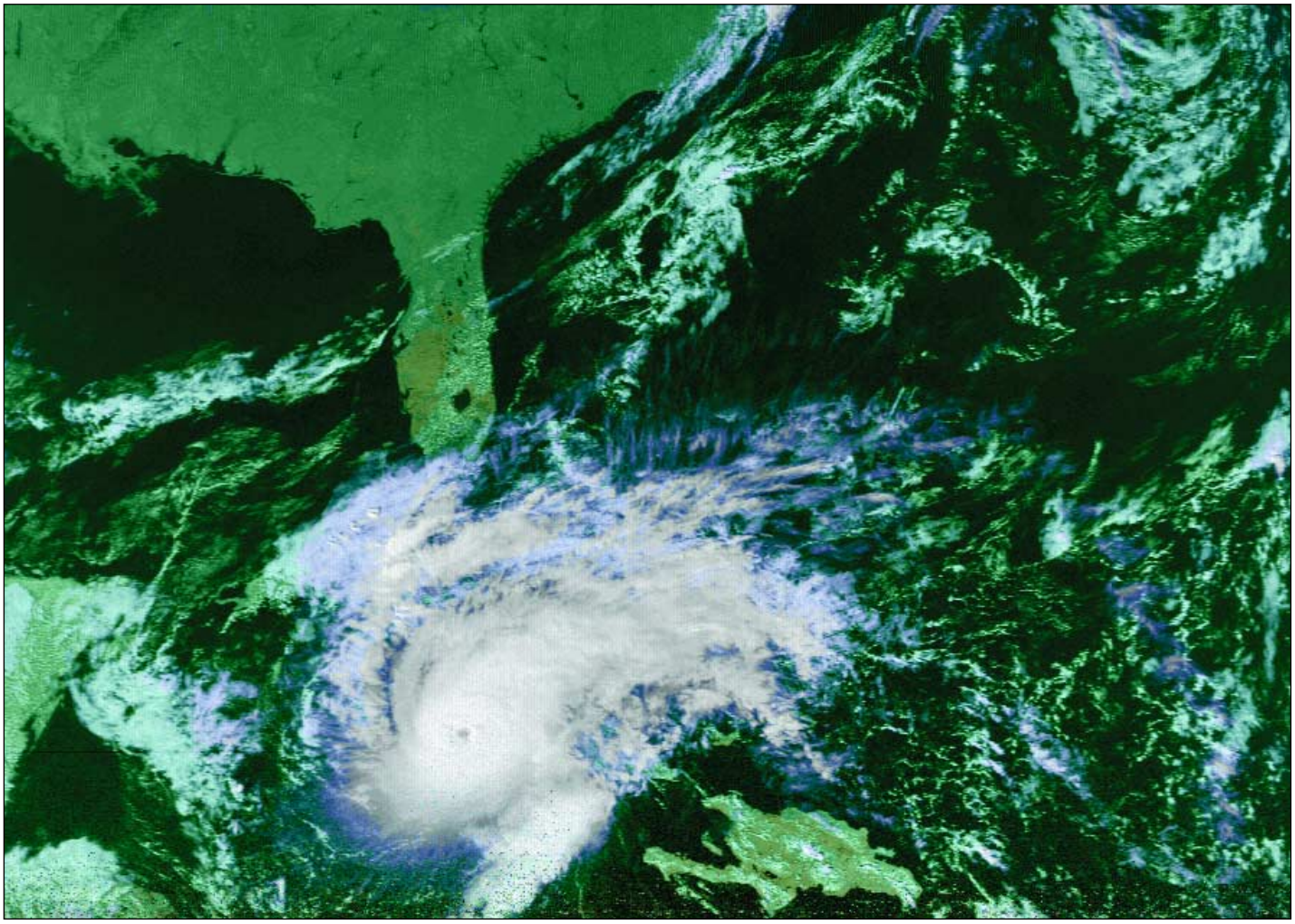
Back to our three LNB's. The vast majority these days are very similar in design, with the cable connector extending vertically downward from the unit when the skew is 0°. You can see this clearly in the case of the *Inverto* model above.

However, this is not always the case. With the *Televes* LNB, the cable is angled at 45°, as seen in the illustration above, when the unit is mounted with 0° skew, while the *MTI* model has its cable angled at 45° in the <u>opposite</u> <u>direction</u> for 0° skew.

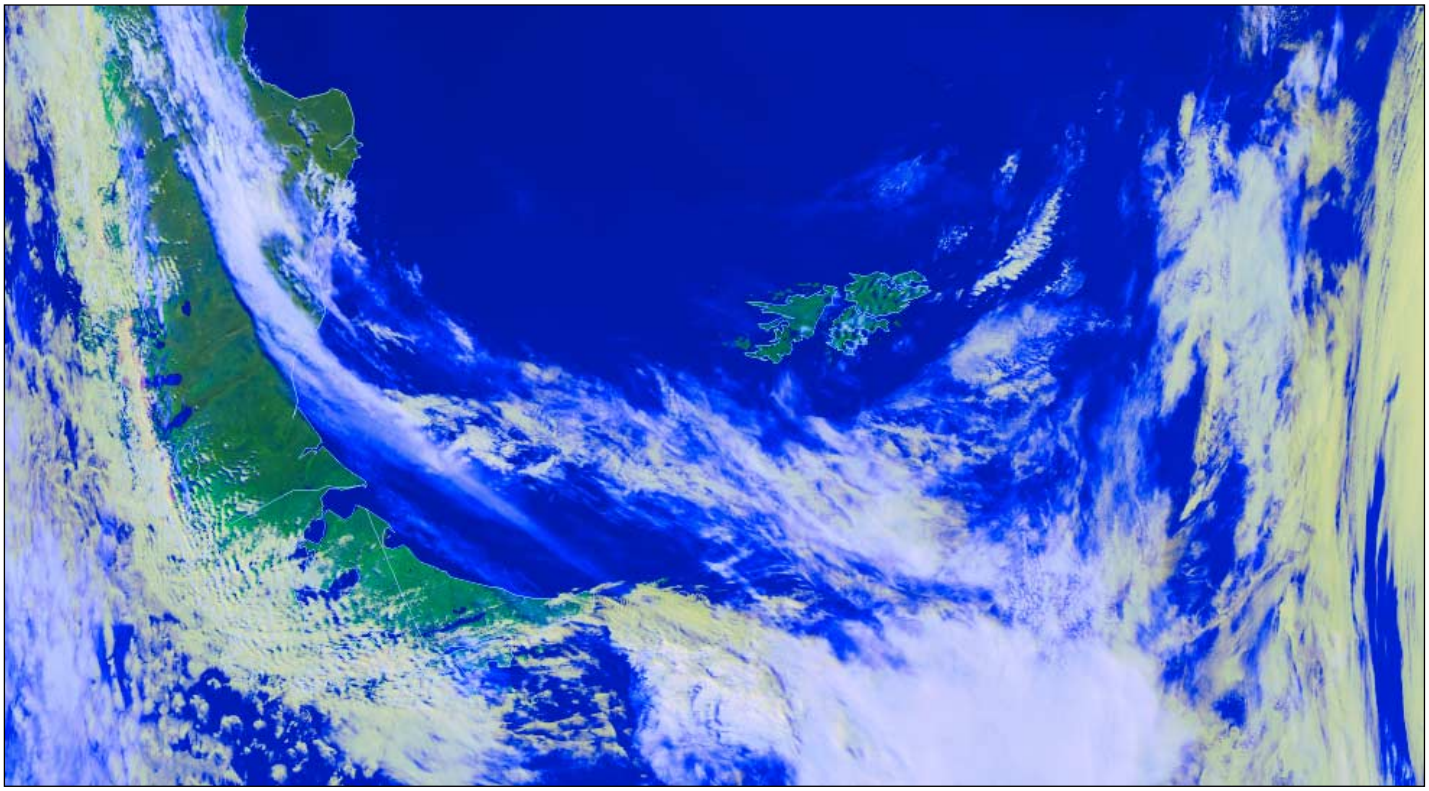
To be fair, both these LNBs have a scale on the feed-horn assembly indicating 0° skew. However, they do look a bit alarming, especially the *Televes* one, which appears skewed in totally the wrong direction when set up at my 0.3°W location. So, be careful.

Regarding the adjustment for skew, this cannot be done with the *SatFinder* meter. This device just shows 'raw' satellite power—very useful for locating *EUROBIRD-9* provided you have tuned your receiver to the 11977 MHz High Band beforehand.

As Arne wrote in his December 2008 Quarterly article, you need to adjust the LNB skew with reference to the signal quality read-out of your EUMETCast receiver.



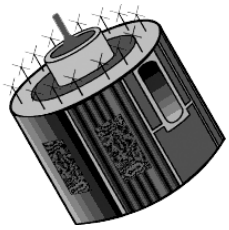
Keith Fraser provided this attractive NOAA-18 APT image of hurricane Paloma, acquired at 18:23 UT on November 8, 2008. Paloma, category-3 hurricane at the time, is seen with a clear eye-wall as it hands out a soaking to Cuba.



Mike Stevens acquired this attractive Metop-A image showing Patagonia and the Falkland Islands on January 28, 2009

Image© EUMETSAT 2009

Analysing EUMETCast Signals with the Discovery ST4 Antenna Analyser



David Simmons

During the course of a recent GEO meeting, David Taylor took this photograph of the screen of my *Rover Discovery ST-4* a/d analyser, an instrument designed to analyse all types of TV signals (figure 1).

In this case, the display is showing a 500 MHz wide spectrum at the output of an LNB set for horizontal polarisation, high-band operation in a 60 cm dish pointed at *EUROBIRD-9*. Voltage is plotted vertically against frequency. The marker is set on the transponder used for *EUMETCast* (TR 63), and the vertical dashed line shows the centre frequency as 11975.6 MHz (upper right of the screen). As you can see by the readings there is quite a good signal strength as indicated below the display by MRK 80.5dBuV (just over 10 mV).

You can also use the *Rover* to examine the IF frequency of a signal as it travels down the cable to your *DVB World* box. 'TR 63' at top-centre of the screen refers to the transponder number on the satellite; the peaks shown on the display represent all the different transponders whose signals are being received. The extensive solid region in the lower half of the display is just 'noise'.

The LNB we were using was probably contributing around 0.2 dB to this. Any noise above this figure would be due to background noise, predominantly emanating from the Earth and space.

Every universal LNB can receive in one of four polarisation and frequency options,

- low band horizontal
- low band vertical
- high band horizontal (figure 1)
- high band of vertical

As you can see, the LNB is doing quite a lot of work in receiving in excess of 500 MHz bandwidth of information coming down from the satellite. To obtain the best results, very careful alignment of both dish and LNB are required (figure 2). The display illustrated above, received using a 60 cm dish, shows a good clean spectrum from the satellite.

However, we discovered during our tests that using a smaller dish—in particular a 40 cm one—meant that the beam width could 'see' transponders from other satellites. This is not a good situation when you are trying to receive data because, for example, if you can 'see' *Hot Bird-6* as well as *EUROBIRD-9* on the same dish, with the same LNB, you would inevitably have poor signal quality even though you could have very high signal strength!

This results from the fact that both of these satellites have transponders on the <u>same</u> frequency, resulting in signal interference. Additionally, there is another direct broadcast satellite, *Eutelsat-10e*, lying between these two satellites, although, at this moment in time, it doesn't have a transponder on the *EUMETCast* frequency we are using; if it did, use of any dish smaller than the recommended 90 cm could raise severe interference problems.

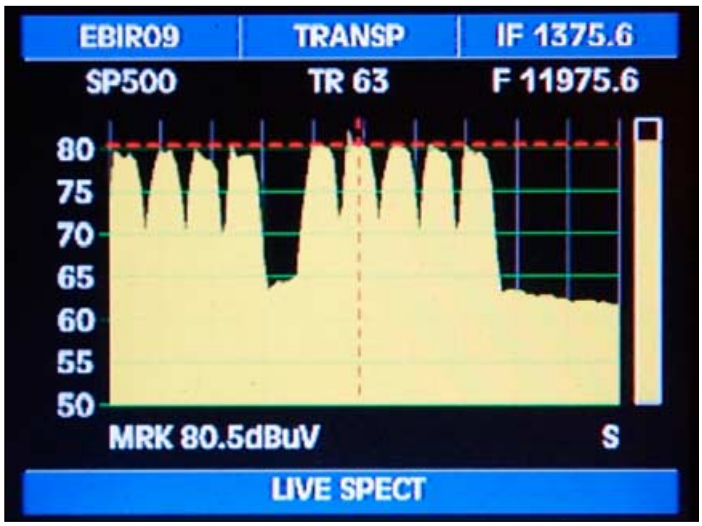


Figure 1
This screen-shot from the Rover ST4 shows a live spectrum display from Eurobird-9, showing nine transponders, four on the left, a break where another transponder might be, and five transponders in the centre of the display. The transponder carrying *EUMETCast*—TP63—is highlighted by the cross-hairs. Note the relatively flat-topped spectrum of these digital transmissions, as opposed to the shaped spectrum seen from analog TV signals. The frequency and signal voltage are shown. The units of voltage are in dB above 1 microvolt, so 80.5 dB above 1 microvolt is 10.6 mV.

Figure 2
David Simmons is shown trying out his satellite meter while tweaking the alignment of Francis Bell's EUMETCast dish. Using a meter like this allows one to make adjustments for optimum signal quality right at the dish—where the azimuth and elevation can be adjusted for maximum signal (i.e. correct pointing) and the skew angle and distance of the LNB from the dish are adjusted for optimum Quality—the most important parameter for good decoding of the digital signal. It is when making adjustments like these that one appreciates the benefits of a rapid response and analogue display over a purely numeric readout..

Photo: David Taylor

Royal Meteorological Society Meeting

January 2009

Robert Moore

On January 21, the Royal Meteorological Society held a meeting at Imperial College on *Metop: A new tool for measuring the atmosphere*. I counted four GEO members attending and John Tellick had set up a demonstration of real-time satellite reception outside the lecture theatre. The meeting opened with Dr Dieter Klaes giving an overview of the EPS/Metop system. Much of this would have been familiar to GEO members, but it provided a useful reminder, nevertheless, of the scale of EUMETSAT's operation and the extent of international and transatlantic cooperation it entails.

I suspect that, for most of us, the visible and infrared imagery is the main attraction of *Metop*: 24 hours worth of beautiful high-resolution images from all around the world every day, showing us terrain, cloud cover, weather systems, and so on. But clearly there is another aspect of *Metop*, one that generates data for input into forecast and climate models of the Earth's atmosphere. The speakers who followed were all meteorologists, some plainly working on the forefront of research on weather forecasting—dealing with formulae, graphs and statistics rather than the visual imagery used by amateur meteorologists and those of us who just admire Earth from space. So for much of the afternoon I was just about getting the gist of what was being said but much of the detail was passing overhead somewhere near the *Metop* orbit. Peter Bauer of the European Centre for Medium-Range Weather Forecasts spoke about the growing percentage of the input to forecasts that derived from satellite data. *Metop* helps close the gap between the predicted and observed features of the weather. The satellite is also especially important in providing data from the southern hemisphere.

Fiona Hilton from the Met Office described how *Metop* data are used to model the structure of the upper atmosphere and described some experiments in which a high-altitude *BAe-146* was used to measure upper air parameters during *Metop* overpasses, thus enabling satellite data to be compared with results from instruments directly reading temperature, humidity etc.

We need to remember that these data are derived from observations of radiance, and readers will be pleased to hear that *Metop* is 'doing well'. It does however have a 'dry bias' in its measurement of water vapour in the upper troposphere. Rose Munro from EUMETSAT spoke about the GOME-2 mission and particularly ozone, SO_2 and particle monitoring; she showed us some striking pictures of high NO_2 concentrations over Germany, Belgium and the Po Valley—with some rather murky smudges over Madrid, Barcelona and the south east corner of England.

I had to leave to catch my train at this point, having had the old grey matter thoroughly tested during the afternoon. I forget whether it was said of Methodists or Presbyterians that they always enjoyed a good sermon, and the less they understood it, the more they enjoyed it. But it certainly does no harm to get a rounder picture of what scientists are achieving and hoping to achieve with *Metop*, and no great harm is done if one fails to follow the detail but is challenged to go back to the books.

I must say I was surprised that one of the world's leading centres for science and engineering was not able to provide a lecture theatre with good acoustics. But, over all, an enjoyable if challenging meeting. If any of the papers are published I will try to keep GEO informed.

Using False Colour RGB-321 Channel Mapping to Highlight Snow in AVHRR Imagery

David Taylor

The image on the front cover shows the UK on Wednesday, December 3, 2008, following overnight snowfalls on Tuesday 2nd. You may have read elsewhere in this issue (page 33) about the packet loss my *EUMETCast* system experienced due to snow on the antenna at Edinburgh. But you can see from this image that Edinburgh and much of the Forth-Clyde valley actually escaped from the worst of the weather, as shown by concentrations over much of the rest of Scotland, the Scottish Borders and parts of Northern and North-East England, and parts of Wales.

This data was obtained by the AVHRR imager on the Metop-A satellite from its morning pass at around 11:00 UT, when the low angle of lighting made the mountains of the Scottish Highlands stand out really well. False-colour processing has been used with the classic RGB321 channel mapping—red is the 1.6 µm channel, green the 0.8 µm channel and blue the 0.6 µm channel. The slightly less green area in the middle of England is the conurbation around Birmingham, where the reduced average vegetation, resulting in less chlorophyll, means that the channel-2 signal is lower, resulting in reduced green in this image. The Manchester conurbation is visible a little farther north, surrounded by snow. In the 1.6 µm waveband, snow reflects poorly compared with the 0.6 µm and 0.8 µm wavebands, and hence corresponds to the cyan areas of this image.

The data were acquired over *EUMETCast* by my *Metop Manager* software, processed in *HRPT Reader* to extract the false-colour, and finally rectified into a more recognisable map projection using my *Ground Map* program.

All programs are available as part of my HRPT Toolset Plus suite from ***http://www.satsignal.eu/***

River Sunglint Causes Sensor Overload

David Taylor

The MSG-2 image on the inside front cover of this issue displays strange artefacts—bright streaks along the course of the Paraná River— that were spotted towards the end of 2008 around 53.5°W, 22.8°S in southern Brazil.

The Paraná must have been particularly calm, and the sun near its maximum southerly position, so that the reflections of sunlight from the river caused the visible waveband sensors on Meteosat-9 to overload, and hence spread out the few pixels across the line. Normally, the sensor is designed to handle light levels corresponding to those from a 100% reflective Earth surface in maximum sunlight, with a small margin in hand so that the sensor can measure values of around 100% accurately. Light levels above those values would normally be handled without problem but, with sunlight reflected directly into the sensor over a number of pixels, the sunglint can sometimes spread over several pixels as seen here.

The Paraná River, stretching almost 4000 km from its headwaters until it merges with the Uruguay River to form the Rio de la Plata estuary, is the second longest in South America and forms part of the boundary between Paraguay and Brazil, and Paraguay and Argentina.

Thanks to Rob Alblas for spotting this one.

You can read more about the Paraná river by visiting

http://en.wikipedia.org/wiki/Parana_River

GEO Symposium 2009

At the Royal Grammar School - Guildford

Francis Bell

As an alternative to Leicester, which has hosted the GEO symposium for the past five years, a number of alternative venues were considered for this year. Ultimately, we decided to hold Symposium 2009 in the Royal Grammar School (RGS), High Street, Guildford on Saturday July 18, 2009.

The town of Guildford lies about 30 miles southwest of central London and is easily accessible by road, rail and air; the airports at Heathrow and Gatwick are nearby and there are excellent motorway connections to the cross-channel ports. The RGS is almost in the centre of Guildford and is within easy walking distance of the railway and bus stations. Arrangements for car parking may be possible.

The venue has a tradition of holding space/satellite meetings. Helen Sharman, the UK's only astronaut to visit the MIR space station has visited twice, once to give a lecture and again as a guest during a satellite exhibition.

The auditorium in the school has been booked for our symposium and is suitable for presentations with the usual computer projector facilities. The associated area is available for stands and displays, with the great advantage of having easy access for cabling from the school's front paved area which has an aspect to the south for satellite dishes and other antennae.

The programme for the day has not yet been fixed but it is expected to have a small number of speakers from space/satellite/weather agencies, together with our own membership demonstrating and presenting their work. The programme will also provide ample time for members to interact informally. The start time will be 9.00 am with the anticipated finish about 5.00 pm. The final hour of the day with be devoted to our AGM.

Guildford has many places to eat and drink. Beyond our own symposium, for any member bringing a wife partner or friend, Guildford has interesting historical and cultural dimensions which are well worth exploring for a day—not to mention the shopping!

For anyone wishing to stay overnight there is a conveniently located *Travel Lodge Hotel* within walking distance of the symposium. The room rates for Friday 17th and Sunday 19th are currently quoted as £19 per room and Saturday 18th is quoted as £29 per room. Contact details for the hotel are

Travel Lodge Hotel
Woodbridge Meadows
Guildford GU1 1BD
ENGLAND
Tel: 0871 984 6295
Fax: 01483 450 174
Email: www.travelodge.co.uk

They quote limited free car parking. However, there are other hotels in the Guildford area to choose from.

Registration

The registration fee for the day has been kept as low as possible to encourage members and friends to attend. The fee is set at £5.00 per delegate payable on the day.

Arne van Belle holds a workshop at Symposium 2008

To make this a successful event please attend if you can and invite any friends with a shared interest in weather satellites to join GEO for the day. The venue has been chosen to attract potential new delegates as well as being conveniently located for members who attend our symposium regularly.

Pre-registration is preferred because it helps with administration on the day. If you intend to come please register with Peter Green by email to

international@geo-web.org.uk

Website Updates

Please check the GEO website at regular intervals for updates relating to the symposium programme. At this time, a balance between APT, Metop and MSG is anticipated but any contributions will be welcome. If you wish to make a contribution to the day's proceeding, such as a demonstration, presentation, workshop etc., please contact Francis Bell directly at

francis@geo-web.org.uk

to enable your contribution to be included in the advanced published programme.

A diverse day with many contributors should be attractive for new and established delegates.

Cover and Full Page Images

Front Cover

David Taylor realised this Metop-A colour composite image on December 3 last year, just hours after blizzards had swept the UK, causing, amongst other things, missing EUMETCast data the day before.

Image © EUMETSAT 2008

Inside Front Cover

David Taylor spotted an unusual example of sunglint on a late-evening Meteosat-9 image showing South America. You can read more on page 10.

Image © EUMETSAT 2008

Inside Back Cover

Douglas Deans submitted this Metop-A image of the late-season hurricane *Paloma* as it approached Cuba on November 8 last. *Paloma*, a powerful storm with a central pressure of 945 mb and winds near 120 knot had just been upgraded to Category-4 by NHS. Shortly thereafter, *Paloma* became the second strongest November Atlantic hurricane ever noted, just behind hurricane *Lenny* of 1999.

Image © EUMETSAT 2008

Back Cover

This composite image showing Antarctica in its entirety was created by Mario Brustia, from Metop-A segments acquired via EUMETCast. You can read how he achieved this on page 25.

Image © EUMETSAT 2008

Page 23

Britain was beset by gale-blown blizzards on December 3, 2008, with particularly high snow accumulations over the Scottish mountains. This channel-2 image from NOAA-17, acquired three days later, provides a brilliant depiction of snow-clad mountains and valleys.

Image: NOAA CLASS Archive (www.class.noaa.gov/)

Page 24

This beautiful channel-4 HRPT infrared image of the Barents Sea comes from the 09:10 UT NOAA 18 pass on February 7, 2009. Most of the area remains open water, thanks to the warming influence of the North Atlantic Drift, but masses sea ice can be seen stacked up to the the lee of both Svalbard and Novaya Zemlya.

Image:NOAA CLASS archive (www.class.noaa.gov)

My NOAA-19 Photo Album

Ed Murashie

What a vacation I had last February!

The excitement had begun in December 2008 when I searched the Internet for information on the upcoming *NOAA N Prime* weather satellite. I noticed that NOAA was soliciting bids for an Educator's Conference in conjunction with the launch and that a company named *Space Information Labs* (SIL) was likely to win.

I contacted SIL and a name from my past wrote me back, Edmund Burke, President and CEO. Back in 1998, I had met Edmund when I attended the very first NOAA Educator's Conference. Edmund was, and still is, affiliated with the *Endeavor Center Organization*, an outreach group whose goal is to inspire students with space science, especially through their teachers. I had thought the government had stopped sponsoring these events because of budget cuts but, in fact, had sponsored one for *NOAA-N*. Edmund not only invited me to attend, but also asked if I would be a presenter; before he could change his mind, I agreed. I must say that putting together one of these conferences, lining up the funding, sponsors, conference center and working with NASA, NOAA and the Air Force for base clearances must be a lot of work, but no one could do a finer job than Edmund. He is one passionate man and a real inspiration for the teachers.

