The GEO Quarterly

Group for Earth Observation

www.geo-web.org.uk

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

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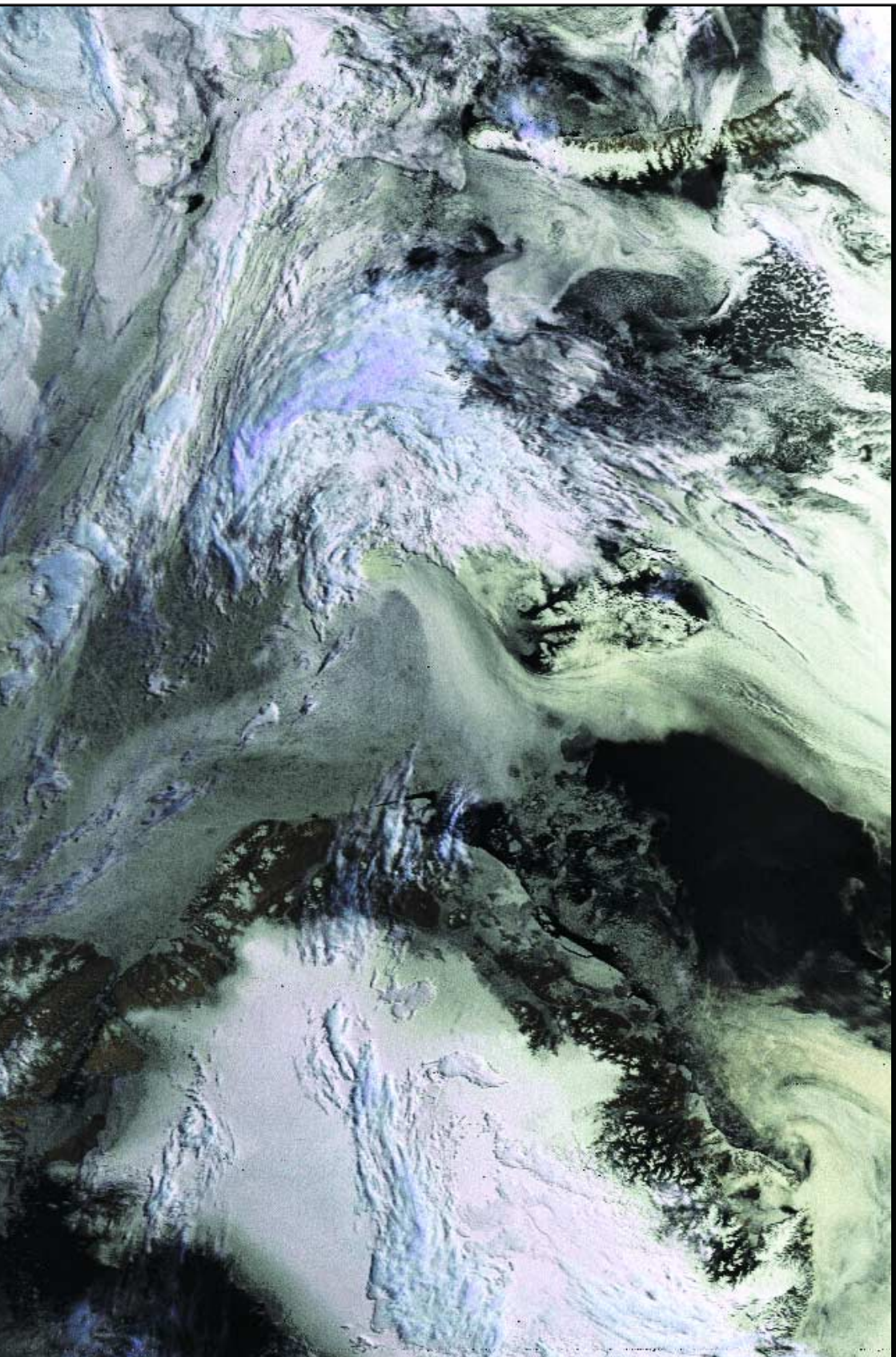


Inside this issue . . .