My first thought was to have a workshop on setting up an APT station—like a teacher might do in class. After talking to several people, including some in the business, their advice was to give a retrospect talk on the satellites. So I prepared a presentation with 90+ *Power Point* slides for a 75 minute talk that covered the history, types of weather satellites, how to set up an APT station, where to get the data on the Internet and what to do with the data once you have it all.

The conference was held at *Allan Hancock College* in Lompoc Valley Center near Vandenberg AFB, California and started for most at 9 am on February 3 then went on until 3 am on February 4. For the presenters, it began around 8 am, when we had to set up the classroom and figure out the elaborate audio visual system. Edmund welcomed the group of about 30 teachers, fewer than in the past due to education budget cuts, and introduced the speakers who gave 30 second synopses of their workshops. There were six workshops including *What's Up with Gravity*, *Mission to Planet Earth*, the Florida State University *Explores!* Program, *Using Satellites to Learn about Weather Around the World*, *How Satellites Measure the Atmosphere* and yours truly's *Weather Satellite Reception in the Classroom.*

There were three sessions, and each workshop was given twice. Shortly after Edmund's introduction, everyone was released to attend their first workshop. Now, even though I explained in my synopsis that the workshop expanded in scope to be '*Weather Satellites 101*', to my worse nightmare, no one showed up! After ten minutes I wandered into Dr Paul Ruscher's *Explorers!* workshop; he glanced at me with a look to say: 'shouldn't you be in your own workshop?' Paul has been attending these conferences since the first one and has been one of the best promoters of weather satellite reception I know. I sat in for a while and then went back to my classroom to ponder whether or not *Weather Satellite Reception* is that boring as subject matter? Has teaching become so focused to allow only teaching the tests? Is this an American issue or one stretching across the world?

As I prepared for my next workshop, during the final session, I was relieved when one person and then another walked in and sat down. By the time I started my presentation, thirteen teachers had showed up. I owe it to Paul and others who had championed my talk. The presentation went well with great questions during and after it, like: 'What do you mean by morning and afternoon satellites?' and political questions like 'Is the satellite data encrypted?' I represented GEO well by mentioning their publication, website, *YaHoo* email group and shop, and handing out PDF copies of back issues. I spoke highly of David Taylor's software and its many uses. I handed out CD copies of my presentation containing many images, Internet links and NASA and NOAA publications.

After the workshops, we took a bus to Vandenberg Air Force Base and had a tour of the *NASA Mission Control Data Center* from where the launch is controlled. Now this was impressive, because the teachers were able to sit in the directors' seats, with consoles displaying live data and the check list and headset sitting in front of them, five hours before the actual directors were to arrive and start the count down. And wouldn't you know it, the consoles are *Microsoft Windows* based. There is no more push of a button; it is a click of a mouse to launch a rocket. John Demko, NASA KSC Resident Office Manager at Vandenberg AFB, talked about the sequence of events, who sat at which consoles, and what his job was like. He spoke about his background as aerospace engineer and said his favourite activity is to give tours; his worst is managing budgets. Overall he loves his job and will probably retire doing it.

As if the Mission Center tour were not enough, Edmund lined up an even bigger attraction. He said we could either go back to the hotel to check in, or go out to the launch pad and watch them roll the tower back from 100-150 yards away! Was it any surprise the bus was full going to the pad? It was a perfect night, a beautiful sunset, a few scattered clouds, the slightest breeze—with the *Delta II* rocket and tower lit up by spotlights.

It took about five minutes to roll the tower back, by which time the sun had set, leaving the bright white payload fairing and slender green rocket against a black background with the temperatures dropping rapidly.

After checking into the hotel, we headed back to the *Pacific Coast Club* at Vandenberg AFB for a social hour followed by a buffet dinner. Let me tell you, the club really knows how to prepare an excellent buffet. The *Pacific Coast Club* was magnificent, with its collection of space photos, past officers' portraits and photos of President Kennedy touring the base. I questioned my luck early on when no one showed up at my first workshop but it turned around and did not stop with the Center and launch pad tour. In picking the best table to get photos for this article, I happened to pick the same table where the three NOAA dignitaries would sit. To my left was Tom Wrublewski, *NOAA N Prime* Satellite Acquisition Manager and a former teacher, Gary Davis, Director of the Office of Systems Development and Mike Mignogno, NOAA Polar Program Manager. We talked about the rich heritage of TIROS and the future and I gave them all a copy of my presentation.

Each man gave a brief talk about *NOAA N Prime*, its uses and the future of the polar program, including NPP and NPOESS. Tom's talk centred around a video that can be found on *YouTube* at

http://www.youtube.com/watch?v=I5gD-YVpnzo

One interesting part was President Kennedy's speech about going

The view at sunset, just hours before the initial launch attempt, as NOAA-Prime sits atop its Delta II launcher.

Ed standing 150 yards from the pad next to the 'No photo' sign

Ed presenting his workshop

Opening remarks by Edmund Burke

NOAA N-Prime Awaiting launch

The Delta II and tower

NASA Mission Data Center

to the moon, where he mentioned the TIROS satellite. The last speaker was Dean Davis, Senior Principal Scientist/Engineer for Boeing, who gave a great talk on the *Delta II* launch vehicle, which is celebrating its 20th anniversary.

After the speeches, it was just a matter of consuming enough caffeine to stay awake, board the bus and watch the rocket take off at 2:22:01 am. We rode out to the viewing site, took a few photos and then sadly climbed back on the bus when the launch was scrubbed. The problem was not the weather or the rocket; it was the launch pad and a faulty relay board that controlled the nitrogen pressurisation system. After a few hours of sleep and a filling breakfast it was time for a beautiful drive down the California coast. So if you ask yourself: 'Did Ed miss the launch?' Not really! I had seen two before but I had never *visited* the Mission Director Center and *seen* the rocket from 150 yards away! I highly recommend attending the next conference. I know I will.

My vacation was not over yet. I had pictures of the people responsible for the satellite and the satellite itself but I needed pictures from the satellite. After hearing first reports from Stefano Grassi and Douglas Deans, and seeing the great first images from Milan Konecny and Fred Piering, I decided it was my turn to see what NOAA-19's image quality looked like. Fred's first picture was so good that it can be found on the NASA and NOAA websites—certainly great press for us amateurs.

My first HRPT image was received at noon on Friday February 6, during orbit 5, but was noisy because I was not ready to operate on 1702.5 MHz with left hand circular polarisation. The following orbit at 1.39 pm still did not produce a noise-free image of the US West Coast because I had not figured out the correct polarisation. I spent Saturday at my ex-wife's house putting up the antenna I took to the conference, since I get better APT reception there than at my house because of power line noise. I received two good passes, from orbits 19 and 20, on 137.9125 MHz using a *Quorum Communications* quadrifilar antenna, a modified *Bearcat* scanner and the WXSAT APT decoder program. On the Sunday, I captured two noise free HRPT passes, orbits 33 and 34, now on 1698 MHz RHCP, with my homebrew equipment and two good APT passes. The HRPT images were processed using David Taylor's *HRPT Reader*. My final fun task was putting together this photo album.

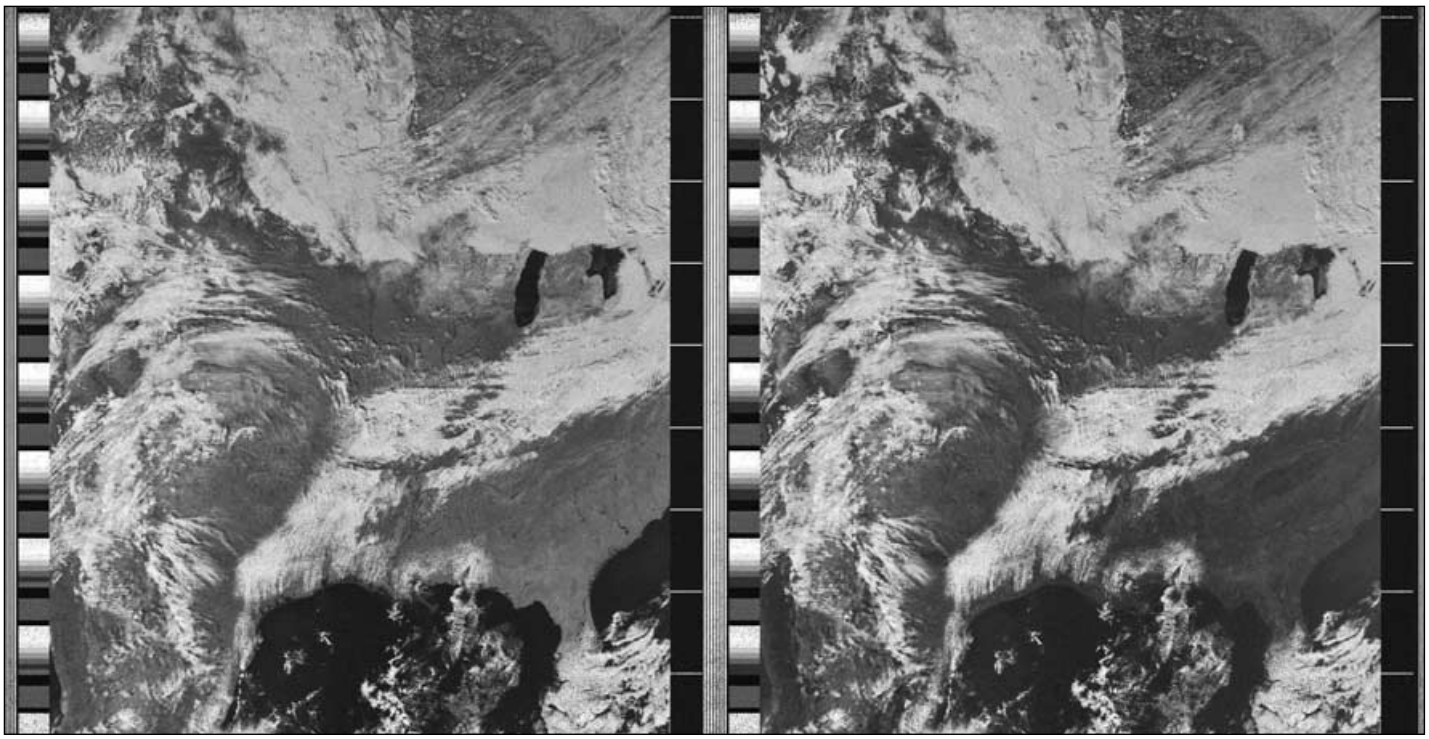
I learned many interesting facts about the satellite and rocket before, during and after the conference. First are the historical aspects of the launch. Next year will be the 50th anniversary of the launch of *TIROS I* on April 1, 1960. A team of volunteers are restoring the Fort Monmouth New Jersey *TIROS I* ground station and their work can be followed at

http://www.infoage.org/

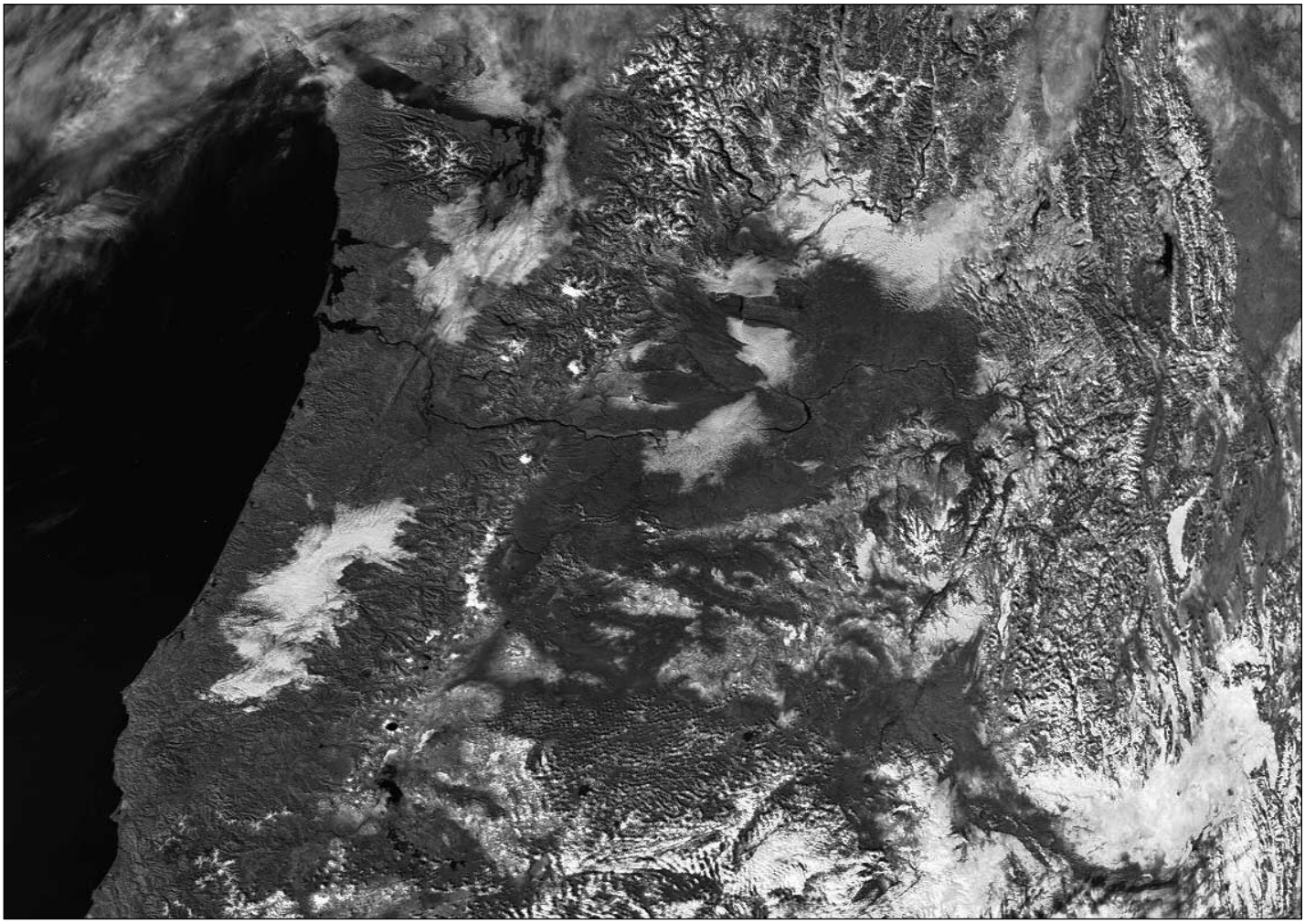
ESSA 1, the first operational TIROS satellite, was launched exactly 43 years prior to the day of this conference and the Delta II rocket used to launch *NOAA N Prime* celebrates its 20th anniversary during February. The saddest historical note is that this is the last ever TIROS satellite and marks the beginning of the end of APT and HRPT. This generation of TIROS has produced operational satellites lasting from two weeks to eleven years: an average lifetime of 3.75 years. Let's hope the latest will last the longest!

NOAA started the $564 million TIROS project by defining the mission requirements and securing the funds. It then relied on NASA and the Department of Defense to supply the satellite, launch vehicle and launch support. NASA contracted with Lockheed Martin to build the spacecraft and ITT to build the six-channel AVHRR/3 instrument that supplies our images. During a routine operation on September 6, 2003, the *NOAA N Prime* satellite made news when it slipped off its turn-over-cart while being moved from a vertical to horizontal position. Twenty fours bolts needed to secure the satellite to the cart had not been installed. Lockheed agreed to forgo their profits on the satellite to pay for the $217 million dollar repairs. Seventy percent of the satellite was repaired or replaced. As a NOAA official put it, in many cases it was easier to replace the pieces than perform the analysis to see if the items were damaged. The repairs were made and the satellite was placed in storage on March 7, 2008.

On November 4, 2008, the satellite arrived at Vandenberg AFB from Lockheed Martin in Sunnyvale California and processing with final ground checks started. The assembly of the *United Launch Alliance Delta II 7320-10C* two-stage rocket, with three solid rocket motors, began in early December at Space Launch Complex-2, Vandenberg AFB. The rocket's 85.6-foot long 8-foot diameter first stage was powered by RP-1, highly refined kerosene, and liquid oxygen. The second stage, 19.6 feet long and 8 feet in diameter, was powered by hydrazine and nitrogen



My First NOAA-19 APT image, acquired during orbit No 19, at 19:52 UT on February 7, 2008



Detail of the States of Washington and Oregon - NOAA-19 channel 2 HRPT at 21:28 UT on February 7, 2008

tetroxide hypergolic fuels. Three solid GEM engines each 42.5 feet long and 3.3 feet in diameter were attached to the first stage. In January, NOAA N Prime was placed atop the Delta II second stage and the fairing attached.

The first launch attempt, during the Educator's Conference, was scrubbed at 1.52 am on February 4, just 30 minutes before launch. The reason was a fault in the relay board that controls the gaseous nitrogen purge system. Repairs were made and a second launch attempt made on February 5, despite approaching bad weather and a forecast for 60% weather violation at launch time. Again a scrub was called, five hours before launch, because of a fault in the air compressor that sends dry clean air into the fairing around the satellite to prevent hydrocarbon buildup.

The third attempt was on the morning of of February 6 during the same 2.22 am launch window. Despite a 60% weather violation, the rocket *was* launched successfully, and within 15 seconds it disappeared into the low clouds. At 65 minutes 56 seconds after launch, *NOAA N Prime* separated from the *Delta II* second stage in a 470 nmi, 98.7° inclination orbit, trailing NOAA-18 by 37 minutes and leading by 5° west longitude. At 4.03 am the satellite was renamed NOAA-19 and Wayne McIntyre, NASA POES Project manager, declared the satellite 'in a nominal orbit and all spacecraft systems functioning properly'. NOAA-19 will go through a checkout phase and, once declared operational, will replace NOAA-18 as the primary afternoon satellite and work with Metop-A, the primary morning satellite, to monitor the Earth's environment. The launch timeline is nicely captured at

http://spaceflightnow.com/delta/d338/status.html

NOAA-19 carries an AVHRR/3 six-channel radiometer similar to the ones carried on NOAA-15 through NOAA-18. When first activated, the HRPT stream includes channels -1 through -3A. Channels -3B, -4 and -5 are currently switched off until the unit has outgassed and the coolers turned on. APT shows channels-1 and -2 during this initial period but once fully operational, should display channels-2 and -4 during the day and channels -3B and -4 at night. Details about the AVHRR/3 characteristics and the spacecraft can be found in the NOAA N Prime booklet, which can be downloaded from

http://www.nasa.gov/pdf/111742main_noaa_n_booklet.pdf

References

http://www.nasa.gov/mission_pages/NOAA-N-Prime/main/index.html
http://goespoes/gsfc.nasa.gov/poes/index.html
http://www.oso.noaa.gov/poes/index.htm
http://www.osd.noaa.gov/POES/index.htm

Second-Hand R2FX Sought

We recently received an enquiry from Steve Craggs, who lives in Canada, asking if we could help him to obtain a second-hand R2FX APT receiver.

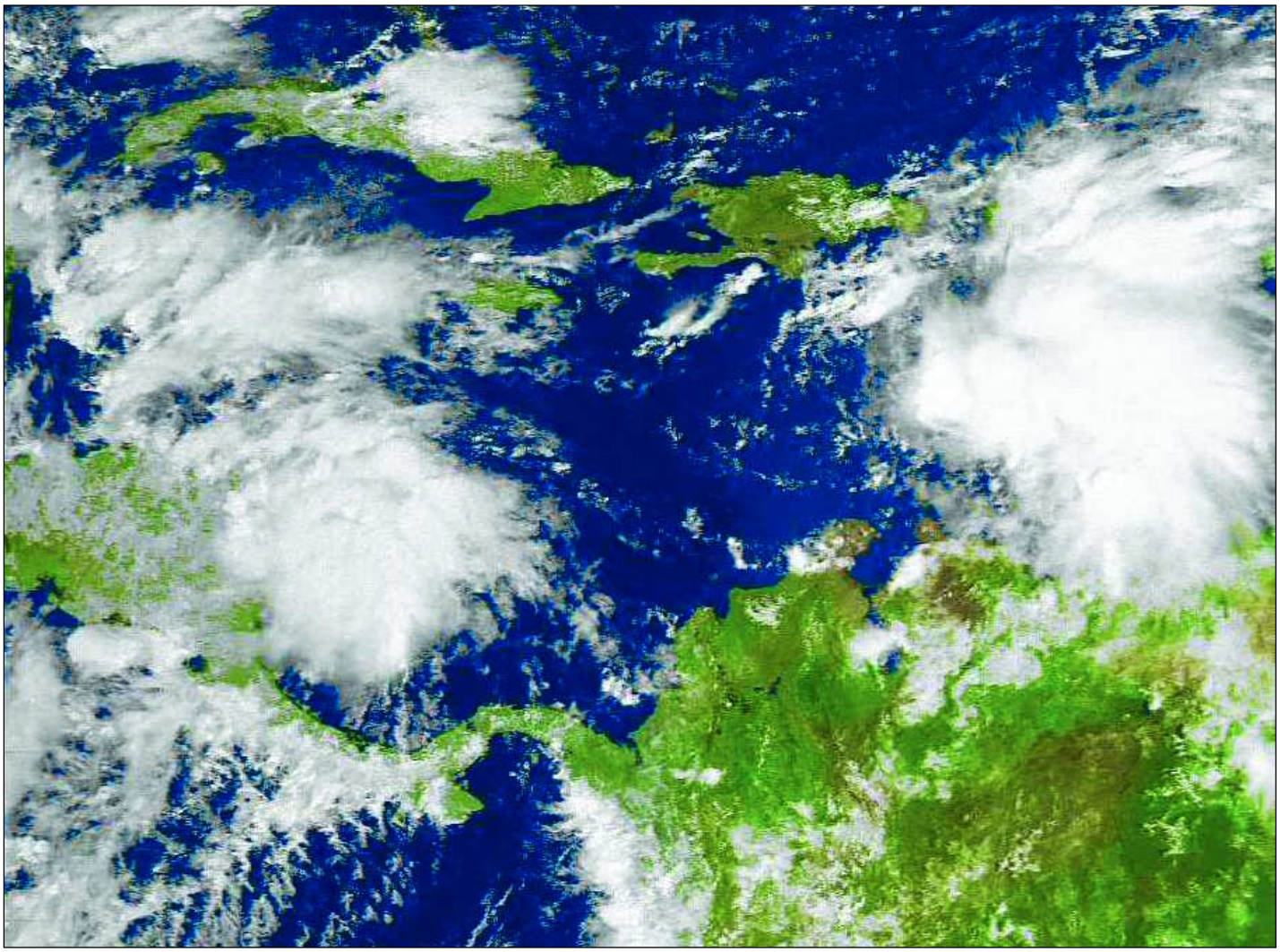
Steve wrote: 'I am looking for a used R2FX receiver. Perhaps some reader has an old one they used before buying the new R2ZX? It would cost me close to $400 to buy a new receiver in Canada.

'Alternatively, I would be interested in plans to build a receiver, but the Internet does not seem to have any such plans. Please email me at ***craggss@novachem.com***

Thanks'.

Steve Craggs, Ontario, Canada.

The R2FX and laptop computer used to record the image below, showing Hurricane Omar over Bonaire



A Visit to Bonaire

and an encounter with Hurricane Omar

Fred van den Bosch

WTNT35 KNHC 152350

TCPAT5

BULLETIN

HURRICANE OMAR INTERMEDIATE ADVISORY NUMBER 10A NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL AL152008 800 PM AST WED OCT 15 2008

...OMAR BECOMES CATEGORY TWO HURRICANE...MOVING QUICKLY NORTHEASTWARD TOWARD THE VIRGIN AND NORTHERN LEEWARD ISLANDS...

A HURRICANE WARNING IS IN EFFECT FOR THE U.S. VIRGIN ISLANDS AND THE ISLANDS OF VIEQUES AND CULEBRA. A HURRICANE WARNING IS ALSO IN EFFECT FOR ST. MARTIN/ MAARTEN...SABA...ST. EUSTATIUS...ST. BARTHELEMY...THE BRITISH VIRGIN ISLANDS...AND ANGUILLA. A HURRICANE WARNING MEANS THAT HURRICANE CONDITIONS ARE EXPECTED WITHIN THE WARNING AREA WITHIN THE NEXT 24 HOURS. PREPARATIONS TO PROTECT LIFE AND PROPERTY SHOULD BE RUSHED TO COMPLETION.

A HURRICANE WATCH AND A TROPICAL STORM WARNING REMAIN IN EFFECT FOR PUERTO RICO...AND ALSO FOR THE ISLANDS OF ST. KITTS AND NEVIS .....