To cater for readers with an interest in antenna construction, Jerry Martes and Patrik Task explain how to build their Double-Cross APT antenna

Marciano Righini, one of the pioneers of APT reception provides a fascinating insight to some of the satellites of the Soviet Era

This issue carries important information for all EUMETCast users. Before December is out, EUMETSAT will switch their DVB dissemination to a the EUROBIRD-9 satellite. To help you update your software and reposition your dish, Arne van Belle has produced two seminal articles that are absolutely essential reading

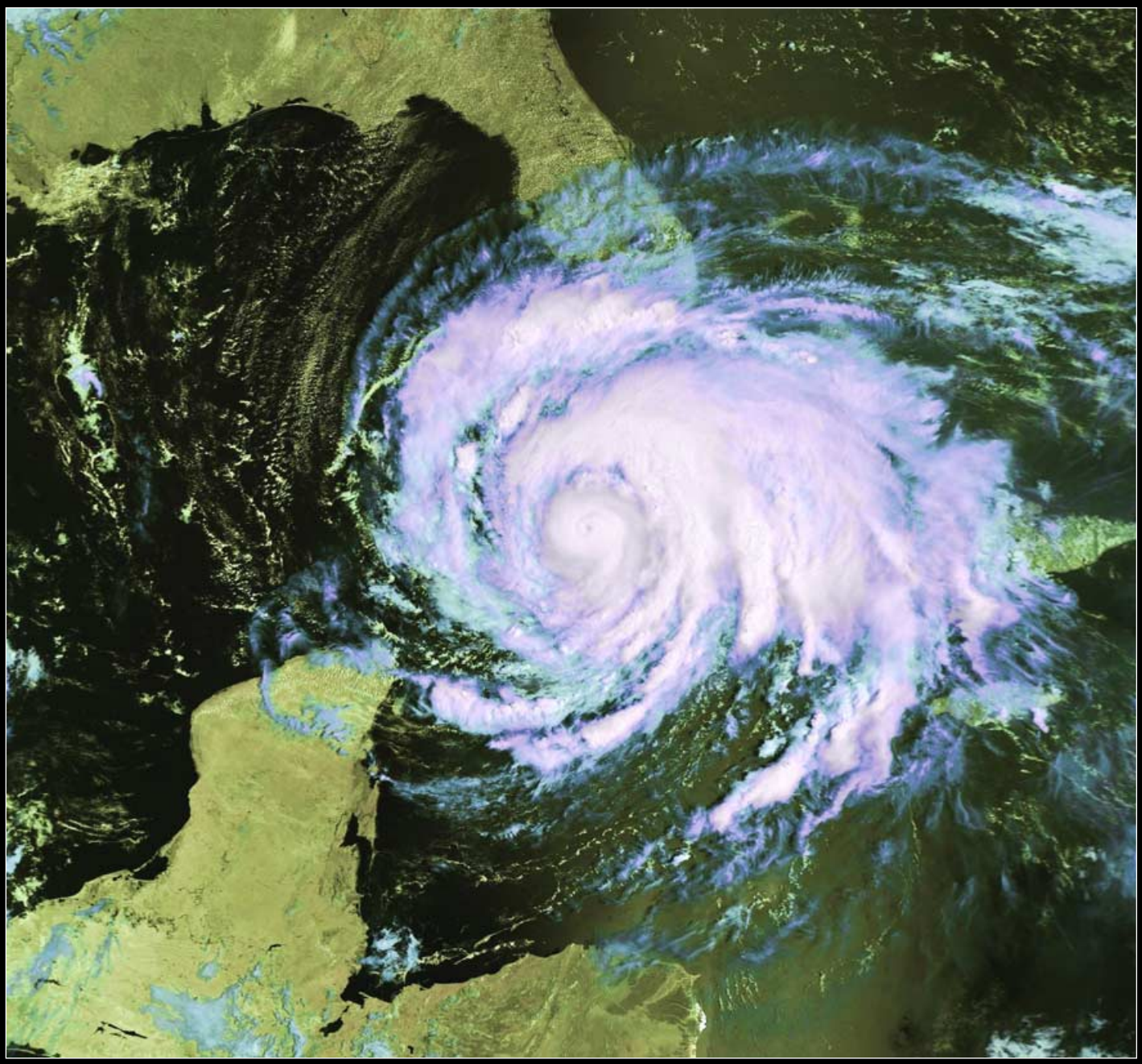
Since last issue, David Taylor has attended both the EUMETSAT users' conference and a meeting of Werkgroep Kunstmanen: you can read his reports inside

Fred van den Bosch explains how you can add various meteorological charts from DWDSAT to your EUMETCast stream

Plus news from the rallies and many more features

APT Competition Winner

See page 24



This month is an important time for all GEO members who rely on the Ku-band European *EUMETCast* service. In just a few weeks time, DVB transmissions from *Hot Bird-6* will be discontinued as the service migrates to the *EUROBIRD-9* satellite. Arne van Belle of *Wergroep Kunstmanen* has produced guides for this issue of *GEO Quarterly* in which he describe how to realign your dish and set up your DVB receiver for this new service.

Also of crucial importance is a notice from EUMETCAST, who advise that a considerable number of registrations for their EUMETCast service are overdue. Do check your registration status to avoid the disappointment of your *Key Unit* suddenly being deactivated!

With the dark winter nights now upon us Patrik Tast and Jerry Martes have hit the ideal time to present their *Double-Cross* APT antenna construction project. Unlike the popular turnstile and QFH designs, it is claimed that the *Double Cross* is easy to build and is highly tolerant towards variations in dimensions. A number of enthusiasts have already reported excellent results with this design and the authors are keen to hear feedback from anyone undertaking their design. You can find details of this construction project on pages 12-19.

Readers trying to access Feng Yun imagery from the *China Satellite Data Service Center* will have been disappointed. Some weeks before *GEO Quarterly 19* was published, in mid July, their website vanished without trace or explanation; perhaps this was related to releasing Internet bandwidth for the media ahead of the Olympic Games. Repeated emails seeking clarification of the position all timed out and were returned. The good news is that the site finally came back on line on November 4.

By the time our next issue reached readers there may well be a new APT satellite in orbit. The launch of NOAA-N-prime, the last of the line, is currently scheduled for early February next year.

With this issue, GEO has reached a major milestone as the organisation completes its 5th year of activity. We enter 2009 full of confidence. Among the offerings we will have for you will be a self-build HRPT project from Rob Denton, a guide to getting the best from *GeoSatSignal's* 'World View' option from Dale Hardy, and of course a report from this month's NOAA Direct Readout Conference in the USA.

Meantime, everyone at GEO wishes you all a happy and prosperous New Year and looks forward to your continued support in the year ahead.

Contents

GEO Report	Francis Bell	2
Cover and Full Page Image Details		4
Tornado in Bulgaria	Rob Denton	4
EUMETCast Registration Renewals	EUMETSAT	4
DWDSAT	Fred van den Bosch	6
Earth Imaging News	Peter Wakelin	9
Signal Plotter	Patrik Tast and Jerry Martes	12
Development of the Double Cross APT Antenna	Patrik Tast and Jerry Martes	13
New Images from *Mercury Messenger*	NASA	19
Report from Utrecht	David Taylor	20
News from the EUMETSAT Users' Conference	David Taylor	22
GEO Shop		*i*
NOAA Satellite Predictions for the UK and Western Europe		*ii*
Helplines and Internet Discussion Groups		*iii*
Copy Deadline for the next issue of GEO Quarterly		*iii*
GEO Membership Renewal Form		*iv*
Autumn in Europe	ESA: Observing the Earth	23
APT Competition	Nigel Evans	24
GEO Takes to the Road	Francis Bell	26
Scottish GEO Group Meeting	David Taylor / Arne van Belle	28
Moving your EUMETCast Dish to *EUROBIRD-9*	Arne van Belle	29
Some Early Birds from Beyond the Iron Curtain	Marciano Righini	33
UNOSAT	Peter Green	37
Computer Corner	Douglas Deans	38
Spectacular Lightning over SE England	John Tellick	40
A Problem with Conifers	Anthony Lowe	41
Adding EUROBIRD-9 to your DVB Receiver	Arne van Belle	42
Feedback		44

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The GEO Report

Francis Bell

You will notice from our page headings that this is *GEO Quarterly* Number 20, a fact that means that GEO has reached its fifth anniversary. In fact, GEO was formally established on November 25, 2003. During those five years our membership has increased to a figure in excess of 500 and I think that everyone who has been associated with the group during that time can feel justly proud of GEO's collective achievements.