This warning (above) from the NHC (National Hurricane Center in Miami) was not what we had reckoned on when we went for a short holiday to Bonaire last October. Bonaire is an island off the coast of Venezuela and is a member of an island group, known, not without reason, as the Windward Islands. I was thinking more about sun, sea and diving, and from time to time receiving a satellite image.

At first everything was just fine but after a few days it became clear that we were situated on the edge of Hurricane Omar. At that time there was scarcely any movement from Omar, meaning that we had to face two days of rain and gales. Fortunately, it started to brighten up on the third day, and we sat on the east coast of the island; there, in the lee of the winds, it turned out better than expected.

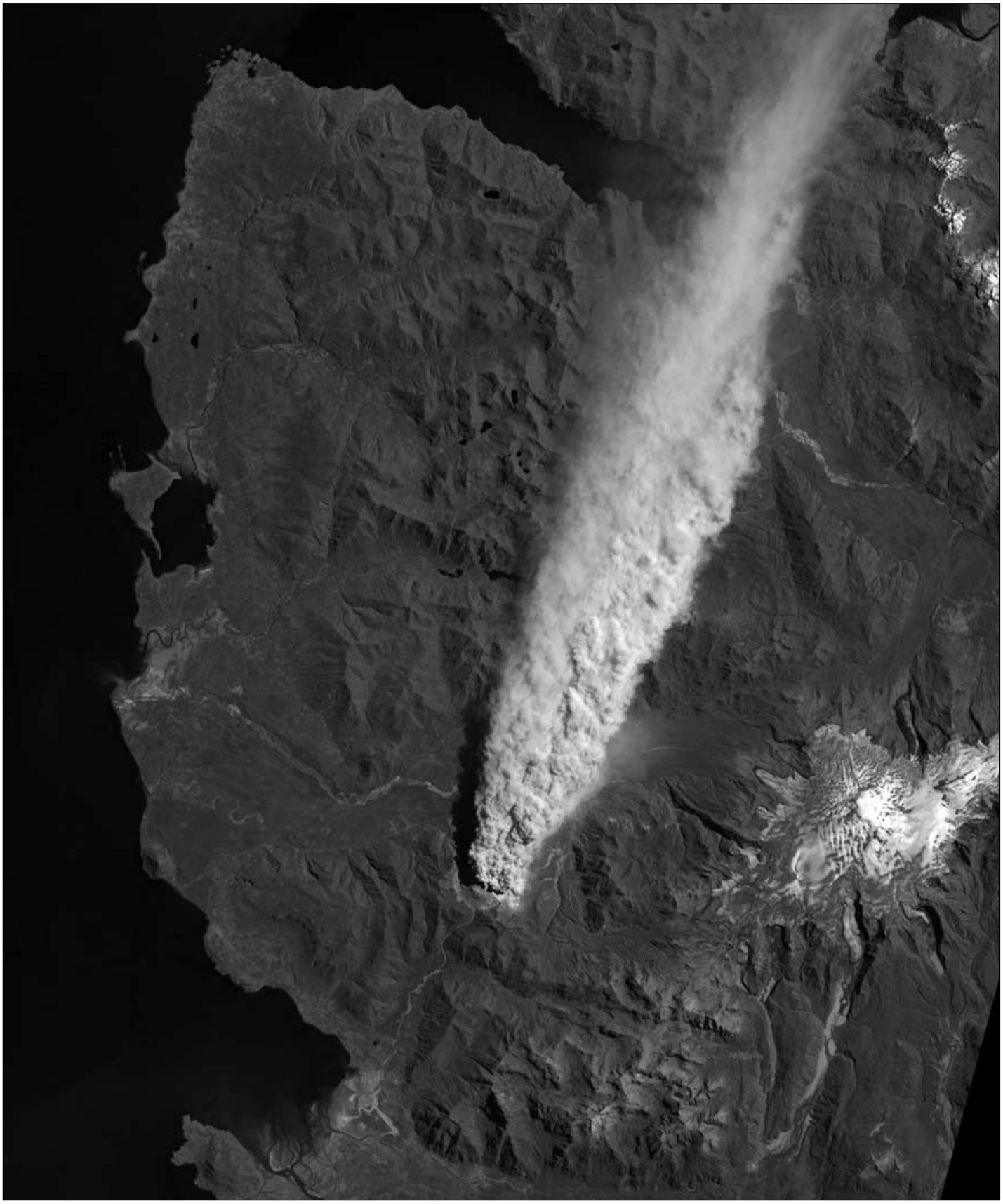
The west coast, however, was harder hit. Tents on the beach were blown away, houses were flooded by water and coastal roads became impassable because so much coral had been washed up from the sea.

The coral itself also suffered considerably. In particular, much of the softer coral has been swept away. I was able to see this for myself during a couple of my diving excursions. Unfortunately I had not dived prior to the storm and therefore could not make a direct comparison. People told me that many years will pass before the coral will find itself in a decent condition again.

Because this was my first visit to Bonaire, I also did some satellite reception. It was difficult to set up the antenna as high as I would have liked, so that I wasn't able to obtain a decent image to the south. Nevertheless, I was still able to make a couple of nice recordings.

The page at left shows my reception station, the PITA antenna standing out of shot on the fence to the left. The receiver was the R2FX and *WxtoImg* was used for the decoding. This proved particularly interesting to the 'suikerdiefjes' (tody flycatchers), the tiny yellow-breasted birds. The lower picture is a satellite image I made, showing Omar over the Venezuelan coast. Bonaire sits approximately a third of the way down, under the large cloud mass.

The photograph below, taken by my friend Hans Holleman shows huge waves from Hurricane Omar crashing on to the coast at the height of the storm.



Chile's ***Chaitén Volcano*** had been dormant for more than 9 000 years prior to its May 2008 eruption. Since then, the volcano has remained active, releasing plumes of steam and volcanic ash which have coated vegetation, clogged waterways and inundated the nearby town of the same name. On January 19, 2009, an explosive dome collapse occurred, resulting in the release of a thick plume of ash and steam from the volcano's summit. The plume from the recent eruption is so thick that it completely hides the land surface beneath. Southeast of the volcano, everything has been coated with volcanic ash. The meandering waterway between the volcanic summit and the coastal town of Chaitén is Río Blanco, the river which carried numerous lahars—volcanic mudflows—into the town in the wake of the initial May 2008 eruption. Despite repeated inundations, the town's grid-like layout remains discernible in this image.

This image of Chaitén was acquired by the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) aboard NASA's *Terra* satellite on January 19, 2009.

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

Presentation Manager

Fred van den Bosch

Introduction

I have recently been busy writing a new version of my *Presentation Manager* software and there is now a functional version available on my Internet site [1].

A few years ago, I wrote an article under the title POVIM (Product Oriented Video, Images and Maps) which, first of all, described how and why I had structured my EUMETCast reception system. When that had been done, I wanted to be able to examine my diverse images in an easy yet structured manner. To this end, I devised a Products and Presentation manager.

In the *Product Manager* you can define products: where they have been stored, what is the data etc. The *Presentation Manager* can then display these defined products on the screen in the form of thumbnails, which you can enlarge to display the full image. You can also scroll through them synchronously—that is to say you can go back and forwards in time, and all the images go along simultaneously.

When I developed the Manager, the quantity of data which came in was still rather restricted: with the consequence that the structure of the file names was also simple. As a result, the manner of defining the products was also simple. As more and more data arrived it became more difficult to fit these into the existing product structure. In short, it was time to devise something new.

In the previous article, I have already stated what I used as a basis for this new version. In the following paragraphs I'll first say a little about the organisation of the entire folder structure and then go on to the new Presentation Manager.

Structuring the Folders

In an earlier article [2] concerning POVIM, I described how I arrived at the chosen structure. Because a couple of years have already passed, I will repeat the basics. In fact nothing substantial has changed in this structure, it's only that more data is coming in. Logically, much new information has been developed in the intervening years.

In fact only one basic rule applies to the folder structure: <u>all</u> output is stored in a folder called 'Products'. In order to structure this further, subfolders are created. This can be done any way you like. To give you some ideas, I'll describe the structure of my own system.

Within the 'Products' folder I have a number of subfolders:

- **DATA**
  Here is written all output from the various manager programs: MSG Data Manager, Metop Manager, AVHRR manager etc. Within the 'DATA' folder are yet further subfolders for the various components: 'DWDSAT', 'FSD', 'HRIT', 'MPEF', 'SAF' etc.

  For Metop, yet another situation applies. Metop Manager produces a pair of global folders, one for Metop files and one for NOAA data. Within these two main folders is created a separate subfolder for each type of data. All these subfolders are regulated by the various managers programs.
- **APT**
  Here I put everything to do with APT, such as WAV files, images and combined images.
- **DAWS**
  Charts, which I generate with help from Digital Atmosphere come directly here. Within DAWS I have made a series of subfolders for each separate type of chart, such as temperature, atmospheric pressure etc.
- **MSG**
  All export from, amongst others, *GeoSatSignal*, is placed in this folder. Here again, each type of product has a separate folder. e.g. Europe, Netherlands, Atlantic (hurricanes) etc. Here I also store results from *GRIB Viewer* and *Sea Ice Viewer*, again, each in a separate folder.

Number of PCs

It does not matter whether you make use of one or two PCs for your setup. With a 1-PC system, it is clear that there is just one 'Products' folder. On a 2-PC system, there are these two possibilities:

1. The reception PC writes everything directly, by means of the network, to the processing PC. In this case there is just one 'Products' folder and it resides on the processing PC.
2. The reception PC writes the data to its own hard disk. In this case, each PC has its own 'Products' folder: only not all subfolders occur on both systems. For example, the 'DATA' folder only exists on the reception PC.

In this way you always know where to look for the data. It also simplifies tasks such as removing old files using *TrimTree* and making batch jobs for automating processes. Figures 1 and 2 show the structure described above in the form of poster presentations.

Presentation Manager (PM)

The *Presentation Manager* is actually a type of umbrella application relating to all the existing programs. This means that the existing programs which create images, charts and animations etc. write their results in the 'Products' folder and *Product Manager* ensures that they display effectively on the screen.

This happens by assigning every image, chart etc. as a product. The advantage of this is that you only need to collect and import all the data for a product once, after which *Presentation Manager* can look it out for itself. You can make these inputs yourself but *Presentation Manager* possesses the intelligence to do a large part of the work itself. I have made a wizard for this purpose: a part of the program that analyses a filename and fills in almost all data for a product. Only the name of the product has to be input yourself. The only stipulation is that you must choose an existing name including the current date. If there is extra information before and/or after the 'yymmddhhnn' string, or characters are placed within the date, it does not matter. Also, in many cases, the wizard knows which program must be started up, if it is a file and not an image.

Furthermore there is now a different philosophy about displaying the products. In the previous version, all products of a certain time were shown. If there was no product available at that time, nothing was shown. This new version works differently. It searches back a maximum of 24 hours from the established time. As soon as a product is found this is shown with time at which it was found. This means that products with various times can appear on the

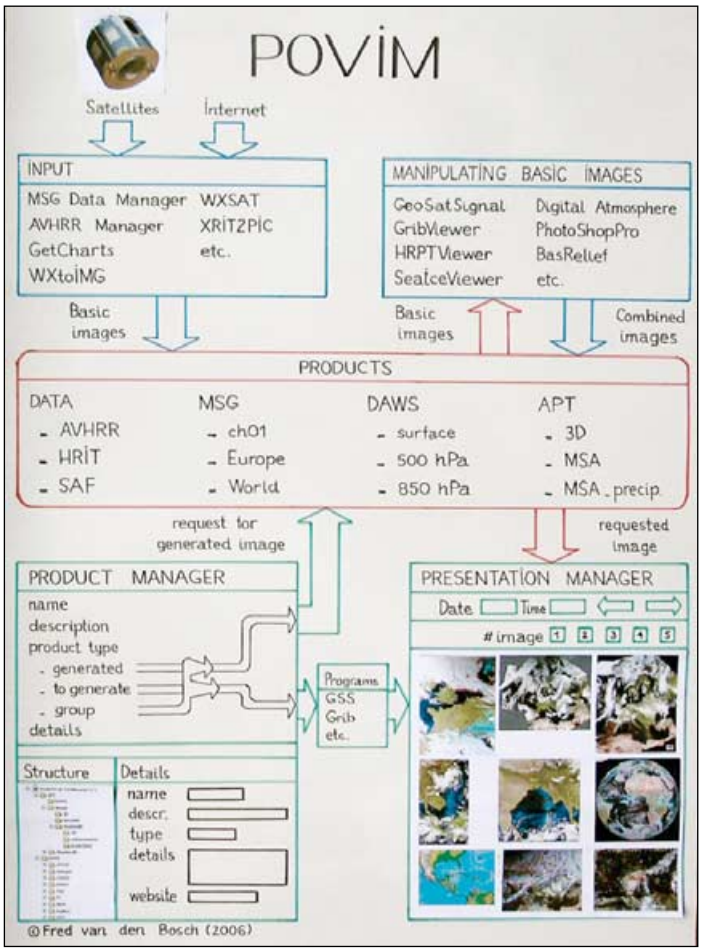


Figure 1 - Poster presentation: 'System Structure'

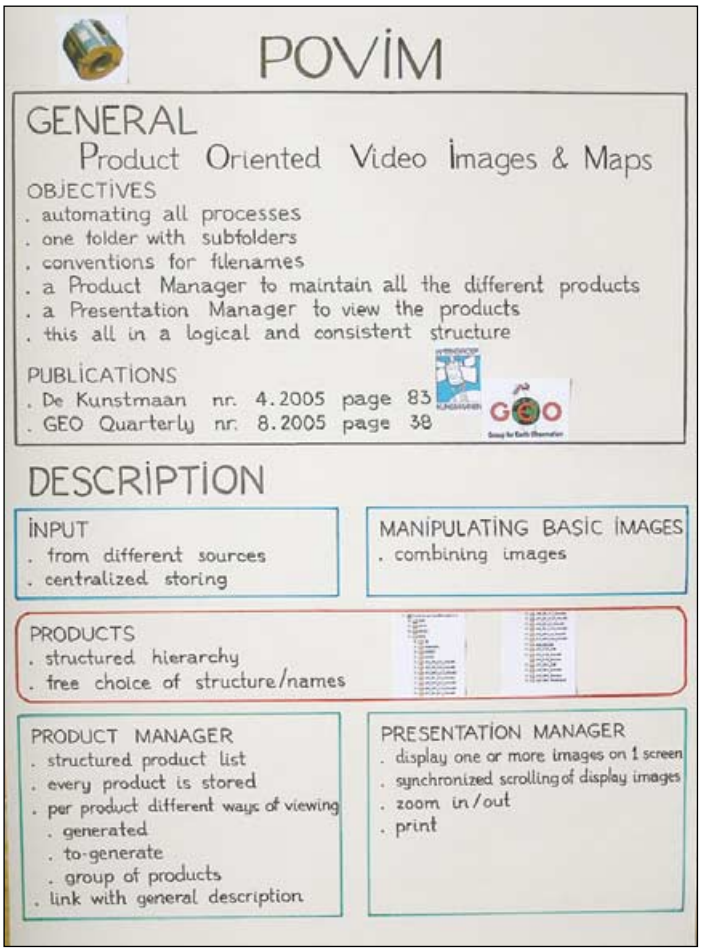


Figure 2 - Poster presentation: 'Explanation of the Structure'

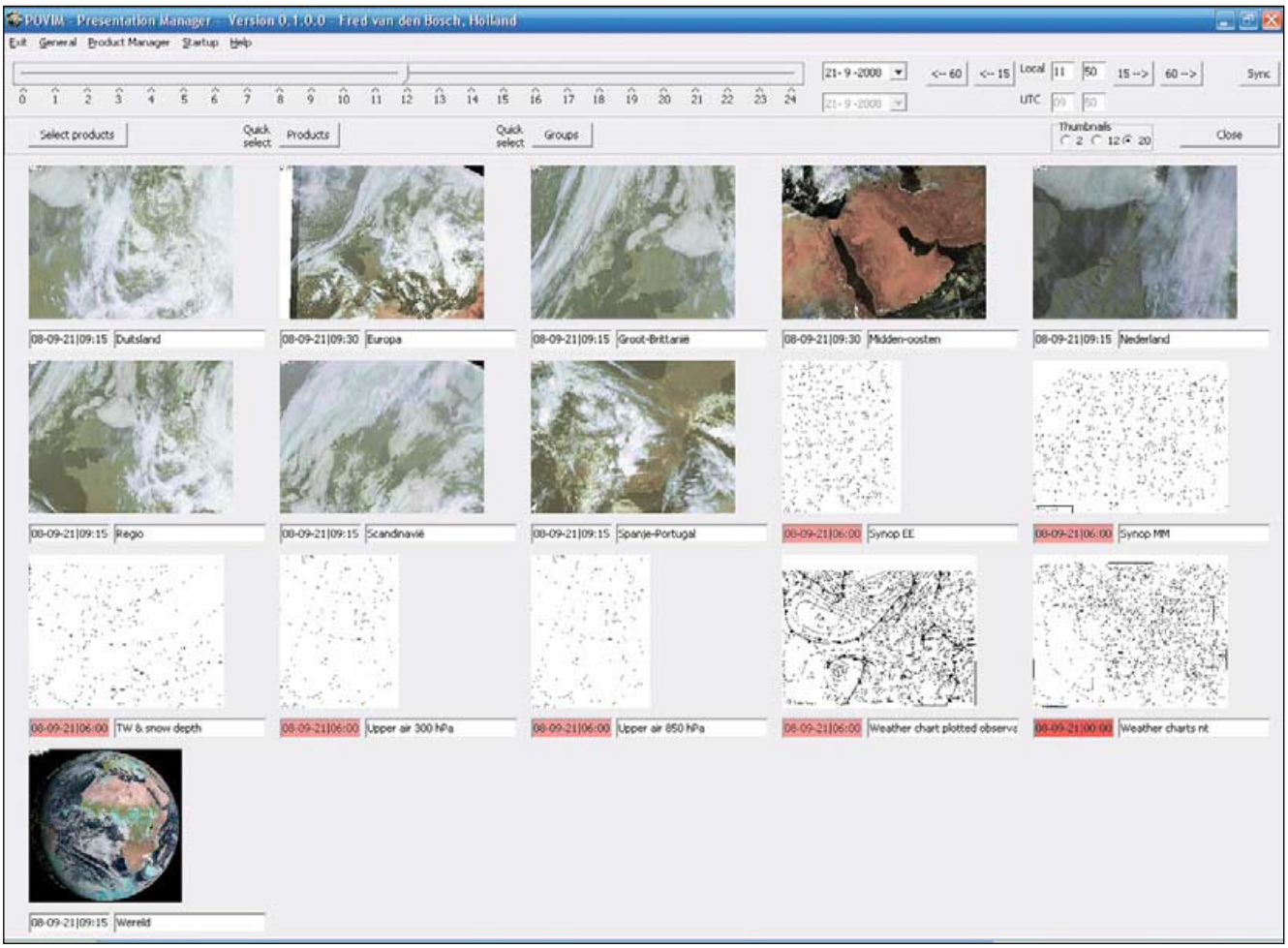


Figure 3 - Presentation Manager

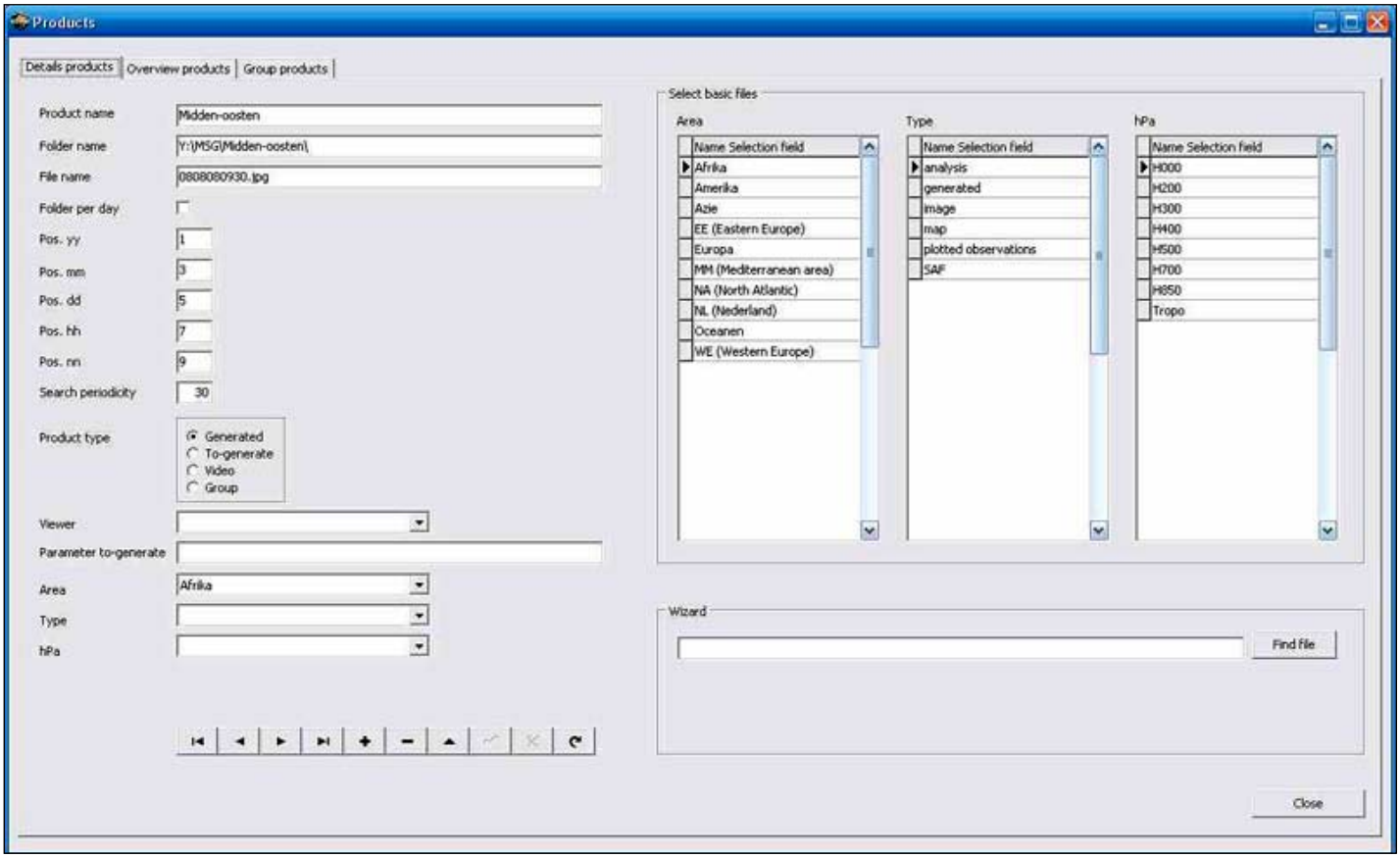


Figure 4 - The Products Screen

screen. To give an idea of the age of a product, various colours are utilised in the date/time field:

No colour:	< 1 hour
Light red:	1 - 3 hours
Mid red:	3 - 6 hours
Dark red:	Older than 6 hours but on the same day
Blue:	Previous day

In the previous version, the difference between *Product Manager* and *Presentation Manager* was clearer: they were two different modules. In this new version you automatically start in the Presentation part but, by means of menu options, you can keep products and a number of other things up-to-date. Here, I give an overview of the separate parts. For detailed descriptions of the screens, refer to the *Help* included in the program.

General

In the ***setup*** screen you can state your own image viewer. However, I recommend *Irvanview* [3]. This is because the option for a slideshow is hard-coded into the program for *IrvanView*. With other image viewers a slideshow is therefore not possible!. In addition, the headings for a number of search criteria can be entered.

The ***backup*** option makes an exact copy of the database.

Product manager

Here, once only, you input all fixed data such as products and programs.

The ***Products*** part takes care of making and managing all products. The screen consists of three tabs. Figure 4 shows the data on the first tab. This is for the products.

The left part of the screen shows all the separate fields belonging to a particular product. Particularly important is the 'search periodicity' field, where you state the number of minutes to search back (for an image): for MSG, for example, this is 15 minutes. By setting this field at 1 minute, you can also display APT images.

At upper right are the fields for the search criteria. These can be filled in, arranged and utilised entirely to your own preferences.

In the setup are headings for the existing files. They can, if desired, be changed to a product. If an addition does not exist it can be added, whereupon it immediately available so that the product can be added.

At lower right is found the wizard. Use **<Find file>** to select a file (for the very same day) and all data appear on the left of the screen. Add the product name and close—that's everything!