New Members

An encouraging feature of GEO's recent attendance at the Kempton and LARS Rallies (see page 26) was the number of new members that were recruited. For these individuals, this will be their first copy of *GEO Quarterly* delivered by post. There will also be others who have joined our group via the website or by post. A sincere welcome to you all. I hope we will fulfil your expectations.

Contributions

The converse is also true, however, because we want and need your contributions to share with other members. Personal experiences, advice on technical subjects relating to hardware or software are all the life blood of our group. In addition, we always welcome particularly interesting images you have received. Offers to join our help-lines would also be welcome if you have particular skills or experiences which you can pass on to others less experienced. Our current help lines are listed on centrefold page iii.

Renewals

This is my usual request to the existing members not to forget your renewals when they become due. If you receive a coloured reminder slip with your Quarterly, please take some action; don't just put it to one side thinking "I'll deal with that later". It takes time and money to follow up lapsed memberships and nobody is paid to do this on your behalf. If you make a positive decision not to renew, it would be useful if you let us know why—thus enabling us to address topics or issues we are not covering. Also, from an administrative perspective, it will enable us to remove lapsed members details from our database.

EUMETSAT Licences

Recently I unexpectedly received several requests from EUMETSAT to renew my *EUMETCast* reception licences which they issued to me three years ago. I had more than one licence because I had made applications on behalf of others as well as myself, but they still all remained in my name. Okay, I'm as guilty as anybody, but my only excuse is that this is the first round of renewals; except for examining three year old files I had no reference for renewal dates or procedures. The point here is that if you receive a renewal notice from EUMETSAT you should take some action, it could not be easier and there is no cost.

Although you can go straight to the EUMETCast Registration Form at this **case sensitive** address

https://registration.eumetsat.int/Registration/intro.faces

you may first find it helpful to refer to GEO's guide to EUMETCast registration on our website

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

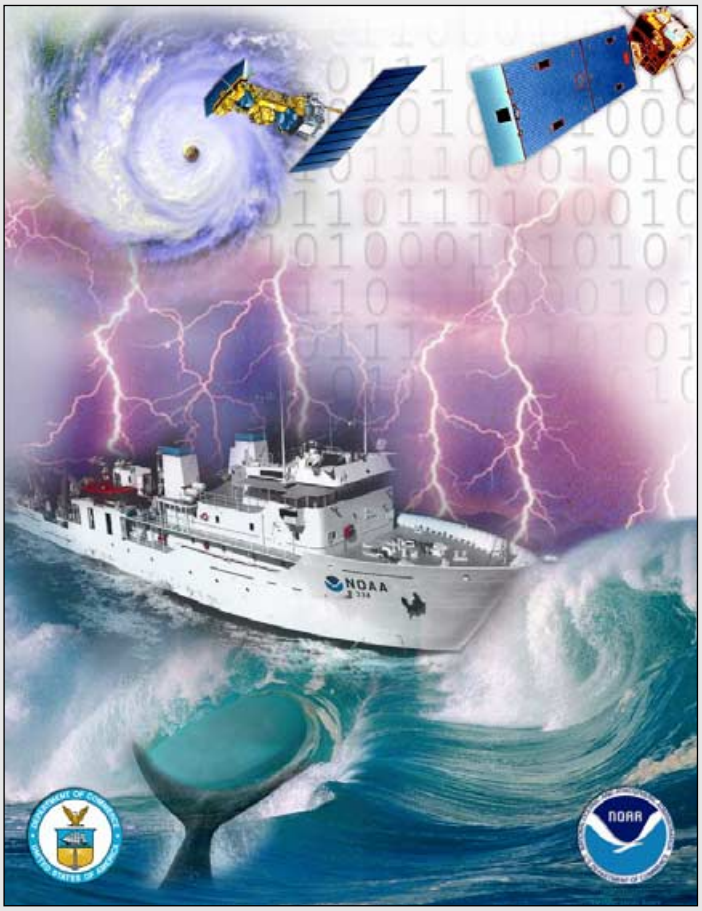
This explains what to do in each of the registration screens and also provides a link to the actual Registration Form.