On the second tab is a complete overview of all products in a spreadsheet format.

The third tab shows the group products. Here you can define a group product and can associate up to 20 products to it. For example, group product 'Europe' can be associated with separate products such as 'Netherlands', 'Great Britain', 'Germany', 'France' etc.

Programs

In this screen, all the programs used by *Presentation Manager* are listed: *GeoSatSignal*, *GRIB Viewer*, *HDF Viewer* etc. Here you can also place links to relevant websites such as EUMETSAT.

Startup

All programs listed under 'Programs' can be directly started up here.

Help

There is large Help feature available.

Presentation Manager

After all the above, called fixed data, have been filled in we return to the main screen (figure 3). From here you can examine all products. There are three features: time, selection/layout and thumbnail display.

Time

At the very top of the screen is a 24-hour scale with a slider, with which the time for which products are to be shown can be set. This can be synchronised with the current time or stepped forwards or backwards in units of 15 or 60 minutes by means of the slider. All times are the local time. The UTC time is worked out in the background and shown as a grey field. The displayed products have UTC time.

Selection/Layout

Immediately below the time selector are three buttons which providing various selection and layout possibilities.

- *Select Products Button*

  This opens the 'Select Products' window, where a choice can be made from all your products using three selection fields (Areas, Type, hPa). The selection is refined by ticking the desired products. Click **<Show selected>** to display the selected products.
- *Quick Select Product*

  Here, a complete overview of all products is shown. Just tick one or more items and display them by means of the **<Show>** button. The selection by means of the 'Select Products' button continues to exist in the background.
- *Quick Select Groups*

  Here you can tick one or more entire groups. A maximum of 20 products can be shown.

And you can choose between displaying 2, 12 or 20 thumbnails on the screen.

Thumbnails

In the bottom section of this screen are shown thumbnails for all selected products. When it come to an animation or a yet-to-be-generated product, that is a standard image: otherwise the actual recording is displayed. By clicking once on a thumbnail with the left mouse button, depending on the type, the detailed image or animation of the respective product is generated. With the right mouse button you can start up a slideshow for images.

Finally

Try the program once and let me know what you think of it. I am very interested in observations, wishes and ideas. In particular, I very much wish to know if the wizard can handle all the different types of file. Please report by means of my forum

http://tech.groups.yahoo.com/group/POVIM-Software/

References

1 POVIM, Fred van den Bosch
http://www.fredvandenbosch.nl

2 POVIM
GEO Quarterly No 8, December 2005, page 38

3 IrvanView
www.irvanview.com

The Werkgroep Kunstmanen

Miami Leaflet

Below is the text from the leaflet GEO circulated at the Miami Conference on behalf of our friends in the Dutch Werkgroep Kunstmanen. It details the activities of their group, some of which I was unaware of. I feel that GEO readers will be interested to learn about their background and activities.

Francis Bell

The 'Werkgroep Kunstmanen', based in the Netherlands, was founded 35 years ago by a group of enthusiastic radio amateurs who wanted to develop antennas, receivers and printing devices to receive images from the first weather satellites. It is remarkable that the 'Werkgroep' is so big, being located in such a small country, but maybe that's because the Dutch people have always been preoccupied with the weather. The group meets five times a year and has its own quarterly magazine with articles written by our members. Some of these articles are now used as a base of our 'Introduction Handbook'.

History (1973 - 2003)

Members of the Werkgroep were the first in the Netherlands to receive images, even before the Dutch meteorological institute KNMI. The first receiver they used was the BC603, modified for the greater bandwidth in combination with a down-converter. The antennas were quite large: 2 metre Yagi beams or helical types, with a diameter of one metre. Printing images was not easy at that time and we developed our own drum-based printers using electrostatic or photographic paper. Modified TV-sets were also used.

During the 1990s, the satellites started to transmit HRPT and In 1996 we developed an HRPT-decoder based on FPGAs. At that time, FPGA's were almost unknown in the non-professional-world. This decoder is now used across the world and is known as the 'Alblas-decoder'. Various APT receivers have been designed based on various FM-chips, as well as two HRPT-receivers, one of which was capable of receiving the PDUS-signal-carrying the high resolution pictures of the first generation Meteosats.

The Present (2003 - 2008)

The antennas used for APT were large. One of the main characteristics of the APT radio signal is that it is circularly polarised. Various antennas have been designed to suit this polarisation but the best antenna for the job is the Quadrifilar Helix Antenna. This antenna is also used on the NOAA satellites. There have been a lot of attempts by amateurs to design this antenna but with various results. The *Werkgroep* has designed two of these antennas that are reproducible, scientifically described and thoroughly tested in the field against other antennas.

This year, the *Werkgroep* will present a combined APT- and HRPT-receiver, the first of this kind in the world. This receiver can be built by amateurs and doesn't make use of exotic components. We did a successful test with an HRPT-stream over the Ethernet. Because of the capabilities of crossing a large distance, and the ease of developing software, we decided to continue our efforts to use this interface. The HRPT-decoder will provide an Ethernet stream of HRPT-data. We are proud to be the first with this development. Currently xrit2pic is the only freeware LRIT/HRIT decoder software, and was written by Rob Alblas.

The Future (2008 - 2015)

The new receiver will have an Ethernet-interface: all communication between PC and HRPT-equipment will be done via Ethernet, including antenna steering, frequency switching and the transmission of decoded HRPT-frames. Components for building your own receivers are becoming more difficult to source as the home-brew market is small and commercially chip-manufacturers are not interested. Designing a new receiver for each new signal modulation is getting more difficult, so we have decided to embrace all new developments-like Software Defined Radio. We are currently looking into the possibilities.

The reception of the QPSK-signal of the new generation of satellites (Metop and FengYun 3A) is high on our wish list. This is a new area for us and we are looking for other amateurs who have some experience in this kind of projects. For more information contact us through our website.

http://www.kunstmanen.net

GEO Shop

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

The 'Pager-Hardened' R2ZX

APT Weather Satellite Receiver

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

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

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

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

R2FX Accessory Pack

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

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

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

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

Current Price List

	Members Prices UK	EU	RoW	Non Members UK	EU	RoW
APT Equipment						
R2ZX APT Receiver (no PSU)	210.00	214.00	222.00	224.00	228.00	236.00
R2FX APT Receiver (no PSU)	180.00	184.00	192.00	194.00	198.00	206.00
R2FX Accessory Pack	59.00	-	-	69.00	-	-
BNC Lead (0.25 metre)	4.50	5.25	5.75	6.50	7.25	7.75
UK Power Supply Unit (12 volt)	8.50	-	-	11.00	-	-
Dartcom High Quality QFH Antenna	269.00	POA	-	289.00	POA	-
Turnstile APT antenna	43.50	-	-	48.50	-	-
John Silver Preamplifier (built)	35.00	36.00	37.50	40.00	41.00	42.50
Bias Tee	20.00	20.50	21.00	24.00	24.50	25.00
GEO-PIC 1.0	7.00	7.80	8.40	7.00	7.80	8.40
Martelec MSR40 EPROM	10.00	10.75	11.25	10.00	10.75	11.25
EUMETCast Equipment						
DVB-S USB2102 Receiver	59.00	62.00	-	69.00	72.00	-
TechniSat SkyStar 2 PCI Card	59.50	61.00	-	65.50	67.00	-
Telestar 80 cm dish with LNB	67.00	-	-	74.00	-	-
Telestar Ku band universal LNB	11.00	12.50	-	17.50	19.00	-
Technisat Satfinder Alignment Meter	23.50	26.50	-	26.50	29.50	-
Miscellaneous						
GEO Quarterly Back Issues (subject to availability)	3.50	4.20	5.10	n/a	n/a	n/a
GEO Quarterly (PDF issues on CD) Annual compilations 2004-2008 (state years required)	8.00	8.80	9.30	n/a	n/a	n/a
GEO Membership (4 x *GEO Quarterly*)	20.00	24.00	28.00	20.00	24.00	28.00

All prices are in £ sterling and include postage and packaging

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

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

DVB World DVB-S USB2102

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

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

Universal Ku-band Satellite TV LNB 0.20 dB

(or equivalent)

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

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

GEO PIC 1.0 for the RX2

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

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

Ordering and Shipping

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

Orders should be sent to:

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

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

+44 (0) 1202 893 323

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

Not a GEO Member?

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

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

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

TechniSat SatFinder Antenna Alignment Meter

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

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

Telestar 80 cm dish and Universal 0.2 dB LNB

(or equivalent)

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

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

NOAA Satellite Predictions

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

	NOAA 15 137.50 MHz	NOAA 17 137.62 MHz	NOAA 18 137.10 MHz	NOAA 19 137.9125 MHz
Apr 01	04:12 05:51 15:39 17:20	10:26 12:06 20:14 21:55	01:43 03:23 11:36 13:16	02:40 04:21 12:33 14:15
Apr 02	05:27 07:08 15:15 16:55	10:03 11:43 19:51 21:31	01:32 03:13 11:26 13:06	02:30 04:11 12:23 14:04
Apr 03	05:03 06:43 14:52 16:31	09:40 11:20 19:29 21:08	01:21 03:02 11:16 12:55	02:20 04:01 12:13 13:54
Apr 04	04:40 06:19 14:28 16:07	09:17 10:56 19:06 20:44	01:11 02:52 12:45 14:27	02:10 03:51 12:04 13:44
Apr 05	04:16 05:56 15:43 17:24	08:53 10:33 20:21 22:02	01:01 02:41 12:34 14:16	01:59 03:40 11:54 13:34
Apr 06	05:32 07:12 15:19 16:59	10:10 11:50 19:58 21:38	02:31 04:12 12:24 14:05	01:49 03:30 11:44 13:23
Apr 07	05:08 06:48 14:56 16:35	09:47 11:27 19:35 21:15	02:20 04:01 12:13 13:54	01:39 03:20 11:34 13:13
Apr 08	04:44 06:24 14:33 16:11	09:24 11:04 19:13 20:51	02:09 03:50 12:03 13:44	01:29 03:10 13:03 14:46
Apr 09	04:20 06:00 15:47 17:28	09:00 10:40 20:28 22:09	01:59 03:40 11:52 13:33	01:19 03:00 12:53 14:35
Apr 10	05:36 07:16 15:24 17:04	10:17 11:57 20:05 21:45	01:48 03:29 11:42 13:22	02:50 04:31 12:43 14:25
Apr 11	05:12 06:52 15:00 16:39	09:54 11:34 19:42 21:22	01:38 03:19 11:32 13:12	02:40 04:21 12:33 14:15
Apr 12	04:48 06:28 14:37 16:15	09:31 11:11 19:20 20:58	01:27 03:08 11:21 13:01	02:30 04:11 12:23 14:04
Apr 13	04:24 06:04 15:51 17:33	09:07 10:47 20:35 22:16	01:17 02:57 11:11 12:50	02:19 04:01 12:13 13:54
Apr 14	05:40 07:20 15:28 17:08	10:24 12:04 20:12 21:52	01:06 02:47 12:40 14:22	02:09 03:50 12:03 13:44
Apr 15	05:16 06:56 15:04 16:44	10:01 11:41 19:49 21:29	02:36 04:17 12:29 14:11	01:59 03:40 11:54 13:34
Apr 16	04:52 06:32 14:41 16:20	09:38 11:18 19:26 21:05	02:26 04:07 12:19 14:00	01:49 03:30 11:44 13:23
Apr 17	04:28 06:08 15:56 17:37	09:14 10:54 19:04 20:42	02:15 03:56 12:08 13:49	01:39 03:20 11:34 13:13
Apr 18	05:44 07:25 15:32 17:12	08:51 10:31 20:19 22:00	02:04 03:46 11:58 13:39	01:29 03:10 13:03 14:46
Apr 19	05:20 07:01 15:08 16:48	10:08 11:48 19:56 21:36	01:54 03:35 11:48 13:28	01:19 03:00 12:53 14:35
Apr 20	04:57 06:37 14:45 16:24	09:45 11:25 19:33 21:12	01:43 03:24 11:37 13:17	02:50 04:31 12:43 14:25
Apr 21	04:33 06:13 14:22 16:00	09:21 11:01 19:11 20:49	01:33 03:14 11:27 13:07	02:39 04:21 12:33 14:14
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GEO Helplines

Douglas Deans
Dunblane, Perthshire, SCOTLAND
All aspects of weather satellites from APT, HRPT to Meteosat-8 DVB/EUMETCast systems.

- telephone:(01786) 82 28 28
- e-mail: dsdeans@tiscali.co.uk

John Tellick
Surbiton, Surrey, ENGLAND
Meteosat-8 advice - registering for the various MSG services, hardware and software installation and troubleshooting. John will also field general queries about any aspect of receiving weather satellite transmissions.

- telephone: (0208) 390 3315
- e-mail: info@geo-web.org.uk

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

- Tel: (01244) 818252
- e-mail: gw3atz@btopenworld.com

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

- email: mikeg4cfz@mypostoffice.co.uk

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

- gmartin@electroweb.co.uk

Hector Cintron
San Juan, Puerto Rico, USA
Hector is prepared to field enquiries on HRPT, APT, EMWIN and NOAAPORT

- Phone: 787-774-8657
- e-mail: n1tkk@hwic.net

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

Internet News/Discussion Groups

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

APT Decoder
This is a group where users of Patrik Tast's APTDecoder can share information and problems.

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

GEO-Subscribers
This is a group where GEO members can exchange information relating to either GEO itself or Earth observation satellites and related matters.

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

Satsignal
An end-user self help group for users of David Taylor's Satellite Software Tools (SatSignal, WXtrack, GeoSatSignal, HRPT Reader, GroundMap, MSG Data Manager, AVHRR Manager and the ATOVS Reader.

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

MSG-1
A forum dedicated to Meteosat Second Generation (MSG), where members share information about the *EUMETCast* reception hardware and software.

http://tech.groups.yahoo.com/group/MSG-1/

METOP
A forum for users of high-resolution AHRPT data from the MetOp satellite, available via *EUMETCast*.

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

AVHRR
A forum for users who download high-resolution EARS-AVHRR data from the NOAA polar orbiting weather satellites via *EUMETCast*.

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

ATOVS
A Group for discussions about using ATVOS data. Data from the whole world is available from CLASS (www.class.noaa.gov) and for an extended Europe, via *EUMETCast*.

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

Weather Satellite Reports
A group providing reports, updates and news on operational aspects of weather satellites.

http://tech.groups.yahoo.com/group/weather-satellite-reports/

WXtoImg
Users of the WXtoImg software package for capturing and imaging NOAA APT can air their problems, discuss its features and ask questions about it.

http://groups.yahoo.com/group/wxtoimg-l/

Useful Websites

ESA Earth Observation Handbook
This website explores the increasing need for information about our planet and explains the role of Earth observation satellites in achieving this end. The capabilities of satellites in many fields are discussed and a number of illustrated case studies are presented.

http://www.eohandbook.com/

MODIS 'Image of the Day'
MODIS Web maintains a rolling 7-day page featuring high-resolution colour images of noteworthy features acquired by NASA's *Terra* and *Aqua* satellites at

http://modis.gsfc.nasa.gov/gallery/showall.php

NOAA National Weather Service
Current weather conditions prevailing at locations within a country of choice from

http://weather.noaa.gov/international.html

The Copy Deadline for *GEO Quarterly* No 22 is Saturday, May 2, 2009

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

- Technical articles concerning relevant hardware and software
- Construction projects
- Weather satellite images
- Reports on weather phenomena
- Descriptions of readers' satellite imaging stations
- Activities from overseas readers
- Letters to the Editor
- Problems and Queries for our experts to answer

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

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

Images and Diagrams
Images can be accepted in any of the major bitmap formats, e.g. 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, Les Hamilton, 8 Deeside Place, Aberdeen, AB15 7PW, Scotland.

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

geoeditor@geo-web.org.uk

Larger attachments (2 to 10 Mb) are better sent to

editor.geo@googlemail.com

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 before sending it in as this simply creates an editorial log-jam.

Group for Earth Observation

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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

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Signature

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

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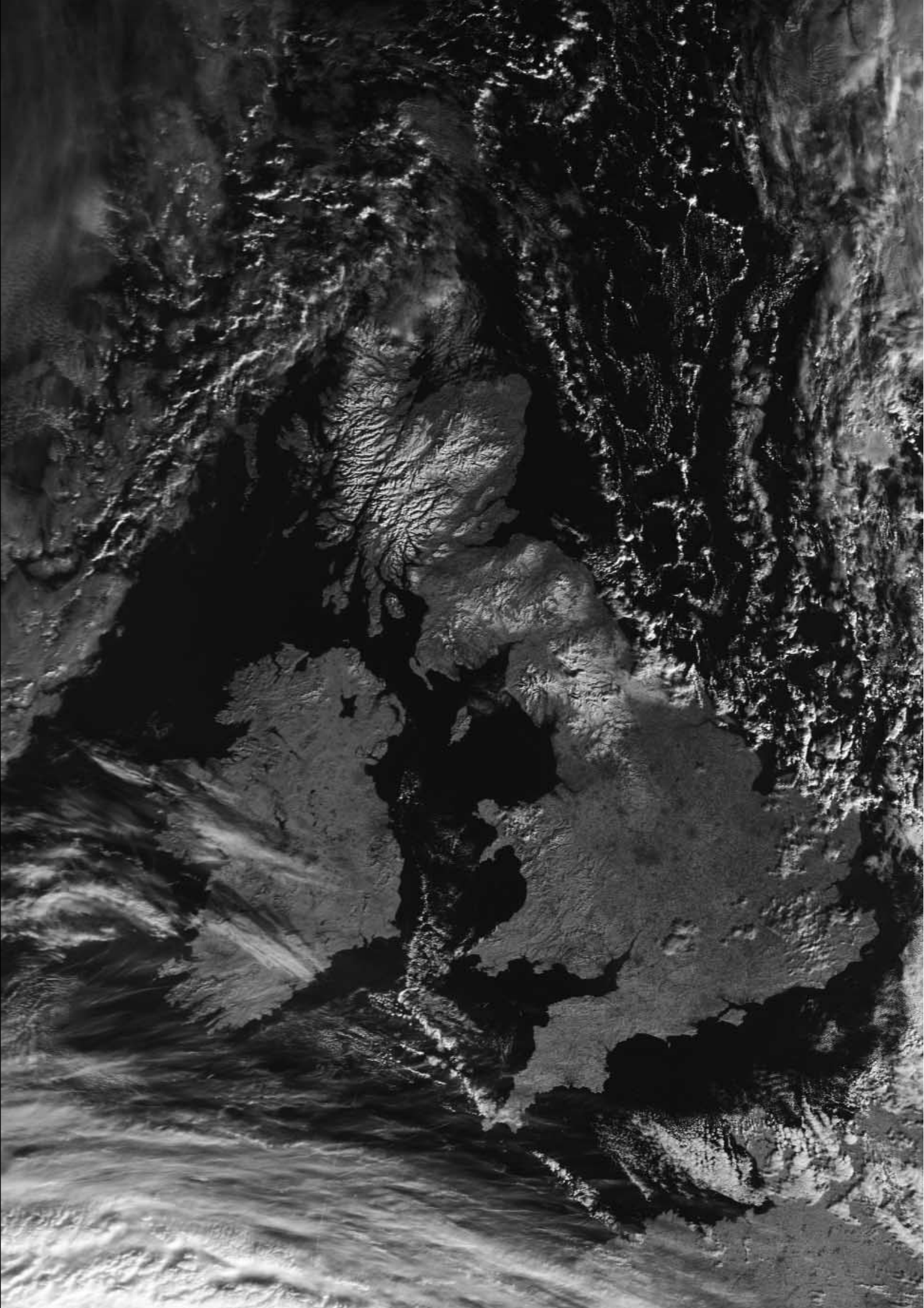


Create an Image of the Antarctic using HRPT Software and Photoshop

Mario Brustia

The magnificent image of the Antarctic that appears on the back cover of this issue was sent to us by Mario Brustia. Obviously, such an image cannot be produced directly by any of the current Earth observation satellites, and we asked Mario to explain how the image was created. You can read how he manipulates Metop-A images received via *EUMETCast* to produce such striking results.

To create an image of the entire Antarctic, it is first of all necessary to capture a complete orbit scan of Metop, without losing any data. I then make use of David Taylor's *HRPT* software and *Photoshop* to obtain a 'photographic' image of the complete South Pole region.

Use of Metop Manager

The following instructions should be followed:

1 Open the *Browser* tab and select *South polar* in the projection drop down menu at lower right (the one which normally shows 'Mercator')

2 Check the *Open in Reader* box

3 Select the day of interest from the calendar (this may be 24 hours of regular orbit spanning two days)

4 Select the *first* orbit from the drop-down menu

5 Select *all* visible chunks by dragging the mouse over the Antarctic, with the Ctrl key pressed (figure 1)

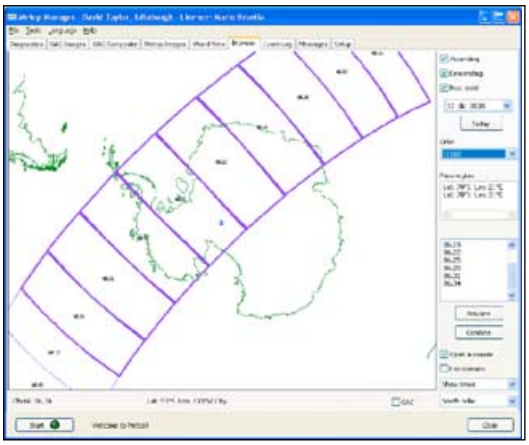


Figure 1 - Selecting chunks

6 Click the *Combine* button to obtain the total scan of the selected obit

7 Press 'OK' to open the combined file in *HRPT Reader*.

You can now close *Metop Manager* and open *HRPT Reader*.

Use of HRPT Reader

1 Open the image in HRPT Reader in the usual manner

2 Disable *all* boundary, grid, text and other overlay features

3 Select the *False colour* tab

4 Go to the *File Menu* and select *Save displayed image*

5 Still in the File Menu, select *Save location data*

Use of GroundMap

Leave *HRPT Reader* now and open the *GroundMap* program

1 In the *Option menu*, select *Output size* as 'Giant', *Location* as 'South Pole' and *Map projection* as 'Azimuthal equidistant'.

2 If you want to add a grid or boundaries over the picture, select these option in the *Setup menu.*

3 In the *Input mapping* drop-down menu, select the top option: 'From .LCN file'.

4 From the *File menu*, select 'Open location data'.

5 Search for the .LCN file (saved previously with *HRPT Reader*), double-click its filename to select it and click the 'OK' button in the following popup window.

Now your selected orbit picture from Metop will be displayed on the *Mapped image* tab (figure 2).

8 Save the obtained image by selecting 'Save image' from the *File* menu.

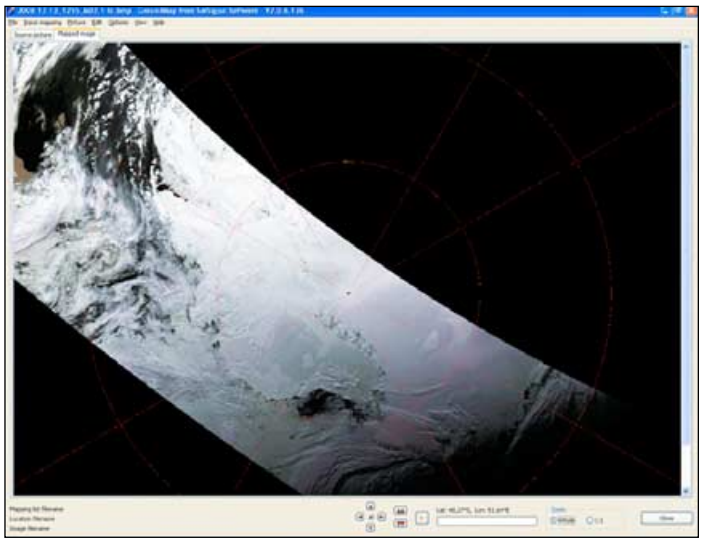


Figure 2 - A Metop image segment in *GroundMap's* Mapped image tab

All these steps must be repeated for every pass over the Antarctic during the selected 24-hour period (14 orbits in my case). So, at the end of the process, I've got 14 pictures derived from 14 orbits over a 24-hour period (although the number can be more or less).

Use of Adobe Photoshop

Now Leave David Taylor's software and open *Adobe Photoshop*. One of the most useful properties of *Photoshop* is this: you can stack multiple images and merge them together. By stacking the 14 image segments of the Antarctic, it is possible to merge them into a single composite image of Antarctica. The process is as follows.

1 Open the first *GroundMap* image, the one from the first orbit of the sequence. This will become the *Photoshop* 'background image'.