Even if you are not currently active on *EUMETCast* it may be worth renewing your licence because there is no renewal fee and your interest or opportunity to receive *EUMETCast* images may return some day.

Survey

You will have seen in *GEO Quarterly 19* the results of our membership survey. It is essential that, as a group, we try to cover the perceived interests of our membership. Sometimes this can mean pushing at the frontiers of what is possible while at others recognising that we must represent the interests of newcomers and

The NOAA 2008 Satellite Direct Readout Conference



NOAA will be holding its 2008 Satellite Direct Readout Conference in Miami, Florida, USA between December 8-12, 2008. I will be representing GEO, emphasising the Group's international membership and its broad spectrum of available technical skills, together with the practical experiences of individuals, educational and non-commercial users of live weather satellite data reception and display.

A small display area has been allocated to GEO just outside the conference rooms. On the conference's third day I will be making a formal presentation to delegates relating to GEO's background, skills and experiences.

If any reader has questions or comments they would like me to present to NOAA on their behalf please email them, not later than December 3, to

francis@geo-web.org.uk

beginners. Personally, I fall somewhere in between these two groups, as I sometimes get defeated with technical issues, often related to software. This can be desperately frustrating when a program which should run refuses to do so. At the time of writing I am in the middle of that experience with the transition from *Hot Bird-6* reception to *EUROBIRD-9*. I expect I will succeed eventually but sometimes I just need to 'Phone a Friend' for advice. Readers with a similar problem would do well to read the contributions from one of our Dutch members, Arne van Belle, on pages 29 and 42.

APT Beginners' Guide

I am sensitive to those engaging on weather satellite reception for the first time so, to this end, I have written a beginners guide to APT. This was available at the recent LARS Rally with about 30 copies being distributed from the stand. I hope this will help interested people to get started. I will make this guide generally available when I have added some illustrations to the text.

ISS

You will see elsewhere in this issue (on page 27) a reference to radio transmissions from the International Space Station (ISS). Recently, Richard Garriott was on board the station for about ten days. During that time I listened to some of his radio contacts with individual radio amateurs and schools. The ISS was also sending Slow Scan Television (SSTV) from a mobile camera they have on board. While I was with a group of friends, one of the SSTV images they sent showed clear cloud patterns below the ISS

It just so happened I was running my *EUMETCast* system at the same time so I was able to identify the area of the Earth the ISS had just imaged. My understanding is that that SSTV transmissions will continue from the ISS so it may be worth listening. The downlink frequency is 145.800 MHz, and if you want to try talking to the ISS the uplink is on 145.200 MHz narrow band FM. Predictions for the passes of the ISS can be found on the web site www.heavens-above.com.

NOAA Conference

My short term plans involve a trip to Miami, Florida for the NOAA Direct Readout conference. GEO will have its own display area outside the conference room which I will use for literature and other small items. More importantly, I have been invited to make a presentation to the delegates, relating to the activities of GEO. With the help of other members of the management team, a visual presentation is being created which I can use in Miami. The same presentation may be used at the rallies and exhibitions GEO attends next year.

I do not wish to repeat here the NOAA conference programme because it is well documented on their web site (see previous page). I strongly recommend you to visit it if you can. When I read the range of topics to be covered my jaw sagged a little; I'm sure I'll be on a sharp learning curve. The draft agenda for the conference is also available on the web site. I will prepare a report of my visit for the next issue.

A Request

Members active in amateur radio will know of the RSGB's mobile display unit, GB4FUN. It goes all round the country to schools and public events, promoting amateur radio. It was present at our Leicester Symposium in 2004. There is now a completely new mobile unit which was present at the recent LARS rally. I naturally looked round and talked to Carlos Eavis who manages it. On asking him if he was still demonstrating weather satellites, I was distressed when he said that he wasn't. Apparently, the somewhat ancient receiver he possessed could not receive the main mid-day satellite NOAA 18 on 137.100 MHz and he has been unable to secure funding for a new receiver. I asked, should I be able to find GB4FUN a newer receiver, if he would be interested in demonstrating weather satellites again—and he said he would be delighted to do this.