2 Next, open the second orbit image as a new picture.

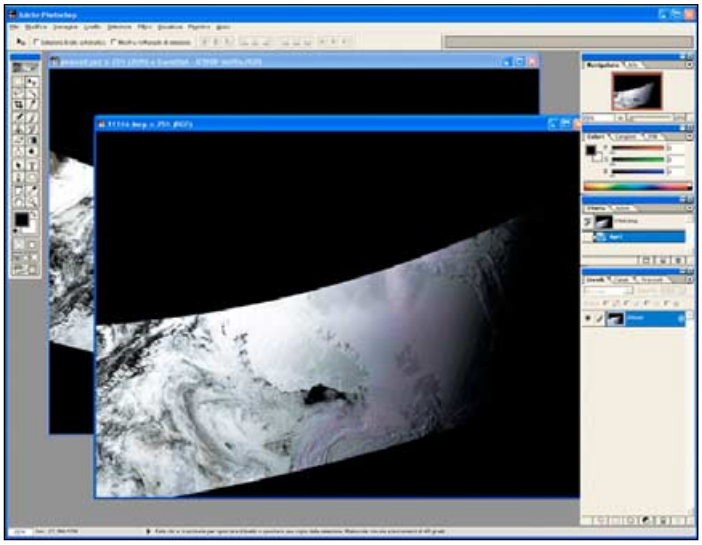


Figure 3 - The 1st image with the 2nd image overlapping it

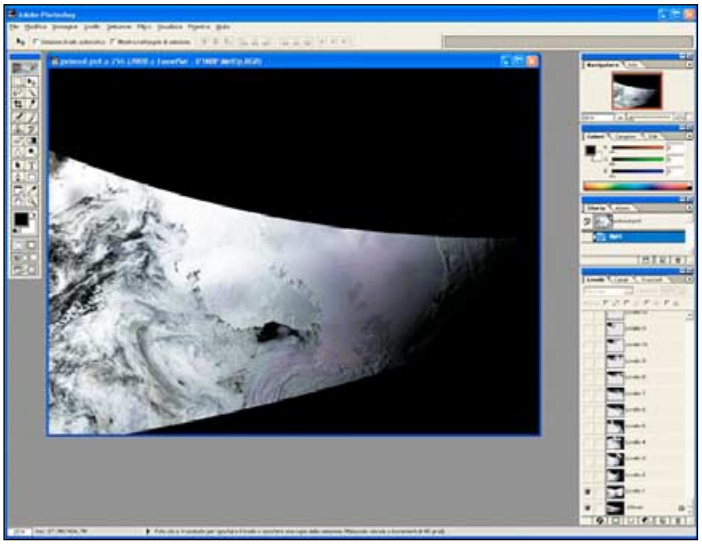


Figure 4 - The first two images successfully merged

This will overlap the background picture, as illustrated in figure 3.

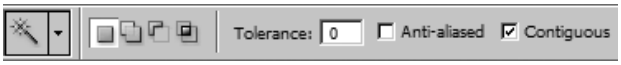
3 From the *Select* menu, click 'All' (or Ctrl-A) to select the whole of this 2nd image, then move to the *Edit* menu and click 'Copy' (or Ctrl-C) to copy it to the clipboard.

4 Next, select the background image (by clicking on its title bar) and paste the 2nd image on top of it by means of 'Paste' from the *Edit* menu (or Ctrl-V).

5. Delete the (now redundant) overlapping 2nd image.

Now you have the background image and the first layer image in place but the black regions of the latter obscure regions of the background. These must now be removed.

6 The background is removed using *Photoshop's Magic Wand* tool (arrowed opposite). But first, select the *Magic Wand* and to set 'Tolerance' to 0 and check the 'Contiguous' option on the panel immediately above the images (illustrated below).



7 Click once on each area of black background and it immediately vanishes, allowing the background image to show through.

8 The image is starting to build up. At this stage, you may wish to make use of the *Lasso Tool* (immediately to the left of the *Magic Wand*) to 'rubber-band' around visible join lines between images, using a 'Feather' setting to smooth them over. A 'Feather' value of 20 is usually adequate, but readers are free to experiment.

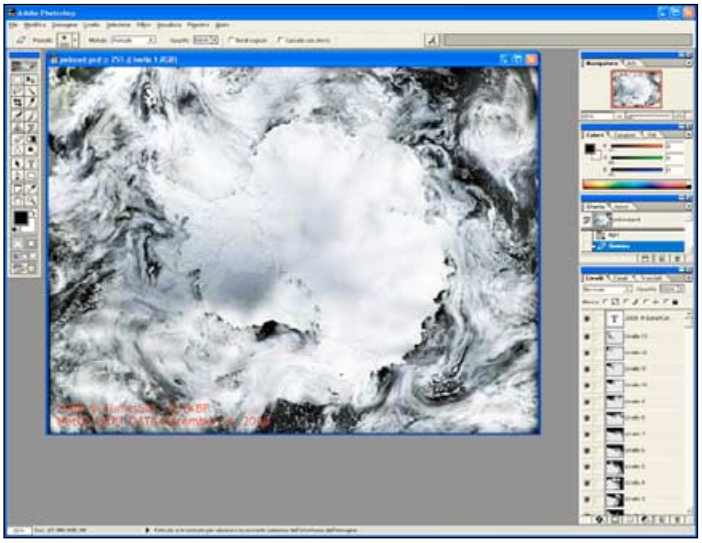


Figure 5 - The final image displayed in *Photoshop*

Figure 4 shows the two images merged together.

Repeat operations 1 to 8 with each of the remaining *GroundMap* images until all have been added to the original background to obtain a complete image of Antarctica like the one shown in figure 5..

Where Celsius and Fahrenheit Meet

Keith Fraser

One of those questions that pops up from time to time on quizzes of various kinds is: 'What is the temperature when a Celsius and a Fahrenheit thermometer give the same reading?' As many readers will know, this is -40°.

But does this ever happen in the real world?

Here it is—in black and white: the January 10 weather report for Yellowknife on Canada's Great Slave Lake.

Current Weather Conditions:
Yellowknife, N. W. T., Canada
(CYZF) 62-28N 114-27W 206M

Conditions at Jan 10, 2009 - 02:00 AM ESTJan 10, 2009 - 01:00 AM
Wind Calm
Visibility 5 mile(s)
Sky conditions clear
Weather Mist
Temperature -41 F (-41 C)
Dew Point -49 F (-45 C)
Relative Humidity 65%
Pressure (altimeter) 30.11 in. Hg (1019 hPa)
Ob CYZF 100700Z 00000KT 5SM BR SKC M41/M45 A3011 RMK SLP238

A Guide to 'Autoget'

A tool to retrieve satellite files and images from the Internet automatically

Dale Hardy

As an Australian member of GEO with an interest in world-wide weather, you can understand that my weather satellite imaging opportunities are somewhat restricted, being out of range of direct *EUMETCast* reception. Nevertheless, thanks to *AutoGet*, an item of utility software from David Taylor, and the repository of images held at the *Dundee Satellite Receiving Station*, I do have access to a wide range of imagery from most of the geostationary weather satellites around the globe. A link for downloading Autoget can be found at

http://www.satsignal.eu/

by following the link to the *GeoSatSignal* page then scrolling down to the *Extra Goodies* section.

Access to all this data comes via the *Dundee* tab in *AutoGet,* as illustrated in figure 1. Just fill in the boxes to select the time slots and channels that you need.

Username and Password

Before you can download satellite images from the *Dundee Satellite Receiving Station,* you must first visit their website at

http://www.sat.dundee.ac.uk

to register for their services, which are free. Click the 'Register for free images' button then enter a username of your choice and your email address in the fields provided. Answer two further questions and click the 'Create account' button. You will shortly be emailed the password required to access the imagery. If you wish, you can then change the password to your own preference.

Editing the Dundee Tab

Enter your <u>username</u> and <u>password</u> in the appropriate fields in figure 1.

Output Path

Browse to the folder where you wish to store the images downloaded from Dundee.

Dates in Folders

Tick this box to place the images in year\month\day folders, such as, for example *C:\Dundee\images\2008\11\12*

Standard Name

Tick this box to give the images a standardised filename (i.e. without the default underscore characters) such as *200811120600_MTSAT1R_1_S1*. Unchecked the file name would have been *2008_11_12_1200_MTSAT1R_1_S1.*

Grid Images

Dundee provides images with and without gridding. Tick this box if you wish to display grid markers on the images.

Size

Different sizes of image are available depending on the detail (and file size) that you require. For example, MTSAT-1R visible images are provided as

Large	2752 x 2784	984 kB
Medium	1376 x 1392	285 kB
Small	688 x 696	85 kB

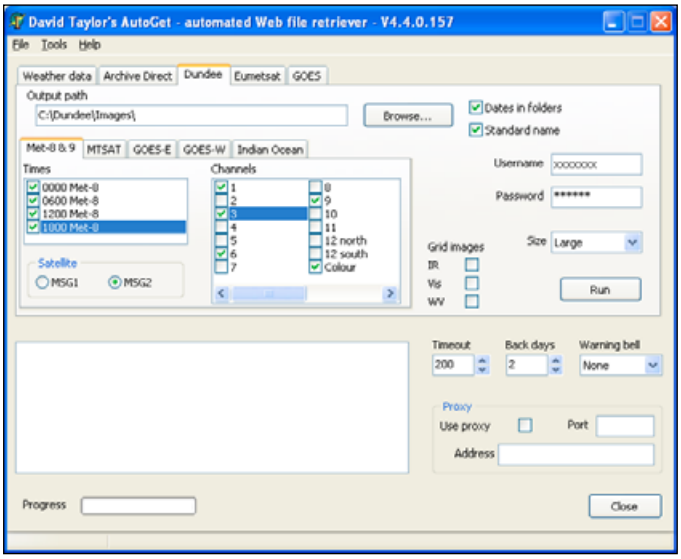


Figure 1 - The 'Dundee' tab showing the Meteosat selection screen

Size and Grid

The *Size* and *Grid* options also determine the filenames of the downloaded images, which becomes vital when processing the them with Geosatsignal. See the article *A Guide To Producing composite 'World' Images using GeoSatSignal* elsewhere in this issue.

<u>No Grid</u>

Large image names end in 'S1' - e.g. MTSAT1R_1_S1

Medium image names in 'S2' - e.g. MTSAT1R_1_S2

Small image names in 'S4' - e.g. MTSAT1R_1_S4

<u>With Grid</u>

All names have the suffix '_grid', e.g. MTSAT1R_1_S1_grid

Times and Channel

Tick the boxes to select the UTC time of the image and the channel(s) required. See the table below for details of the available channels.

Leave other boxes at their default settings. My own preferences are for no grid, dates in folders (organised) and standard filenames.

Obtaining the Images

With all the options set up to your satisfaction, downloading your chosen images could hardly be simpler: just click the *Run* button.

The downloading process can be further streamlined by running *AutoGet* from a **batch file** which automatically downloads images at different times during the day. To do this, run *Notepad* and type in this line

autoget.exe -DUN -close

then, with the 'Save as type' option set to '*All Files*', save it as 'AutoDundee.cmd' into the folder where Autoget resides (usually the *GeoSatSignal* folder). This filename can be any name you choose as long as it has the <u>.cmd</u> extension.

Finally, open Windows *Control Panel* and create a 'scheduled task' with the time slot (s) you want.

A Guide to Producing Composite 'World' Images using *GeoSatSignal*

Dale Hardy

A feature of David Taylor's *GeoSatSignal* program which I find very useful, but which has not been described previously in GEO Quarterly, is the *World View* feature, which collects images from geostationary satellites around the globe to create fascinating visualisations of the weather around our planet. Recent images from the two GOES satellites, Meteosats 7,8 and 9 plus MTSAT-1R are merged into a Mercator map of Earth displaying all the current weather systems. Here's how to set about it.

Configuring GSS7 for World View

First, select **<File → Open world view>** from the *GeoSatSignal* menu.

Figure 1 - The default *World View* screen

Here, you must first define the paths where the relevant satellite images are stored on your hard drive in the five fields at lower left in the window. By default, the path for the first field, GOES-W (GOES-11), is shown as

C:\Meteosat\Dundee\images*WI1_n.jpg

Pay particular attention to the filenames; see the following article, 'A Guide To AutoGet' for more details on filenames.

Although western hemisphere enthusiasts can generate *World View* images from their *EUMETCast* downloads, I do not have this option: I live on the opposite side of the planet—in Australia. My answer to this problem is to retrieve appropriate imagery from Dundee Satellite Receiving Station [1].

I store all my *Dundee* images in the folder

C:\Dundee\images

If you store your images in the same folders as I do then, taking the GOES-W (GOES-11) field as an example, all you need do is copy the following to process images from Dundee: just change the GOES-W entry to

C:\Dundee\images*_GOES11_4_S1.jpeg

Don't worry about the date folders. *Geosatsignal* knows these details and will find the latest images in the folder tree. Edit the other boxes using the details below.

EUMETCAST Derived Images

GOES-W: C:\MSG-2\images\FSD*-g10-ir.jpg
GOES-E: C:\MSG-2\images\FSD*-g12-ir.jpg
Met 8/9: C:\MSG-2\images\HRIT*-msg-ch09.jpg
IODC: C:\MSG-2\images\FSD*-met7-ir.jpg
MTSAT-1R: C:\MSG-2\images\FSD*-g9-ir.jpg

DUNDEE Derived Internet Images

GOES-W: C:\Dundee\images*_GOES11_4_S1.jpeg
GOES-E: C:\Dundee\images*_GOES12_4_S1.jpeg
Met 8/9: C:\Dundee\images*_MSG1_9_S1.jpeg
IODC: C:\Dundee\images*_MET7_2_S1.jpeg
MTSAT-1R:C:\Dundee\images*_MTSAT1R_4_S1.jpeg

Figure 2 - The updated *World View* screen

All the images referred to above are the thermal IR images, so make sure that they exist. These are the filenames needed for the large (S1) best quality images. You could change to visible images by modifying the filenames.

Your screen should now look like figure 2. Do note that I am using Dundee images and that *my* path to these is on drive E:\.

After filling in the boxes, press the *'Refresh'* button to confirm that all paths are correct. If there are missing images, check and correct the paths and press *'Refresh'* again.

By default, the world view is centred on Europe but if you tick the *Pacific* box, maps will be centred on the 180° meridian. You can also select the size of the output image.

Merge Map

If you have a background file called *UserMap.jpg* in your *WXtrack* folder, you can merge it with the *World View* thermal images you create by setting the **<Merge Map>** field to a non-zero value. As before, you will need to press the *'Refresh'* button to see the result of your new setting: the higher the number, the stronger the cloud impression. *GeoSatSignal* will also look for *UserMap.jpg* in its own folder if it does not find the one in WXtrack. You can download a suitable file from the WXtrack Web page, or use a *Blue Marble* image from

http://earthobservatory.nasa.gov/Newsroom/BlueMarble/

to produce an image like figure 3.

Background LUT

SatSignal version 7.0.1.894 or higher is required for this technique, which allows you to use a colour palette with the *World View*. It works with a background image (such as a *Blue Marble* style image with 2:1 aspect ratio such as 5400 x 2700 pixels), together with a 100 × 2 or 361 × 2 palette. As with the other background-mode palettes, the two lines of the palette file are not interpreted as land/sea, but as either

- two lines of the same colour, when the right-hand pixel gives the colour where the background should be, and any other colour means 'use this colour for this temperature', or
- two different lines, when the bottom line is the colour for that temperature of cloud, and the top line gives the transparency of the background (typically the left end, corresponding to the lowest temperature, is 100% transparent, and therefore 255 in the green channel).The standard

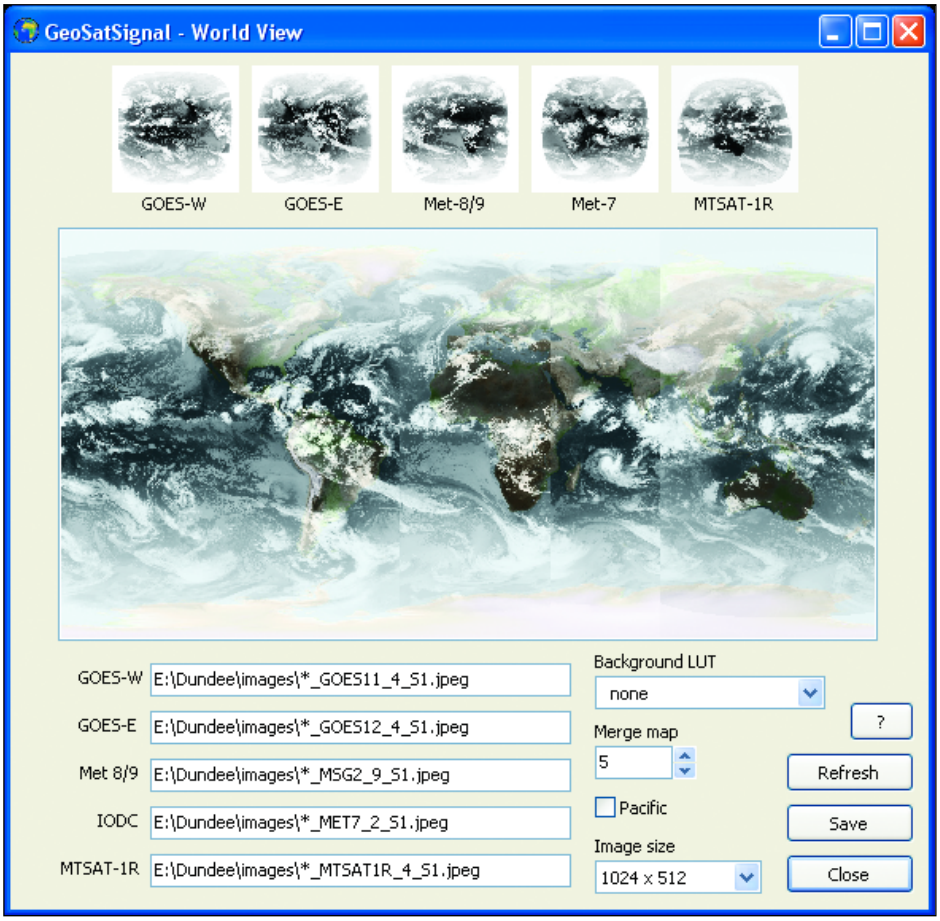


Figure 3 - World View including a merged background image

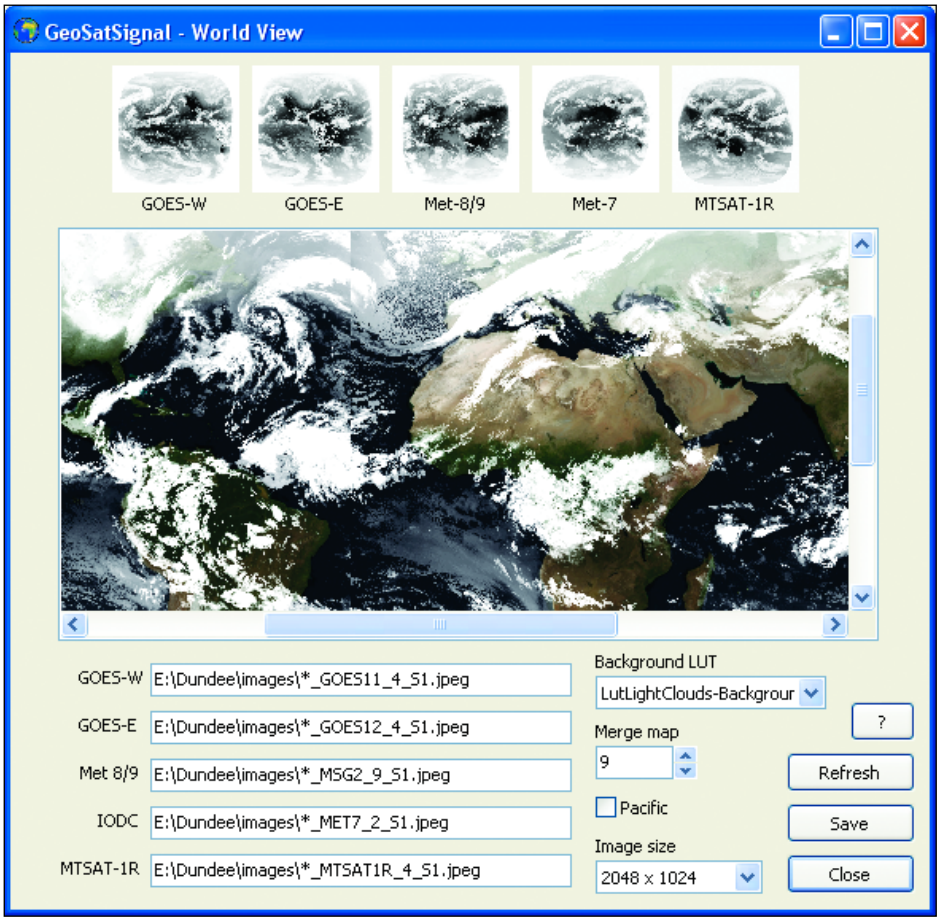


Figure 4 - World View with the *LutLightClouds-Background-2* LUT

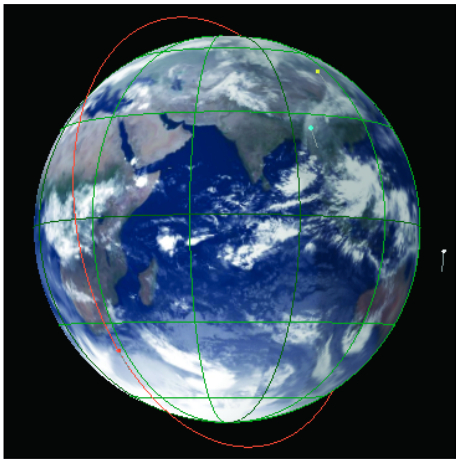


Figure 5 - World View in WXtrackGL

conventions of 100 pixel-wide palettes (0..99) being for temperatures -60C..+39C and 361 pixels-wide palettes (0..360) being for temperatures -120C..+60C apply.

To use the 'Background-mode' and different LUT's, a background image named '*background-world*' must be included the same folder as *geosatsignal.exe*. This must be a 2:1 aspect ratio image measuring 5400 × 2700 pixels. If you don't have such an image, download an 8km/pixel *Blue Marble* image [2]—which are 5400 x 2700—and rename it to '*background-world*'. This image must be a JPEG.

The LUT must measure 100 or 361 pixels wide by 2 pixels high. A suitable LUT is '*LutLightClouds-Background-2*' (figure 4). This and the 'background-world' image may be obtained from

http://www.satsignal.eu/software/GeoSatSignal-UserSubmissions.zip

Experiment with different LUTs, and you can get surprising results. One I like is *LUT361_EUM-IR-cc*, which is included in Ton Lindemann's LUT collection available from

http://www.satsignal.eu/software/TonLindemann-LUTs-ENH2.zip

If you want to try your hand at making your own 100 x 266 LUTs, try *CLUTCreator* [3]. just make sure the name of your LUT starts with LUT e.g. 'LUTsomename'.

Saving World View Images

When you click the **<Save>** button, the default image name is *UserMapGL*. If you have the *WxtrackGL* [4] program installed, you can save the image to the WxtrackGL folder and make some very nice full globe images (figure 5).

Alternately, if you have saved it to your *WXtrack* satellite tracking program folder as *UserMap.jpg*, you can use it as your background image.

Batch Processing

With command line batch files, the process can be automated. The World View is activated with the '-world' parameter. From V6.1.2.822 of GeoSatSignal, the '-world' parameter can accept a list of the files (including wildcards) to be used for the five images. Here is a typical parameter example, a single rather long line.

```
-world:
C:\MSG\images\FSD\*-g10-vis.jpg,
C:\MSG\images\FSD\*-g12-vis.jpg,
C:\MSG\images\HRIT\*-msg-ch02.jpg,
C:\MSG\images\FSD\*-met7-vis.jpg,
C:\MSG\images\FSD\*-g9-vis.jpg
```

Alternatively, to select the latest images, use only the '-world' parameter

```
-world
```

The resulting image will be saved in the folder from where the images were sourced, as '*world.bmp*'.

You can modify the parameter and save as a JPG by amending as

```
-world:somename.jpg
```

or vary the path by

```
-world:C:\Images\somename.jpg
```

Sample Batch Files:

Using DUNDEE images as the source, the following batch file will produce a *World View* visible image.

```
cd C:\Dundee\Images\
CALL "C:\GEOSATSIGNAL\geosatsignal.exe" -world:
C:\Images\Dundee\GOES11-VIS.jpg,
C:\Images\Dundee\GOES12-VIS.jpg,
C:\Images\Dundee\MSG2-VIS.jpg,
C:\Images\Dundee\MET7-VIS.jpg,
C:\Images\Dundee\MTSAT1R-VIS.jpg
```

Everything following the 'CALL' statement is a single line which contains **no** line-breaks and **only** one space character, which immediately follows 'geosatsignal.exe'.

Here are some more simple batch files:

```
CALL C:\GEOSATSIGNAL\geosatsignel.exe -world:
C:\Images\Worldview.jpg

CALL C:\GEOSATSIGNAL\geosatsignel.exe -world:
"Worldview-Today".jpg

CALL C:\GEOSATSIGNAL\geosatsignel.exe -world
```

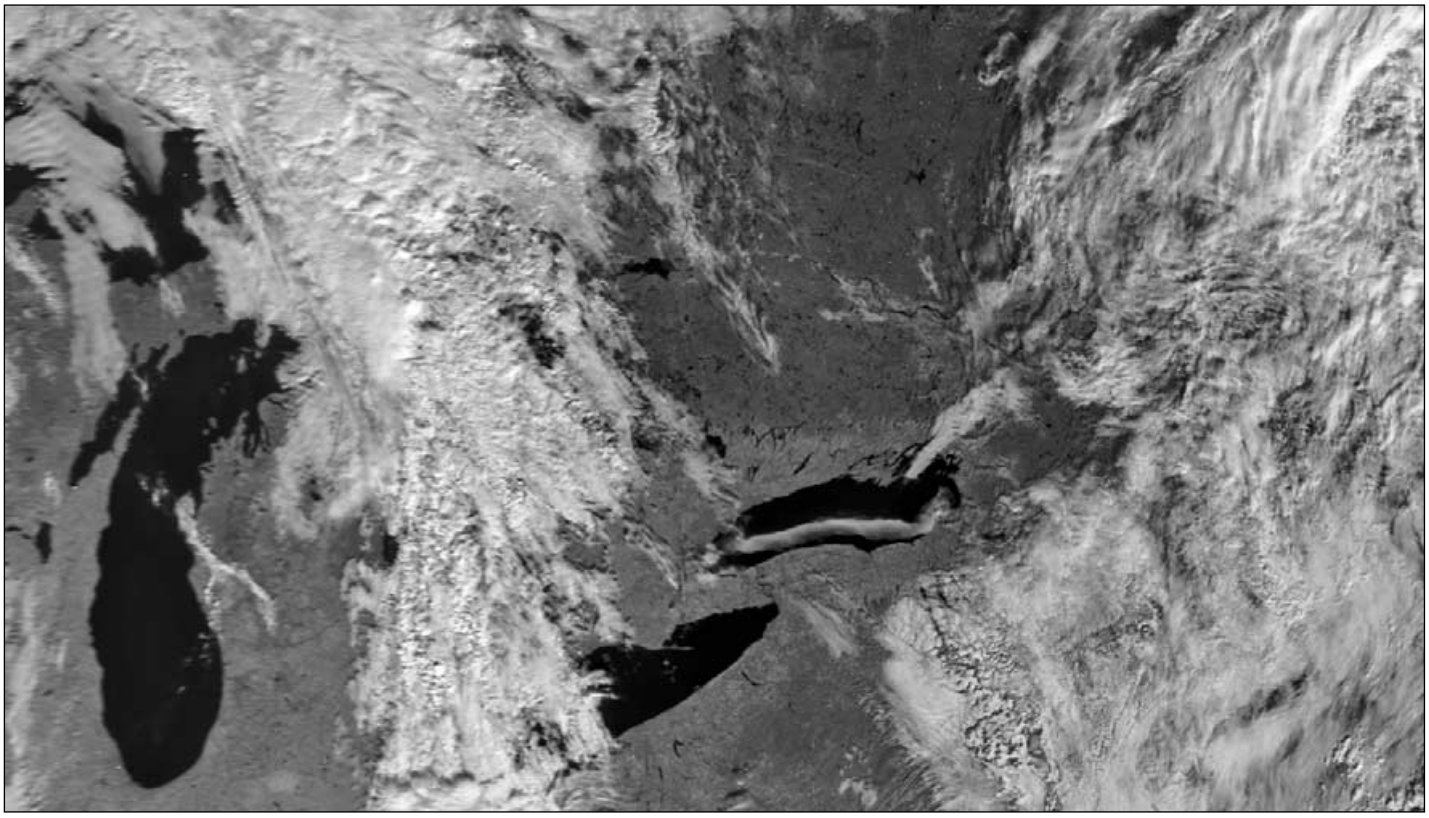
This file will update the background in Wxtrack

```
CALL E:\GEOSATSIGNAL\geosatsignel.exe -world:
C:\Wxtrack\UserMap.jpg
```

References

1 Dundee Satellite Receiving Station
http://www.sat.dundee.ac.uk/
2 Blue Marble
http://earthobservatory.nasa.gov/Features/BlueMarble/
(This is a case Sensitive URL)
3 CLUT Creator
http://myweb.tiscali.co.uk/wxsatellite/clutmaker.htm
4 WXTrackGL
http://www.satsignal.eu/software/wxtrackgl220.zip

Short-Lived Fog over Lake Ontario



Keith Fraser from Buffalo, New York spotted an interesting cloud feature over Lake Ontario, Canada on November 7, 2008. Keith writes: "I spotted a fog bank, about 200 miles long, off the southern shore of Lake Ontario in the 15:05 UT NOAA-17 pass. The lake water and the air temperature were matched at 11°C and a slight east-northeast breeze from the low pressure storm over New York city was squeezing the moist air above the lake against a high pressure ridge over Rochester NY. resulting in this short lived fog."

Image: NOAA CLASS Archive (http://www.class.noaa.gov/)

GEO's Live EUMETCast Display

at the Royal Meteorological Society

John Tellick

You may already have read Robert Moore's note on last January's meeting of the Royal Meteorological Society. As Robert pointed out, GEO showed a high profile at these proceedings with a display of real-time EUMETCast imaging, thanks to John Tellick. It was John who took the initiative to liaise with the RMS, undertaking all the background work, including a preliminary visit to the venue to ascertain the logistics of the exercise. In the event, it turned out to be one of the most complex operations GEO has yet undertaken. John explains below.

We had been alerted that the January meeting of the *Royal Meteorological Society* in London was to be an afternoon of lectures on EUMETSAT's Metop satellite and data. Well! That was just too good an opportunity to miss for demonstrating 'live' Metop imaging and to introduce *Society* members to GEO.

Accordingly, in early December, discussions took place as to the possibility of GEO putting on a live demonstration of *EUMETCast* during the meeting. However, when I stated that I would like to erect a satellite dish, this seemed to ring an alarm bell—or at least a degree of 'fear of the unknown.'

Christmas and New Year intervened and no plans had been emplaced apart from a tacit agreement that a display might be possible. The RMS proceedings were to take place in a lecture theatre at the Blackett Laboratory—part of Imperial College, London. Imperial College shares a large block of land between Cromwell Road and Prince Consort Road, which contains the Natural History, Science and Geological Museums with the Royal Albert Hall and Albert Memorial just to the north on Kensington Gore. The museums and college buildings are tall and quite densely packed so the possibility of erecting a dish to feed live signals into the lecture area was a big unknown. Living in London and having filmed several times at the College, I was familiar with the area but not the location and aspect of the Blackett building. What was required was a full-scale reconnaissance of the building.

Further discussions with both the RMS and Imperial College continued during early January as to whether it would be possible to install a dish, either on the ground somewhere or at an open window. I went to meet the building manager on January 13 and both these hopes were soon dashed owing to the layout and height of the adjacent buildings. It initially looked as though we would only be able to demonstrate stored images, a poor substitute.

The dish on the patio with the Royal Albert Hall visible in the background

There was, however, a large area adjacent to the lecture theatre entrance where we could certainly set up a GEO display. It was then, as I was bemoaning how disappointed I was at the prospect of being unable to demonstrate live imaging, that the building manger had a most helpful bright idea. There was a large patio area, 'way up on the roof of the block, off the students' common room which, might provide a possible location.

On visiting this area we found clear views from the south right round to northeast, in a westward arc, although a taller building just east of south might possibly be blocking the satellite location. Nevertheless. a compass reading looked promising, so it was well worth a try. A worry, though, was the high exposure of the area should the day prove windy.

When we got back to the ground floor, the height of the patio became obvious and the length of down-lead required suddenly became a worry. As the display area had no windows that opened, the down-lead would have to drop from the 8th level down to the ground floor and then back up to the 3rd level. Fortunately, Francis Bell had two long lengths of cable—but were they long enough? We would only know that when we arrived to set up on the day. But it was agreed by all that we could give it a try.

The weather on the day of the meeting couldn't have been better; it was clear, calm and sunny, though rather chilly. Not realising that the RMS were putting on a static display themselves, and having arrived before them, I had rather 'taken over' the area; but a bit of table moving accommodated us both.

At noon, when I ascended to the level 8 patio, came the moment of truth. The sun was already clear of the adjacent tall building to the east of south so the 9°E slot looked good. Setting up the 60 cm dish using my new digital meter was a dream—I set the meter to EUROBIRD-9, swung the dish and up came the bleeps indicating the signal. Peaking for maximum strength and signal quality was a breeze thanks to the comprehensive set of signal read-out parameters available.

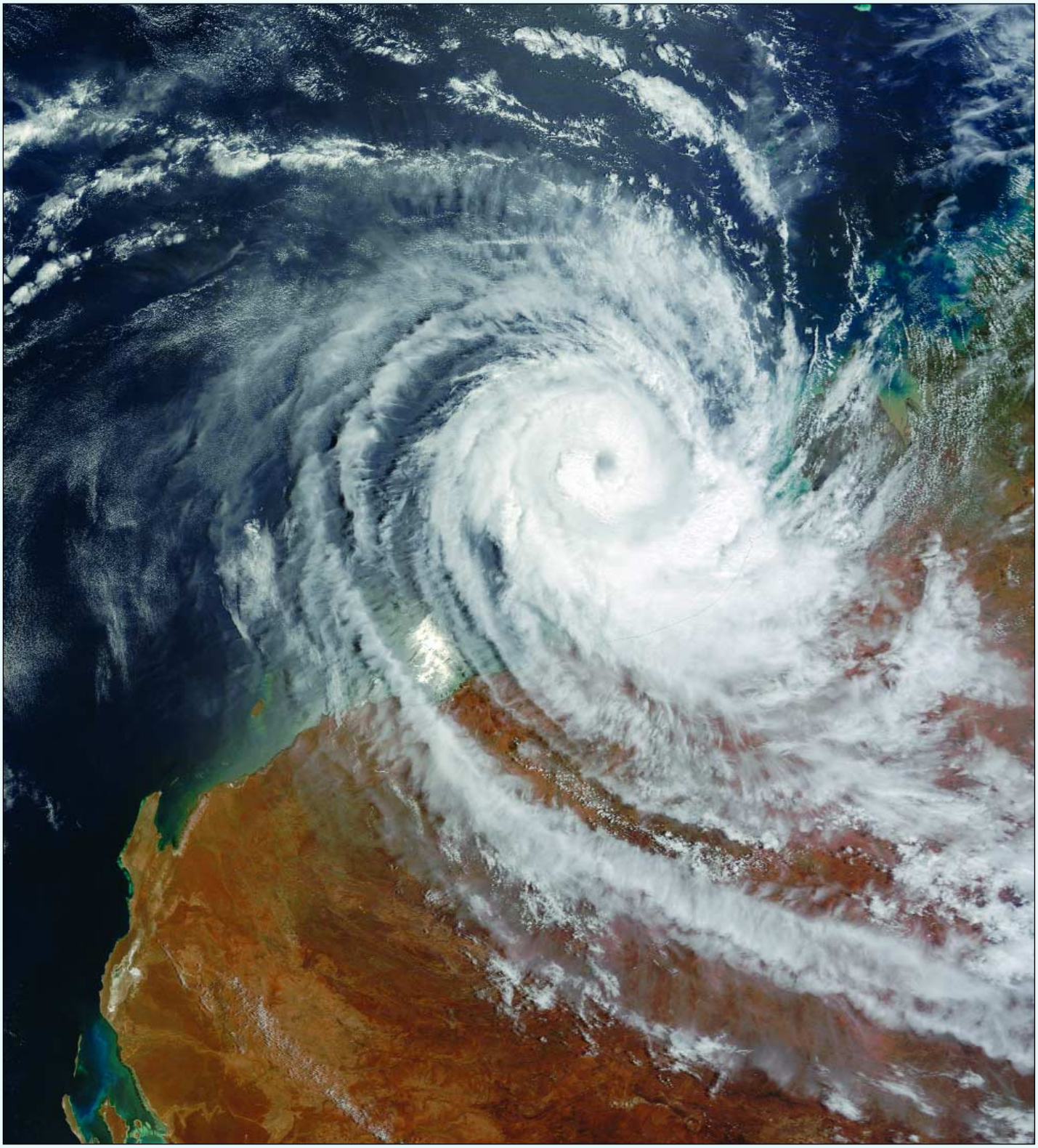
The downlead had to be routed safely through the public area and was then connected to the longer of Francis' two 'long' cable extensions. I fed it slowly over the parapet and down the building—but owing to the design of the parapet I couldn't hang over to see how it was going.

Having got to the end of the cable length connected to the dish I wend down to the ground floor; and what a relief to see several coils of free cable on the ground, available for the re-routing up to the display area. This done it was just a matter of firing up the computer and the *DVBWorld* USB box and in came live *EUMETCast* images, with good signal strength considering the cable run. Success!

Tropical Cyclone Billy

hits northwest Australia

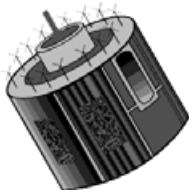
A NASA Earth Observatory Report



This MODIS image from NASA's Terra satellite, acquired on Christmas Eve, 2008, shows Tropical Cyclone Billy during its travels westward along the coast of Western Australia. Although the eye of the storm is over the ocean in this image, clouds linger over the coastline and are especially thick immediately southeast of the storm's eye. A tendril of clouds extends from the western margin of the storm toward the southeast in an arc that stretches hundreds of kilometers inland. Most of Australia's oil and gas are produced off the country's northwest coast and Billy's presence halted work at several of these installations for a number of days.

NASA image by Jeff Schmaltz, MODIS Rapid Response Team, Goddard Space Flight Center. Caption by Michon Scott

Extending EUMETCast Monitoring



David Taylor

I have recently extended the automated monitoring of *EUMETCast* that I first described in *GEO Quarterly* No 8 (December 2005) to include monitoring of the FSY file size, the *TelliCast* missed packets, and the signal strength and quality reports from the new *Dexatek* and *DVBWorld* boxes described in *GEO Quarterly* No 17 (March 2008). Such monitoring is very useful, as it allows you to see the longer-term performance of your system—the effect of tree growth or other obstructions in the summer—as well as seeing the effects of rain, snow or ice crystals on the current signal strength, and the effects of driver or other software changes. A number of GEO members across Europe contribute to a Europe-wide monitoring page on which the effects of any outage at the uplink station at Usingen near Frankfurt can be obvious by the common shape of the graphs. For the current data, please refer to

http://www.satsignal.eu/mrtg/EumetcastEurope.html

But first, I would like to update you on the latest *SkyStar* monitoring software

SkyStar 2 PCI Card Monitoring Updates

Monitoring the *SkyStar-2* PCI card relies on calling a program—*b2status.exe*—from a *Perl* script and interpreting the results. This program worked correctly with the *SkyStar* drivers version 4.3.0 which were then current. However, since then *TechniSat* have released updated drivers, and I know that versions 4.4.1 and 4.5.0 are now in use. I have also heard of version 4.4.3 but I haven't happened to use that version myself. The problem which arises is that the earlier *b2status.exe* program won't work with these later drivers. Fortunately, a later version of *b2status.exe* is available, which does work with the later drivers. You can download both versions of the status program from my website at

http://www.satsignal.eu/software/B2status.zip

One small issue which remains is that with the v 4.5.0 drivers, I sometimes see the *SNR* and *Quality* levels reported as zero: perhaps the *b2status.exe* program fails or there is something wrong with the *Perl* code. I would welcome any suggestions! You can see the result here

http://www.satsignal.eu/mrtg/Eumetcast.html

where there are occasional dips in the level reported by my backup PC, 'Stamsund', which are not seen on the other PCs. Figure 1 shows a sample I collected earlier, where all but one dropout was caused by this v 4.5.0 driver issue.

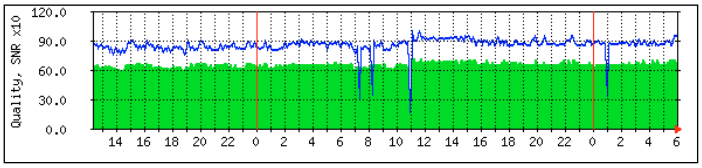


Figure 1 - 'Stamsund', with SkyStar 2.6D PCI card and v 4.5.0 drivers
Signal Quality % / SNR dB x 10 /

FSY Filesize Monitoring

Fred van den Bosch has already provided code which allows the monitoring of the FSY file size. However, I wanted to avoid the repetition of the code for the two FSY files some people have and allow its easy extension for any number of FSY files. I ended up writing the following small *Perl* subroutine which could be called with the filename, returning zero if the file did not exist, otherwise the file size. The idea for this code has been taken from Fred's original submission.

```
sub fsysize
# procedure to extract file size, if the file exists
{
    $dev = stat ($_[0]);
    if ($dev > 0) {
    stat ($_[0])->size;
    }
```

This allows you to total up the size of the FSY files with one *Perl* statement, specifying the name of the two FSY files for two calls to the routine

```
$total = &fsysize ("0.fsy") + &fsysize ("1.fsy");
```

I wanted to make the *Perl* script versatile, so I allowed it to take the location of the FSY files as a parameter; the second line of the script changes the current disk and directory to the location specified by the command-line argument. Thus the entire *Perl* script to get the FSY file sizes and return the four lines of output required by the *MRTG* monitoring program is

```
use File::stat;
chdir ($ARGV[0]);
sub fsysize
# procedure to extract file size, if the file exists
{
    $dev = stat ($_[0]);
    if ($dev > 0) {
    stat ($_[0])->size;
    }
}
$total = &fsysize ("0.fsy") + &fsysize ("1.fsy");
print "0\n";
print "$total\n";
print "0\n";
print "0\n";
```

Test the script by running it from the command line

```
perl FSYsize.pl Z:/receiving
```

and ensure that you obtain four numbers, three of them zero, on successive lines.

To use this script with MRTG monitoring running on your local PC would require adding lines like those shown below to your *MRTG.cfg* file.

```
#————————————————————————————————————————————————
#  PC Gemini - FSY File Size
#————————————————————————————————————————————————
Target[Gemini-fsy]: `perl FSYsize.pl Z:/receiving`
MaxBytes[Gemini-fsy]: 4000000000
Options[Gemini-fsy]: integer, gauge, nopercent, growright, unknaszero, noi
YLegend[Gemini-fsy]: FSY size
ShortLegend[Gemini-fsy]: B
LegendO[Gemini-fsy]: Size   
Title[Gemini-fsy]: Gemini FSY file total size
```

```
PageTop[Gemini-fsy]: <H2>PC Gemini - FSY Files Total Size</H2>
#————————————————————————————————————————————————————————
```

Figure 2 shows sample plots from three PCs, illustrating what happened to the FSY size during the first major snow of the winter in Edinburgh. With a very high packet loss rate, caused by snow almost blocking the signal to the LNB, there was a dramatic increase in the FSY file on two of the monitored PCs. Strangely, the third PC didn't show such an increase, despite not being near its limiting value (set by the RAMdisk size).

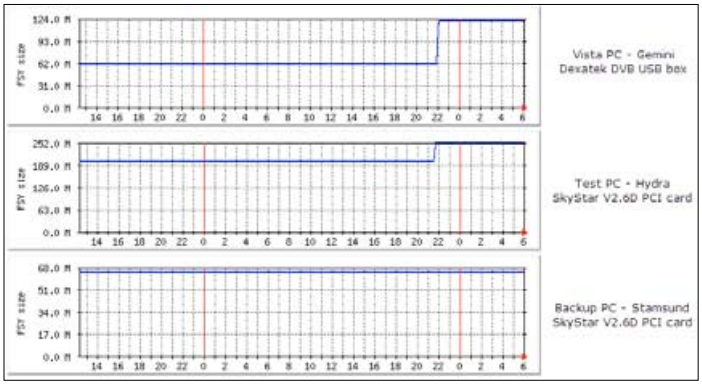


Figure 2 - FSY sample plots showing signal attenuation by snow

TelliCast Monitoring: Missed and Recovered Packets

There are a number of measures in the *EUMETCast* system designed to protect against missing data. The DVB (Digital Video Broadcasting) system itself includes FEC (Forward Error Correction), where redundant data bits are sent to allow recovery of missing data. Hence, even though the decoded satellite stream may have a finite bit error rate, the stream delivered following FEC has a much reduced bit error rate. However, rather as computer data CDs have stronger protection against data errors than audio CDs, so the *TelliCast* system adds protection over and above the FEC of the DVB system alone. You can monitor how well this performs by using the *HTML Shell* option of the *TelliCast* software (right-click the pink 'T' icon) and selecting the *Statistics* screen. The 'Missed Packets' figure is a guide to the quality of the signal after FEC, and 'Recovered Packets' provides a guide to how well the *TelliCast* software can recover from those errors. Ideally, you want either zero missed packets, or the same number of recovered as missed packets: i.e. a 100% recovery of the data (figure 3).

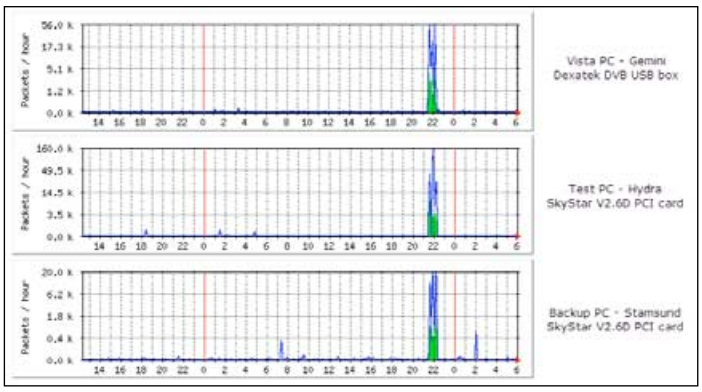


Figure 3 - Missed Packets on three PCs

On the *SkyStar* systems, you may have zero missed packets if using a relatively powerful PC as a receive-only system but perhaps a hundred missed packets a day on a PC which is both receiving and processing data. A poorly configured PC with a substandard firewall and anti-virus software, or one undergoing too much interactive use, might result in as many as a thousand missed packets per day! The *Dexatek* (and presumably *DVBWorld*) systems behave slightly differently, at least as observed in Edinburgh. On these systems, the missed packet rate is typically non-zero, but the number of recovered packets is the same as the number of missed packets: so the *TelliCast* software is able to completely recover whatever had been 'lost'. Of course, with a really poor signal, a 100% recovery is not achieved. Quite why this happens I do not know.

You can see in figure 3 the effect of layers of snow on the LNB: the missed packet rate dramatically increased for about 30 minutes around 22:00 hours and, although some packets were recovered, many were lost—hence I had missing segments in my Meteosat images.

To monitor the *TelliCast* statistics, I wrote a small program called *TelliCastStats.exe* which reads the data from the *Statistics* screen (there is no need to have a Web browser running) and outputs the recovered and missed packets as numbers on four lines, as required by *MRTG*. Slightly different code is required for the *TelliCast 2.4.4 B* and the later 2.4.4a clients, but the program handles these differences automatically. The recovered/missed packet count order causes the missed packets to be shown as a blue line, and the recovered packets as a shaded area in *MRTG* (figure 3). As the program is network-capable, you can monitor the statistics on any remote PC to which you have access, simply by putting the TCP/IP name of that PC on the command-line. So a typical configuration line for MRTG would be

```
Target[Tellicast-Feenix]: `TelliCastStats feenix`
```

You can download the program from my Web site

http://www.satsignal.eu/software/TelliCastStats.zip

Note the 'back' quotation marks around the command—the grave accent on the top left key (above the TAB key) of the keyboard. Here are the full set of *MRTG* commands I use

```
#————————————————————————————————————————————————————————
#  TelliCast statistics - Feenix
#————————————————————————————————————————————————————————
Target[Tellicast-Feenix]: `TelliCastStats feenix`
MaxBytes[Tellicast-Feenix]: 1000000
Options[Tellicast-Feenix]: unknaszero, growright, logscale, nopercent,
   withzeroes, perhour
YLegend[Tellicast-Feenix]: Packets / hour
ShortLegend[Tellicast-Feenix]: packets / hour
LegendI[Tellicast-Feenix]: Recovered packets
LegendO[Tellicast-Feenix]: Missed packets
Title[Tellicast-Feenix]: TelliCast Statistics - on main PC Feenix
Legend1[Tellicast-Feenix]: Recovered Data Packets
Legend2[Tellicast-Feenix]: Missed Data Packets before FEC
PageTop[Tellicast-Feenix]: <H1>TelliCast Statistics - on main PC
   Feenix</H1>
#————————————————————————————————————————————————————————
```

Note: The two indented lines in the above listing are extensions of preceding lines that have suffered 'word-wrap'.