Does any GEO reader have an APT VHF receiver that they would be willing to donate to GB4FUN. Even if it's an old receiver without the 137.100 MHz frequency, that would not matter, because I could either recrystal the receiver or emplace a new PIC chip. If anyone can help with this good cause please get in touch with me by email, post or telephone.

Events for 2009

At the time of writing, dates for our 2009 events have not been finalised. These dates will be published as soon as available. Please watch the web site for early information.

QUARTERLY QUESTION

Question No 19

The Question posed in the September Quarterly related to the *Jason-2* satellite, a joint mission between NASA, CNES and EUMETSAT to monitor the Earth's oceans. Earlier satellites in this series were *Topex Poseidon* and *Jason-1*. The question asked what instruments would be needed on Jason-2 to accomplish the mission objective of measuring sea surface heights to within the high accuracy of 3 to 4 cm. A subsidiary question related to the launch of Jason-2 and the connection between Jason and Poseidon.

The question was submitted by Sally Wannop user support manager at EUMETSAT and after consultation with her scientific colleagues she also provided the following model 3-point answer.

- A dual frequency altimeter, the two frequency measurements allowing correction for ionosphere perturbations
- A three-frequency radiometer to acquire the best wet troposphere correction (water vapour and clouds)
- A set of precise orbit determination (POD) instruments—Doris, GPS and Laser in the case of Jason-2—that allow together a one centimetre POD accuracy.

I received four entries (from Frank Skillington, Les Hamilton, Steve Edwards, Ian Leitch and Andre Lubnow), some more detailed than others, but all of which I considered correct. If you had been starting from scratch I thought it was a difficult question but EUMETSAT's own literature, their web site and the article by Peter Wakelin in the same Quarterly contained the information for the framework of an answer. All the answers have been submitted to EUMETSAT for their judgement in due course.

Poseidon

The subsidiary question about Poseidon and Jason relates to the tradition of naming astronomical objects after mythical Greek and Roman gods. Poseidon was the Greek god of the sea, to whom the design of all sea creatures was attributed. One of the benefits of being a Greek god was the ability to come to Earth and procreate with a desirable woman. In the case of Poseidon he did so, fathering a son who had an earthly half-brother who in turn had a son—Jason. I'm not sure how you would describe the family connection but Jason being the step-grandson of Poseidon is descriptive. Jason in his turn was reputed to have sailed the Mediterranean and Black seas, exploring for the golden fleece.

I have regard for naming future satellite missions monitoring our seas because to move from Jason-1 to Jason-2 is distinctly unimaginative. I am sensitive of my own Celtic and Norse antecedents, so what about 'Kraken' the Norse god of the sea for the name of the next mission? I'm sure John Wyndham would have approved.

Question No 20

This Quarterly Question relates to the GERB instrument on Meteosats 8 and 9. The data from this instrument is not disseminated via EUMETSAT's normal data stream but only to those research organisations who were responsible for designing and building the instrument and analysing the data.

GEO was privileged at our last symposium to have a presentation by Dr. John Remedios from Leicester University's Space Research Centre, who presented us with some preliminary results from GERB. GERB is an acronym: the question is '*What is the full name of the GERB instrument?*' If you know the full name it will indicate what the instrument is measuring. If you don't know the answer directly a source of information would be to visit the web site

www.src.le.ac.uk/projects/gerb

Replies to ***francis@geo-web.org.uk*** by Saturday February 28, 2009.

Cover and Full Page Images

Front Cover

This false colour APT image from NOAA-15 was acquired from Vasa, a Finnish coastal town 63°N on the Gulf of Bothnia, by Patrik Tast, using a *Double Cross Antenna*. Greenland is prominent in this image, which stretches all the way east to Novaya Zemlya. A construction feature on the Double Cross Antenna starts on page 12.