Dexatek USB Box Monitoring

With the move to USB boxes for *EUMETCast* reception (*GEO Quarterly* No 17, page 25, March 2008), the facility to monitor the *SNR* and *Quality* variables was lost as a program like *b2status.exe* was not available.

However, I have managed to write a small and simple program which extracts the *Quality* and *Strength* status from a running *Dexatek* or *DVBWorld* system and output the four numbers required by *MRTG*. So you can, once again, monitor your system and contribute data to the European pool. The program is named *DVBreport.exe*, and is included

in the download already mentioned from

http://www.satsignal.eu/software/B2status.zip

This program replaces the earlier *Perl* scripts for extracting the numbers from *b2status.exe*. To test the program, run it from the command-line and check that it returns four numbers, the first of which is the *Quality* and the second the *Strength*.

Please note that there is some variation with both the hardware and the drivers as to exactly which 'quality' is reported for a particular signal. Having some background in digital signals, I tend to think of eye-height as being a good measure of quality, but just *what* is measured by these consumer-quality boxes I would love to be told! It gets worse with *Strength*. The *SkyStar* systems report SNR (signal-to-noise-ratio), which is quite meaningful, although it is bandwidth dependent. The 'strength' value which *SkyStar* systems report seems to be very vaguely related to the RF level present, but not in any linear way. In addition, for most satellite TV systems, the SNR is determined at the head-end—the low-noise-block or LNB—and not by the signal level at the receiver (which is more akin to the first IF stages, and not to a receiver as such). The *Dexatek* and *DVBWorld* software reports strength as a percentage, but it seems to correlate well with the SNR reported by the *SkyStar* software. Of course, SNR is measured in dB, and not as a percentage! Perhaps it's ten times the SNR.

Explanations welcome—if you know, please write in!

To use this program in a *DVBWorld* or *Dexatek* system, you could use the following lines in the MRTG configuration file.

```
#-----------------------------------------------------------
# PC Gemini - EUMETCast quality and SNR
#-----------------------------------------------------------
Target[Gemini_DVB_Qual]: `DVBreport.exe`
MaxBytes[Gemini_DVB_Qual]: 120
MaxBytes2[Gemini_DVB_Qual]: 120
Unscaled[Gemini_DVB_Qual]: dwmy
Title[Gemini_DVB_Qual]: Dexatek DVB USB box on PC Gemini,
   Edinburgh
Options[Gemini_DVB_Qual]: integer, gauge, nopercent, growright,
   unknaszero
YLegend[Gemini_DVB_Qual]: Qual, Strength
ShortLegend[Gemini_DVB_Qual]: %
LegendI[Gemini_DVB_Qual]: Quality: 
LegendO[Gemini_DVB_Qual]: Strength: 
Legend1[Gemini_DVB_Qual]: Signal Quality (0..120%)
Legend2[Gemini_DVB_Qual]: Signal Strength (0..120%)
PageTop[Gemini_DVB_Qual]: <H1>DVB USB box Quality & Strength
   on Gemini</H1>
#-----------------------------------------------------------
```

Note: Once more, indented text show where lines have been affected by 'word-wrap'.

Comparing the Results

It's interesting to compare the results from the different DVB devices and their monitoring software. Figure 4 shows three plots from different systems. The first two plots are using the same hardware—the *SkyStar-2* PCI card—installed in two different PCs. The results from the v 4.5.0 drivers show rather more quantisation of the values, to my eye, than do the results from the v 4.4.1 drivers, although all the values are similar to within the tolerance you might expect from domestic TV equipment. The *Dexatek* unit shows a consistently higher quality level (if it's really reporting the same measurement) but the values here are also quantised. This is also what you observe when using the *Dexatek* values to align an antenna: both the *Strength* and *Quality* values vary in steps of three. The dip at the right-hand side of the graphs was caused by the first major snow in

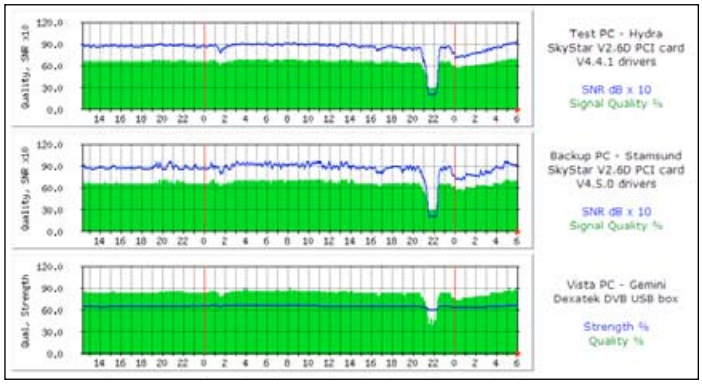


Figure 4 - Missed Packets

Edinburgh, on December 2nd, probably caused by the snow accumulating on the LNB. I didn't venture outside to check! It's fascinating to look at the gradual recovery after midnight, where the almost step-less recovery of the v 4.4.1 drivers compares with the steps in the v 4.5.0 drivers (And not quite flat steps. Why? An older version of MRTG) and the steps-of-three values from the *Dexatek* drivers. In reality, all the systems would have been experiencing a smoothly recovering signal as the snow cleared from the LNBs, and perhaps the dish surfaces as well.

Making MRTG Easier: Using 'Include' Files

One hint I would like to add is about using 'include' files in your MRTG configuration. Although I have now moved each PC's MRTG monitoring on to the local PC, one of the advantages of MRTG is that, for network monitoring at least, you can place all the MRTG work on to a single PC and access the other PCs across the network. This can make for a long and unwieldy configuration file, so you may like to consider putting the configuration for each monitored network node into a single file (named 'PC-1.inc' for example); and then including in your main configuration file just the common information about where the log files and output files are located, etc. For example, your main configuration file could be as simple as the script shown at right.

```
LogDir: C:/mrtg/logs/
HtmlDir: C:/WebServer/mrtg
ImageDir: C:/WebServer/mrtg

RunAsDaemon: Yes
Interval: 5

# Default values

XSize[_]: 500
Timezone[_]: GMT
Include: PC-1.inc
Include: PC-2.inc
Include: PC-3.inc
```

where PC-1, PC2 and PC-3 refer to the PCs you are monitoring. Although this doesn't help with single-PC monitoring, it means that, if you have a number of PCs, you can see more clearly what is being monitored on each. Just a suggestion: you can use or ignore as you wish.

As you will see from my website, there are lots of things you can monitor with MRTG, not just network data flows. I've added CPU-load and memory-usage as features that I monitor on a regular basis. It's fascinating to see how differently *Vista* and *XP* use memory, for example. But that's for another day. I do hope that you have enjoyed seeing how you can extend the monitoring of your *EUMETCast* system using a few simple programs.

Further Information

For more information, please refer to this web page, where all the *Perl* examples shown above can be accessed by cut-and-paste

http://www.satsignal.eu/mrtg/Eumetcast.html#HowTo

and to David Taylor's *SatSignal Software* website

http://www.satsignal.eu

Multitemporal ASAR Imagery from ENVISAT

Les Hamilton

The eye-catching false coloured image on the opposite page, which depicts parts of the far northern coastlines of Ellesmere Island and Greenland, is a radar image acquired by the ASAR (Advanced Synthetic Aperture Radar) instrument aboard ESA's *Envisat*. ASAR imaging differs from conventional satellite imaging in that the radiation source—microwaves—is aboard the satellite itself. Microwaves are directed down towards the Earth where they suffer reflection. If the surface receiving the microwaves is completely smooth, all the radiation is reflected away from the satellite (figure 1); no radiation returns to it and no information about the surface is recovered. On the other hand, where the surface is rough, the microwaves experience scattering (figure 2) and a proportion of the microwave beam is returned towards the satellite (backscattered). The rougher the surface, the greater the degree of backscatter, allowing the creation of images of the terrain below.

Articles describing radar imaging in much greater detail have appeared in earlier issues of GEO Quarterly, but the accompanying images were always depicted in monochrome [1,2]. The purpose of this article is to explain some of the methods that can be used to incorporate meaningful colour into radar images.

As long-time enthusiasts of satellite imaging know well, the actual data returned by almost all Earth observation satellites consists exclusively of greyscale images. This applies equally to both the low-resolution APT images and HRPT images from NOAA-18 and Metop to the high-resolution images returned by the MODIS instruments aboard the NASA satellites *Terra* and *Aqua*. The coloured representations of our planet that we create ourselves or view on the Internet rely on the fact that these satellites image at a number of frequencies, each with different reflective characteristics. By assigning data derived from particular frequencies to the primary colours red, green and blue, it is often possible to produce a false-colour composite image exhibiting colouration that the human eye accepts as being close to reality.

Since the microwave frequencies of radar belong to the same electromagnetic spectrum as the visible and infrared ones used to produce coloured weather satellite images, there is—in theory at least—no reason why the same technique cannot be applied to microwave imagery. Indeed, since microwaves are relatively unhindered by cloud cover, such a possibility has its attractions: unhindered coloured imagery 24 hours per day!

The Trouble with Microwaves

Alas, the reality is not so simple. In the first instance, microwave radiation is not spontaneously emitted from the Earth; neither is our planet bathed in significant microwave energy from the sun. This means that imaging the surface of the Earth from orbit, at microwave frequencies, requires the satellite itself to carry a high-energy microwave source. The high energy is required to create a beam of microwaves sufficiently powerful to travel several hundreds of kilometres to the land surface below and then reflect back at sufficient intensity to provide measurable data. This proviso means

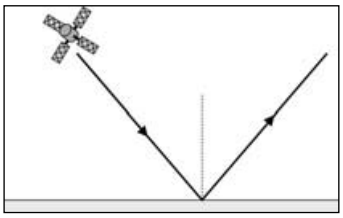


Figure 1
Radiation reflecting from a smooth surface

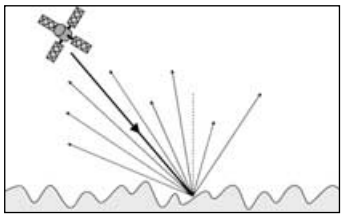


Figure 2
Radiation reflecting from a rough surface

that, as a rule, a satellite will be able to support only a single microwave frequency, with the promise of greyscale radar images at best.

Creating Coloured Radar Images

It might at first glance seem that the creation of false-colour radar (i.e. microwave) images would be out of reach. The very minimum requirement is two greyscale images of the same scene, exhibiting different radiance properties. Although this cannot be realised through the use of different microwave frequencies, the objective *can* be attained by imaging the same region under different circumstances.

The basic concept is that images are acquired at different times, when the microwave scattering characteristics of the underlying terrain itself differ, for one reason or another. This technique is termed *multitemporal* imaging: literally, imaging at a number of different dates.

Some of the situations that can be used advantageously to create multitemporal colour composite images are

- Acquiring images of the same terrain taken at **different seasons** of the year. These will scatter microwaves differently because of land preparation, the progressive growth of crops and their subsequent harvesting, and can be combined to produce colour composites of particular value in studies related to agriculture
- The angle of the radar beam with the ground plays a significant role in the manner in which scattering takes place. Images of a region can be acquired, on different orbits, when the radar beam is slanted at **different incident angles** to the terrain. As the beam becomes more oblique, backscatter characteristics change, again facilitating the introduction of artificial colour.
- A particular example—often widespread—where the terrain becomes highly modified by a natural event, is **flooding**. Formerly rough terrain, which scatters microwave energy back to a satellite efficiently, can suddenly become a very much poorer reflector in the wake of heavy inundation: rivers that burst their banks to leave vast regions of ponded water and temporary marshland; high tides or storm surges that swamp coastlines; spring thaws that release more meltwater than rivers can cope with. Such events can again be followed using radar. Images of saturated or inundated ground can be combined with earlier images taken prior to the flooding episode, when the terrain was dry.
- Semi-permanent **ice** and snow cover also markedly alter the ability of terrain to scatter microwaves, as exemplified by figure 3 on page 37.

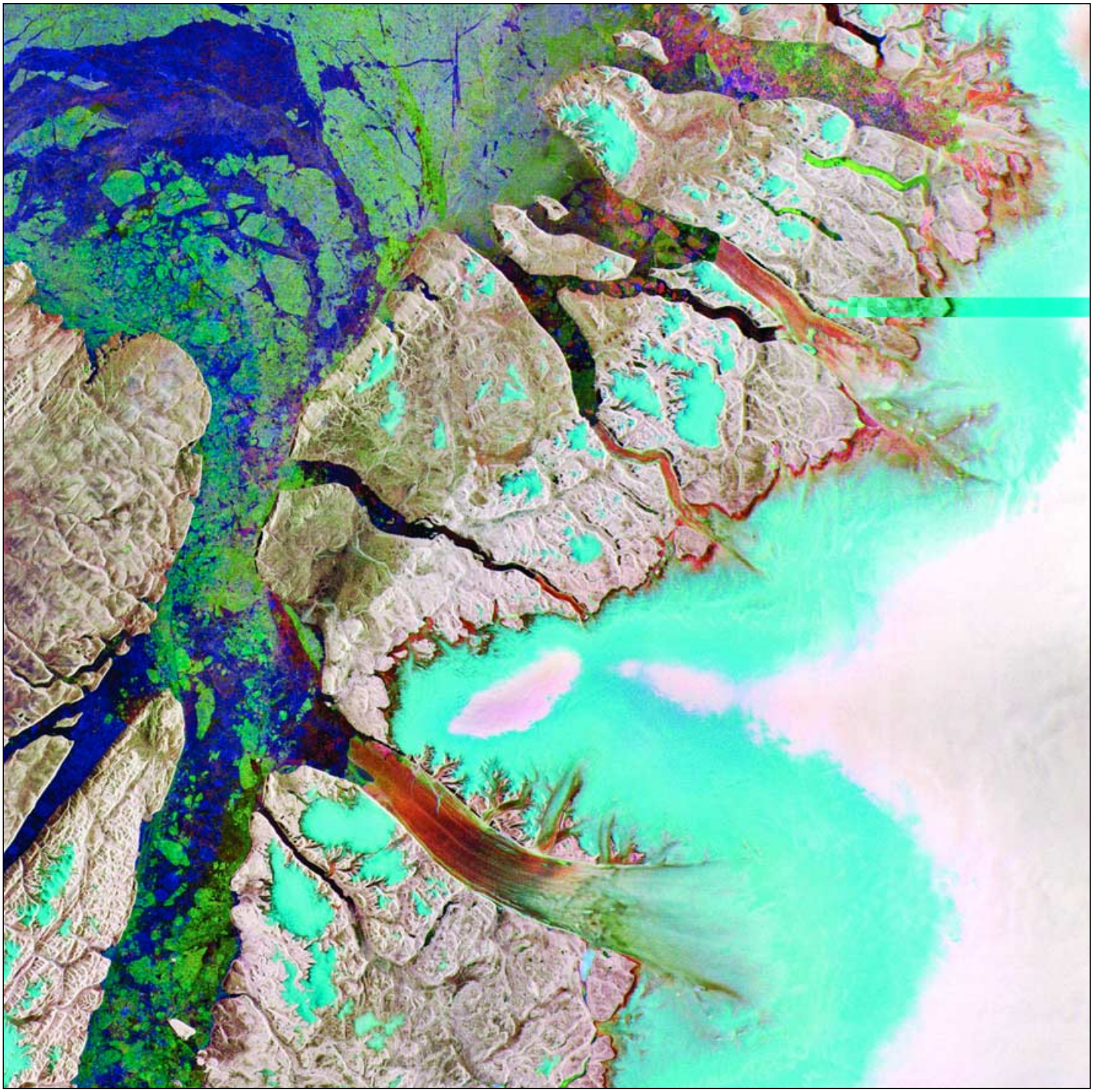


Figure 3 - A pseudo-colour multitemporal image created from data acquired by the ASAR aboard ESA's Envisat satellite during 2008
Image © ESA

Envisat Images Greenland and Ellesmere Island

Multitemporal false colour radar imagery is used to follow the seasonal advance and retreat of ice. The composite *Envisat* image above has been made up from three *Advanced Synthetic Aperture Radar* (ASAR), images acquired on different dates, with separate colours assigned to each to highlight the differences between them: May 29 (green), August 7 (red) and October 16 (blue).

The water pictured in the lower part of the image, indicated by purple and green colours, is Nares Strait, the northern-most part of which is the Robeson Channel, emptying into Lincoln Sea, part of the Arctic Ocean. The rather featureless white and greenish areas to the right of the image show part of the Greenland ice sheet, the second largest concentration of frozen freshwater on Earth. Cutting a reddish swath across the lower part of the image and emptying into Nares Strait is the Petermann Glacier, the longest floating glacier in the northern hemisphere. This glacier lost a 29 km² chunk during July 2008.

Monitoring the depth of ice sheets and the rate at which they melt is vital in view of the current regime of warming Arctic temperatures. Should the Greenland ice sheet melt completely, global sea level could increase by up to seven metres.

Acknowledgement

Radar images and corresponding descriptive text courtesy ESA, the European Space Agency

References

1 Advanced SAR from Envisat, GEOQ 1, page 22, 2004
2 Radar Satellites, GEOQ 13, page 41, 2007

Santa Ana Winds

fan the Orange County 'Corona' Fire

Ed Murashie

Sometimes we personally witness disturbances seen in weather satellite images, be it hurricanes, record snow-fall or in my case, a wildfire. It started as a casual Saturday morning, as I drove with my younger son to visit my ex-wife and other son in Yorba Linda, California. It was one of the clearest days of the year because of the dry, 80°F warm *Santa Ana* winds which blow from the desert to the northeast and sweep away the smog and haze. The 30 mph winds dropped the humidity down to single digits.

As I left my house in Fullerton, the road took me to the top of a hill from where I could see everything from the ocean to the San Gabriel and San Bernardino mountains. Three things caught my attention: the large number of people at the side of the road, a very small column of smoke near my workplace in Brea and a larger column of smoke off in the distance to the east. Seeing smoke in the distance on a clear day grabbed my attention but was not a concern since it looked to be about 10 miles away, and the smoke in Brea looked too small.

I arrived at my son's house, which is located near the Chino State Park with just a large empty housing lot between us and the dry, brown hillside, at 11.00 am. I turned on the news to learn that the *Corona* fire was eight miles away and, helped by the Santa Ana winds, was blowing in our direction. I still was not concerned because, obviously, all of the fire fighters would put it out before it reached us. Right?

Smoke looms beyond a neighbour's house

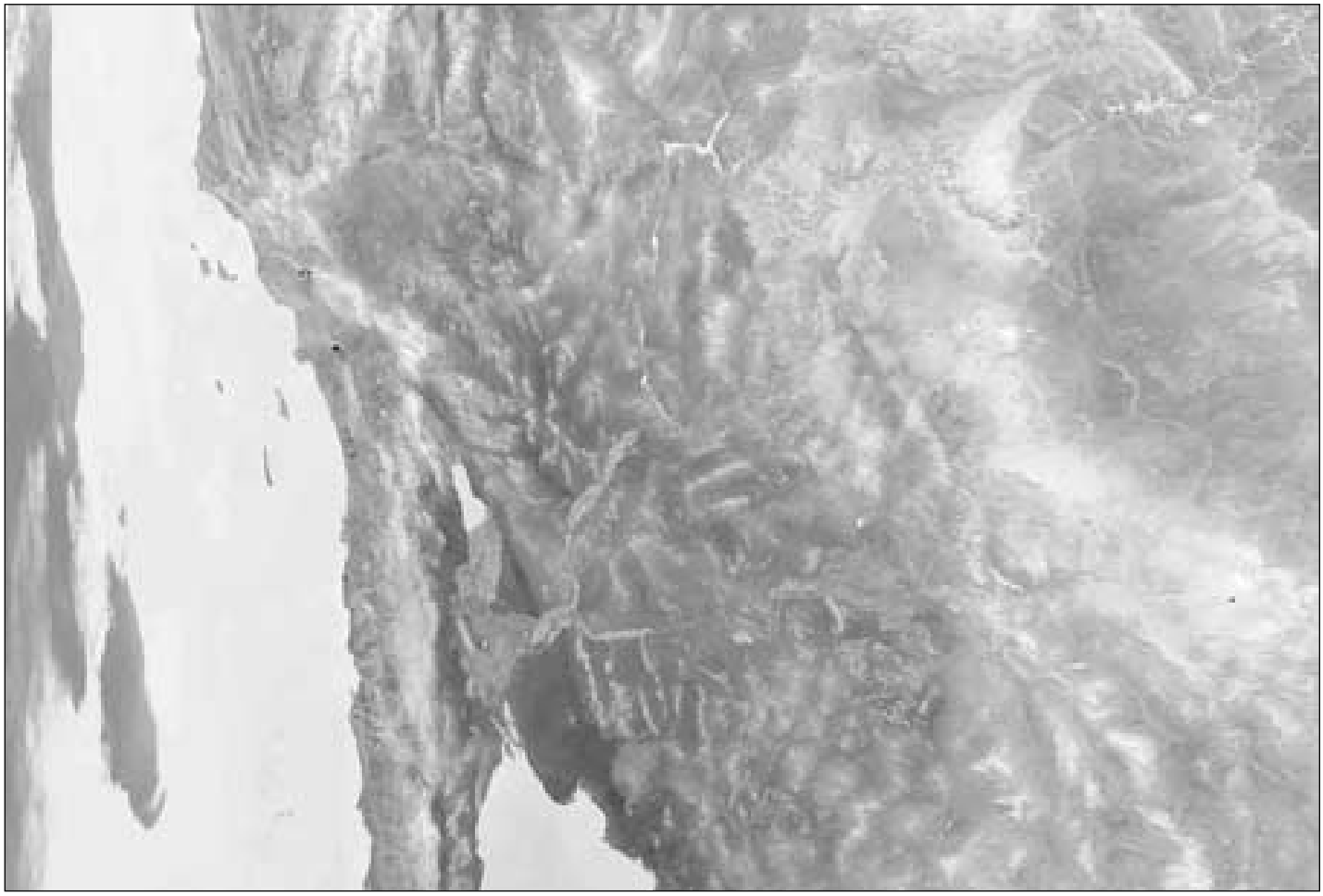
An hour later I was shocked to see a large wall of rolling gray and reddish smoke looming behind the neighbours' house across the street. It was still far enough away that I was not worried, unlike my ex-wife who owns the house. She talked to neighbours who explained that mandatory evacuations were occurring in the neighbourhoods to the east as the police made their presence known on her block. The officers insisted that everyone evacuate, so she started

A DC-10 preparing to make a ridge drop

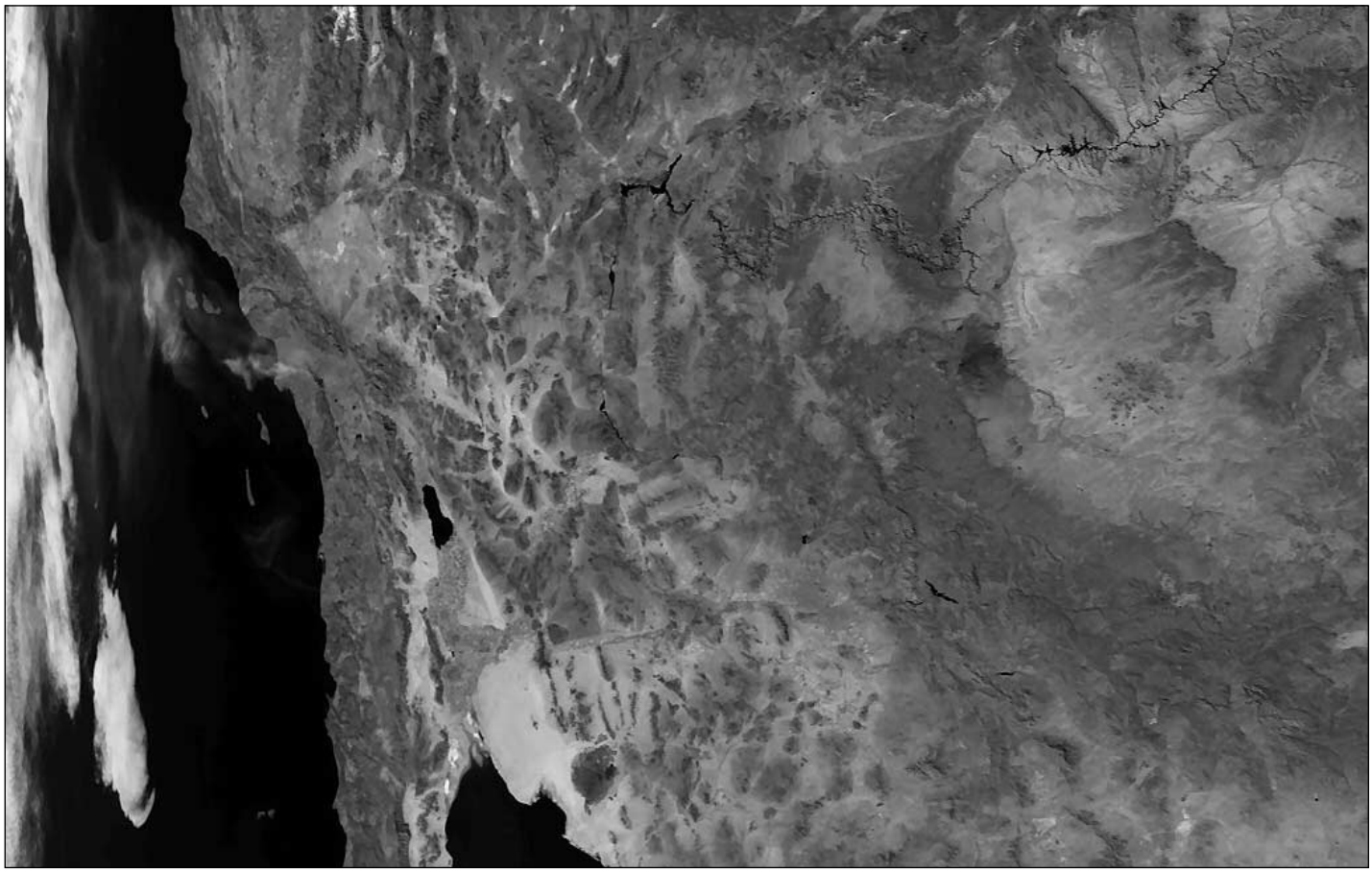
to pack the car while I watched in amazement and watered down the roof. Shortly thereafter, the police disappeared, never too be seen again. By 4.00 pm the fire appeared on the ridge to the north and an air-show of water-dropping helicopters, spotting planes and a phoscheck-dropping DC-10 roared overhead.

The most impressive sight was to see the fire move along the ridge at about 20 yards per minute (figure 10). Within the hour, the fire had burned to within ten blocks to the northwest and was racing down the hill. It was then that all but a dozen of us had packed up and evacuated, including my crying ex-wife and my boys—who wanted to stay for the sheer excitement. The second impressive sight was the neighbours, who usually don't talk, yet sat outside and drank beer together until near midnight when most went inside to watch the news. I called my ex-, assuring her everything was alright, but stayed up all night watching the local news where the news anchor was reporting from someone's backyard just ten blocks north of my location. Only an empty housing lot protected me and the ex-wife's house from the devastation.

concluded on page 41 ...



A NOAA-18 channel-3 AVHRR infrared image showing the seats of the fires as black hot-spots



The corresponding NOAA-18 channel-2 AVHRR visible image, acquired by the author on November 16, 2008

Time to evacuate as the fires approach habitation

This image from the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's *Aqua* satellite shows the Los Angeles metropolitan area on November 16, 2008. The smoke is seen spreading far to the west over the Pacific Ocean. The Freeway ('Corona') Fire consumed 5,800 acres.

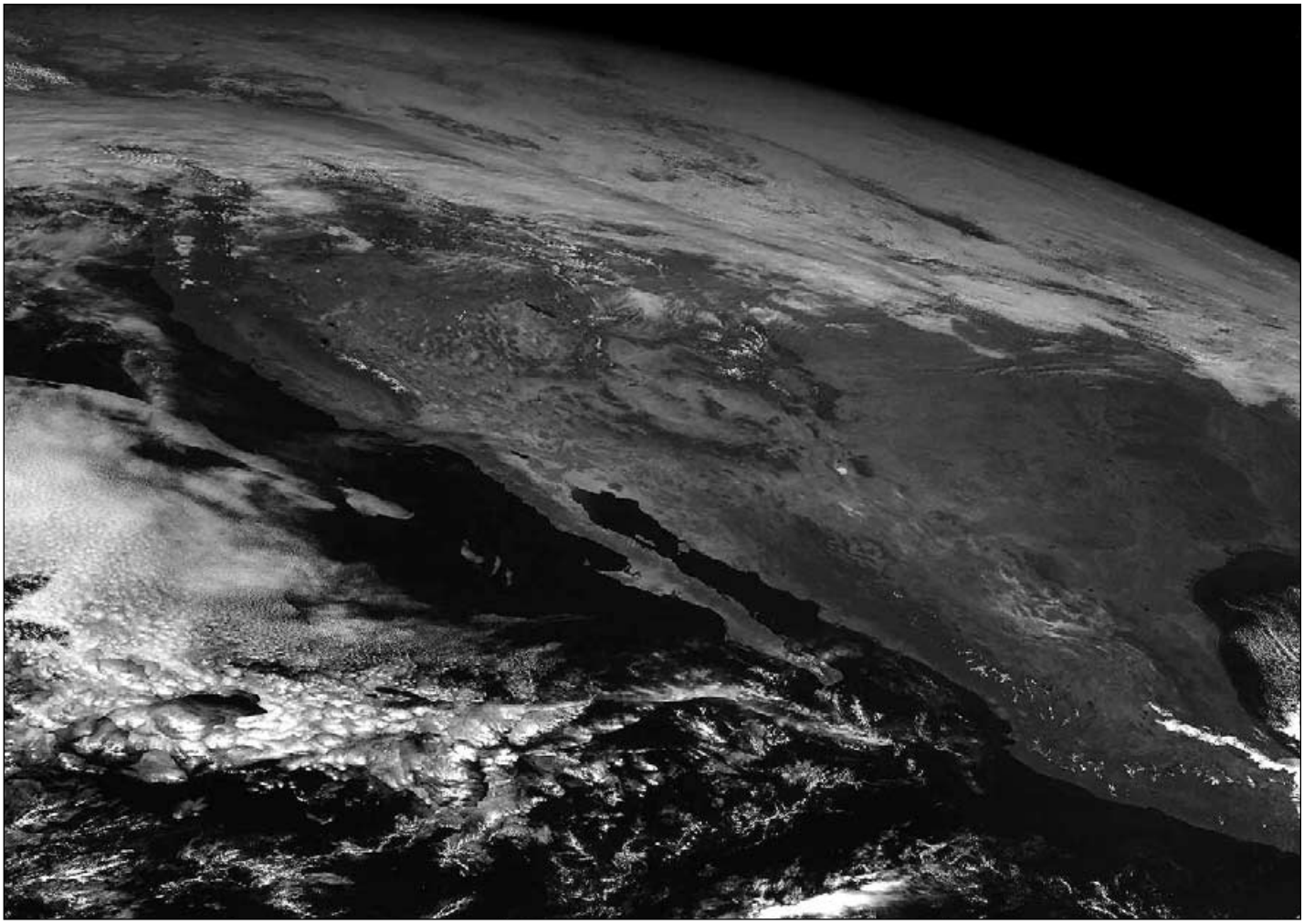
NASA image courtesy the MODIS Rapid Response Team. Caption by Rebecca Lindsey

Flying over the burned region a week after the fire in a Cessna airplane

Photo: Ed Murashie

The scars from the Freeway ('Corona') Fire imaged by NASA's *EOS-1* satellite's Advanced Land Imager (ALI)

Image: NASA



This GOES 11 LRIT VIS image was acquired by the author on November 16, 2008

Next morning, after my ex- and kids were able to get through the roadblocks back to her house, I was anxious to get home and capture some LRIT and HRPT images. I was especially interested to see HRPT channels-1 and -2 for smoke plumes and channel 3 for fire detection. I was not disappointed, other than being unable to find a direct overhead pass. The smoke blown out to the ocean was so thick and patchy that it looked as if there were more islands than there really are. A week later I flew above the burned areas in a small Cessna and was able to take in the scale of the fire.

The fire burned from 9.00 am on November 15 until it was contained at 6.00 am on November 19, being finally extinguished at 8.00 am on November 25. The *Corona* fire was so large that it joined the *Brea* fire, was renamed the *Triangle Complex Fire* and later the *Freeway Complex Fire* as it jumped several freeways. The combined fire burned 30,305 acres and is considered the third largest fire in Orange County California history; it destroyed 187 and damaged a further 127 residential structures.

The natural-colour image of the burned area at lower right opposite shows the Chino Hills to the north and Anaheim Hills to the southwest of the Riverside Freeway on November 18, 2008. The dark charred area stretches across most of the Chino Hills and part of the Anaheim Hills.

Southeast of the Riverside Freeway is a part of Chino Hills State Park called the *Coal Canyon* area. The area has a dull greenish-brown colour that is typical for the dry woodland/chaparral ecosystems native to the area. (In this part of California, bright green vegetation is the product of irrigation, for example, golf courses and lawns.) The *Coal Canyon* area was added to China Hills State Park in 2000, and was the only part of the 14,000-acre park that was not burned, according to local news reports.

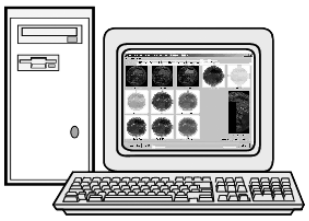
The fire moves along the ridge behind the houses

I was glad there were no fatalities but felt terrible for the 14 firefighters who sustained minor injuries and for the people who lost their homes.

Internet References

1. http://www.ci.yorba-linda.ca.us/Fire_Prelim_Report.pdf
2. http://en.wikipedia.org/wiki/Freeway_Complex_Fire

Computer Corner



Douglas Deans - dsdeans@tiscali.co.uk

I noted with some interest a press release from a few months ago, saying that Microsoft has ordered another stay of execution for Windows XP. What this means is that computer vendors have been given a further six months during which they can offer XP as an option with new computers. Note that there are certain cheaper models of computers available that would not be suitable for *Vista*, but this decision does not affect the continued use of XP for such models. Those considering a new computer with XP should however be aware that Microsoft is still intending to end free help and warranty support for XP this April.

An interesting twist to this is that Microsoft announced that their next operating system, *Windows 7*, would be available approximately three years after the launch of *Vista*. If this continues to be accurate then it is actually possible that some people could skip using Vista at all. Beta testing of *Windows 7* is already under way and early reports, particularly from those who criticised *Vista*, are very promising. There continues to be some very mixed views about *Vista* but as I have mentioned time and time again in this column, my experience with the Operating System has been an enjoyable one. Again, I did not follow the upgrade route, which does seem fraught with difficulties, but waited for my next new computer, something I recommended in my column in *GEO Quarterly 19*.

There continues to be debate about the use of Vista 64 bit. I have no personal experience of this so my comments below can only be based on various reports I have read.

This quarter I'm taking a look at KVM switches. These can be particularly relevant to our hobby as many receiving EUMETCast may be using a two-computer system, as recommended by EUMETSAT: particularly relevant if you are intending to take a high proportion of the available data.

I also have a quick personal tip for users of GSS.... one not listed in David Taylor's help files !

Computer Q and A

Vista 64 bit

Vista 64 bit has been available ever since the launch of the new operating system. Most people will be using the 32 bit version of the Operating System, and to be honest will have no need for the 64 bit version. If you have any doubt as to which is installed on a computer, simply open Control Panel and select 'system' There you will find if it is 32 or 64 bit.

If 64 bit has been purchased in error, fear not as both *XP* and *Vista* OSs are designed to enable 32 bit applications to run through emulation. However, performance can be hampered and there is no guarantee that emulation will work with all software.

However, it is a different situation when it comes to hardware as there must be dedicated 64-bit drivers for this or it will just not work. Availability of such drivers is now much better but it can constitute a problem, particularly for older equipment.

There is no doubt that there will come a time when 64-bit operating systems will be the norm (as is happening with the hardware). The current situation for upgrading—but keep in mind my comments about *Windows 7*—is that if you are running a retail version of Windows *Vista* 32-bit (not OEM) then you <u>will</u> be able to upgrade for a nominal fee. The exception to this is *Vista Ultimate* as this already ships with the 64-bit DVD.

KVM Switches

What are KVM switches and how can they benefit us, particularly in relation to our hobby? KVM stand for Keyboard, Video and Mouse. The real benefit of using such a switch is that you can run multiple computers simultaneously but only need to use *one* keyboard, *one* monitor and *one* mouse (and in some cases one set of speakers).

Computers that the user wishes to control are connected to the KVM switch using special KVM cables. A keyboard, monitor and mouse are then connected to the KVM switch. Control is transferred from one computer to another by means of either

- the use of a button on the KVM unit
- on-screen display (OSD) controls, or
- hot keys on the keyboard

which instruct the KVM switch to route signals between the computers and the keyboard, mouse and monitor as appropriate.

This is beneficial from a cost point of view but can also help those with limited space. KVM switches are available to control from just two computers up to 32, and indeed there are methods of daisy chaining them to allow thousands of computers to be controlled. This could be useful for large servers and the like. However, for domestic purposes we will probably only require to control a few computers.

There is a very large choice of these switches available. Here are a few general points to consider when choosing a KVM switch.

- How many computers do you want to connect? There's no point purchasing a 12 port switch if you only have two computers.
- What type of hardware device will you be connecting the switch to: a standard PS/2 connection or a USB one?
- Ensure the KVM switch is compatable with your operating system.
- If you plan on creating shared access to a monitor, choose a KVM switch that supports that monitor's video resolution. It's always advisable to choose a KVM switch that supports all standard resolutions. Superior video quality up to 1920 x 1440 pixels can be achieved.
- Check to ensure that VGA and DVI video connections are provided to suit your needs. Not all switches come with the necessary cables, so these may have to be purchased separately.

There are many other more advanced features available but, as always, these will add to the cost and for simple

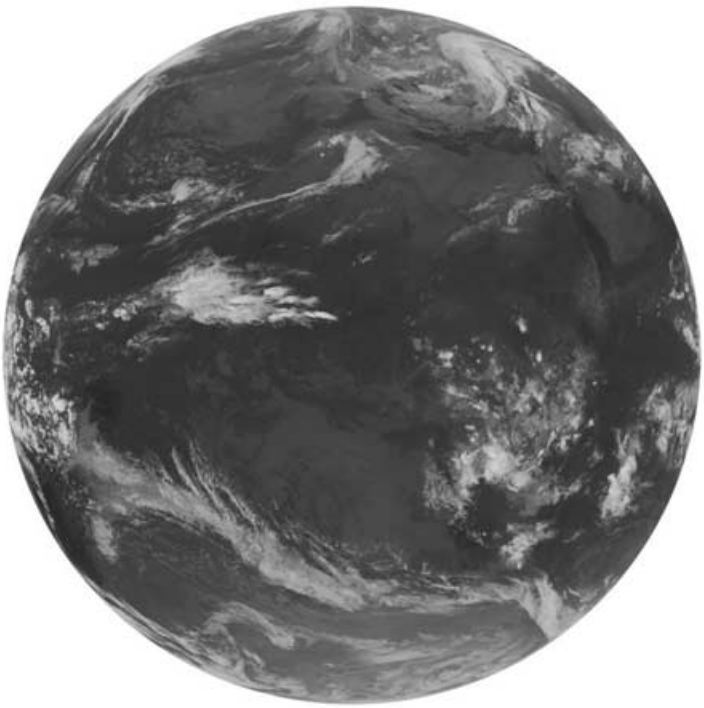


Figure 1 - A typical IR Meteosat image, as received, with a white background

domestic use are probably unnecessary. Some typical additional features include a *LED display* to show which computer the switch is monitoring, a *time-out* feature which automatically disconnects inactive users from the switch and an *auto scan* function to search for all connected computers.

I have used a KVM switch very successfully for a long time with few issues. I have just one bit of advice relating to the monitor; mine has a widescreen 1680 x 1050 display and I have noticed sometimes that, if the KVM switch is not set to the booting computer, it goes to the wrong resolution. This is a simple matter to correct; by ensuring the KVM is switched to the currently booting computer, the problem is resolved. I have been unable to trace the problem but it may be down to the inclusion of a 'default' monitor on the list.

Finally, it crosses my mind that some readers may wonder why a simple manual switch cannot be used. There are a number of reasons for this but the obvious one is the fact that a manual switch does not have a two-way communication with the mouse and keyboard. When the computer powers on it looks for a response from the mouse and keyboard. An intelligent KVM switch emulates the connection electronically and sets their functionality and characteristics whereas with a manual switch the connection is lost every time it is switched off.

GeoSatSignal Tip

Most readers will know that full-disc IR images are normally white outwith the Earth's disc simply because of temperature, whereas corresponding visible images have black surrounds. Although a trivial matter, a black surround on an IR image can greatly enhance its overall appearance and, in my opinion, seems to make the eye focus better on the actual image.

Figures 1 and 2 show the same IR image processed in the normal way but also processed to provide a black background. This can be achieved very easily in GSS by simply changing one setting: but it's not the one you might expect!

In the **<Job option/Processing tab>**, set *False Colour* to 'Normal', leaving *Brightness adjust* and *Crispen* set to your own particular requirements (I normally use 'Stretch' and 'Crispen'). *CLUT* should be set to 'None' and 'LutGreyscale' selected in the *Vis ch* box—the unexpected setting—despite there being no VIS channel involved. The effect, which appears in the image under the *False colour* tab, is very pleasing when a single IR image is loaded.

Next quarter, amongst other things, I hope to have a further look at some basic *Vista* settings and perhaps some news about *Windows 7*.

Software Updates

Here are the latest versions of David Taylor's software. To learn more about these programs and to download the latest updates please go to

http://www.satsignal.eu

ATOVS Reader	v 1.1.4
AVHRR Manager	v 1.5.0
CMA Viewer	v 1.2.0
DWDSAT HRPT Viewer	v 1.1.0
GeoSatSignal	v 7.0.2
GRIB Viewer	v 2.2.2
GroundMap	v 2.0.6
HDF Viewer	v 1.3.0
HRPT Reader	v 2.8.0
Kepler Manager	v 1.3.0
MapToGeo	v 1.1.6
Metop Manager	v 1.3.2
MSG Animator	v 2.5.20
MSG Data Manager	v 2.5.24
PassControl	v 3.1.0
SatSignal	v 5.1.2
Sea-Ice & Viewer	v 1.3.4
Wxtrack	v 3.7.0

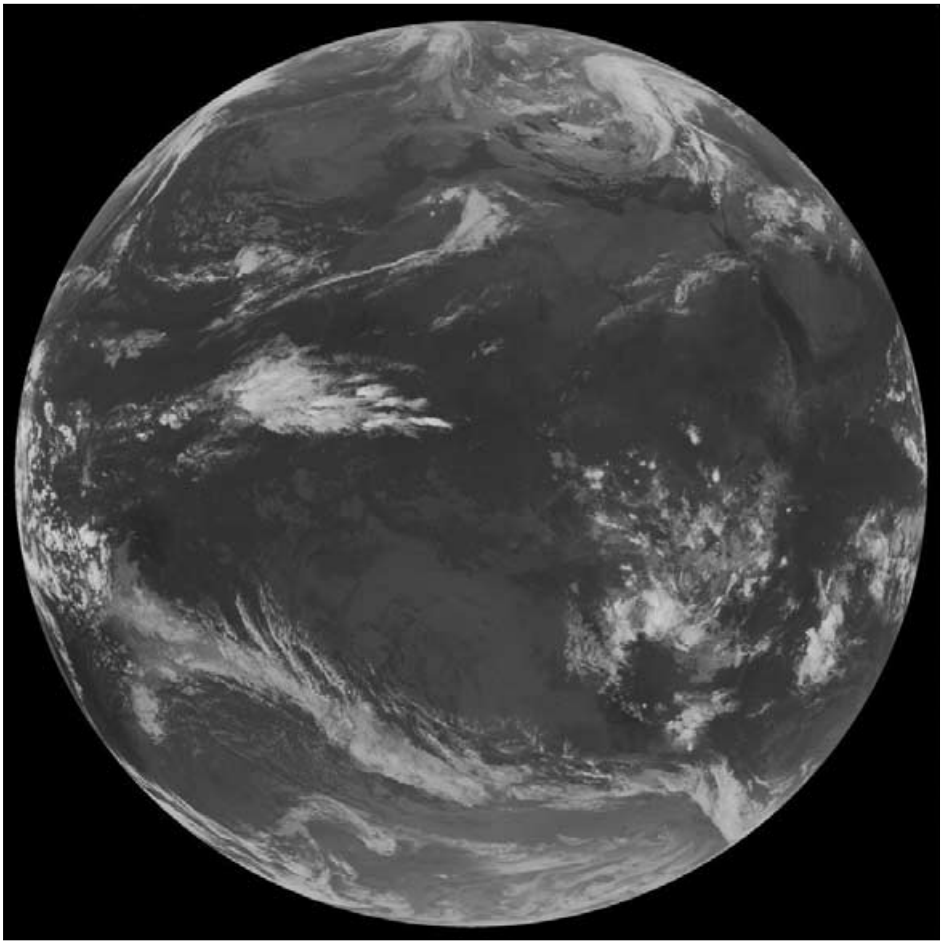


Figure 2 - The same IR image, with the background processed to black

FEEDBACK

The Column for Readers' Letters and Queries

email: geoeditor@geo-web.org.uk

Cloud Shadow

Attached is an APT image from NOAA-18 acquired at 17:50 UT on December 10,2008. A cold front is crossing Lake Ontario, bringing arctic air south. Hudson Bay and James Bay are now frozen.

I was intrigued by the sharply delineated black cloud shadow across Ontario Province and New York State. The sun angle is low but probably this shadow is only about a mile wide. I wonder if the experts could calculate this?

Keith Fraser, Buffalo, New York.

Lightning Strike

The two photographs show my then newly built QFH (left) before it was installed on the roof; the second shows the aftermath of it having been struck by lightning at 6.15 am last October 14.

The bottom portion of the mast, including the plastic box, was blown to smithereens and its debris scattered over a wide area.

John Wills, Pissouri,Cyprus.

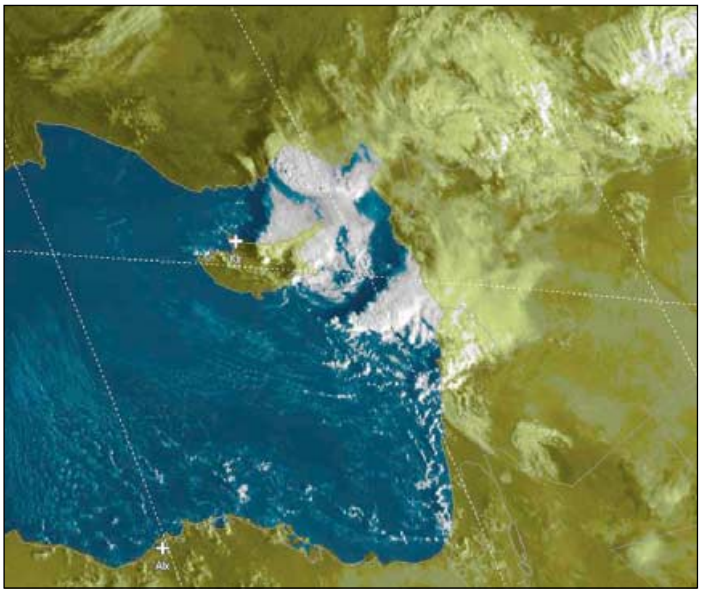
Storm Clouds seen from Above and Below

I took a photo, looking SE, of quite dramatic clouds building over the eastern half of Cyprus. The MSG-2 ch12 image at the same time confirmed that something was 'brewing'— could it be our first 'real' rainstorm of the autumn?

A southeasterly wind had picked up to about 20 mph during the previous half-hour, following several calm days, whilst a low pressure region sat over the island. It had become very hazy with a temperature of 22°C, humidity at 56% and barometric pressure of 1009.9 hPa and rising at 9.15 am. In the event, all the cloud passed to the north without so much as a drop of rain.

As always, I'm looking forward to seeing the next issue—the September Quarterly was a great read and very interesting. Many thanks for all your and the other contributors' efforts

Nigel Heasman, Kayalar, North Cyprus



MSG-2 image at 07:15 UT on October 22, 2008

Image © EUMETSAT 2008

The approaching cloud, seen from the ground.

The Royal Meteorological Society

Are you interested in weather and climate? ... Then why not join the Royal Meteorological Society?

The Royal Meteorological Society has members from many different walks of life: amateurs, professionals, academics and teachers. The one thing that connects them all is their interest in weather and climate.

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