Inside Front Cover

Hurricane *Ike* was imaged making this spectacular entrance into the Gulf of Mexico in this September 9 Metop-A image sent to us by Mike Stevens.

Image © EUMETSAT 2008

Inside Back Cover

This 08:15 UT Meteosat-9 image from September 5 this year comes from Mike Stevens and shows the severe storm that hit the UK on that date. Mike reports that his barometer dropped to 998 mb as windspeed reached gale force 8, with some areas of the West Country experiencing a months rain in a day.

Image © EUMETSAT 2008

Back Cover

Keith Fraser sent us this NOAA-15 APT image from the 22:07 UT pass on August 23, 2008. It includes *Tropical Storm Fay* which dumped over 50-cm of rain over Florida. The storm was being held over Florida by a blocking high and an intense depression, clearly visible over Hudson Bay, spawned a cold front which continued to keep Fay stuck. The cold front soaked Chicago. Also prominent in the image are sun glint on the Missouri river and associated lakes, and thunderstorms over Cuba.

Page 5

Eric Dean provided this spectacular Meteosat image dating from 16:30 UT on September 2, 2008. A parade of cyclonic storms marches across the Atlantic ocean, led by Hurricane *Gustav* on its way for a close encounter with New Orleans.

Image © EUMETSAT 2008

Page 7

DigitalGlobe's *WorldView-1* satellite captured this detailed view of the Bird's Nest Olympic Stadium in Beijing on July 12, 2008.

Image: DigiGlobe

Page 8

This image depicting the whole of New Zealand was observed by the MODIS instrument aboard NASA's *Terra* Earth observation satellite on August 9, 2008.

Image MODIS Rapid Response Team, NASA Godard Spaceflight Center

Tornado in Bulgaria

Rob Denton

On the morning of October 5, I was just preparing to leave Bulgaria for England to collect some HRPT gear and have a holiday. I had to set out at 10 am in order to catch the flight.

At around 8 am that same morning all hell broke loose. Seemingly from nowhere came wind ,rain and debris, accompanied by an almighty roar, louder than a freight train. Yes! I was experiencing my first tornado. It was frightening; everything was moving sideways, the dog was going crazy. It was all I needed just before my holiday break.

We took shelter inside the house. Watching safely from a distance, through the kitchen window, I saw the neighbours' two whole chimneys and part of the roof head towards my property! Luckily, most of the debris landed in my garden but I did loose the first two rows of tiles from my own roof and all the fruit from my trees.

Can you imagine the scene? I was there in the aftermath, in wind and heavy rain, trying to put back my roof before I left for England. I had only two hours to fix things, replacing the damaged tiles with the few spares I had plus a few others borrowed from the top of my garden wall. I managed to fix the roof before departing, thank goodness, but didn't know what I would come back to. As I neared Sofia there was snow on the roads.

Fortunately, on arriving back 11 days later, all was OK. The weather had once again reverted to hot and sunny. I heard from the villagers that the tornado had continued through the country for some distance hitting quite a few villages before dying out.

Sometimes adversity can be a blessing in disguise. The tornado had snapped my APT mast completely off. On repairing the mast and replacing the antenna after straightening an element, it worked better than ever! I don't get pager interference now. It must have been that I replaced the antenna elements in a different direction, thereby nulling out the pagers somewhat. I'm well pleased that happened now. It was worth replacing two vertical rows of roof tiles to get better images, although it was hell trying to get all the broken bits of tile and mortar out of my lawn.

EUMETCast Registrations due for RENEWAL

EUMETSAT

Urgent

There are approximately 120 amateur/educational licenses that have expired. EUMETSAT's Legal Department have sent reminders but we have not yet received updated registration forms from these customers.

We are hoping to send out further reminders before deactivating licensed data from these EKU accounts. The very last thing we want to do is remove data from anyone's EKU account.

This notice applies to any amateur/educational user of data, via EUMETCast or FTP, in Belgium, Finland, Germany, Greece, Iceland, Latvia, Luxembourg, The Netherlands, Norway, Portugal, Romania, Spain, Sweden or the UK.

If your license has expired, you **must** complete the online registration form on the EUMETSAT website

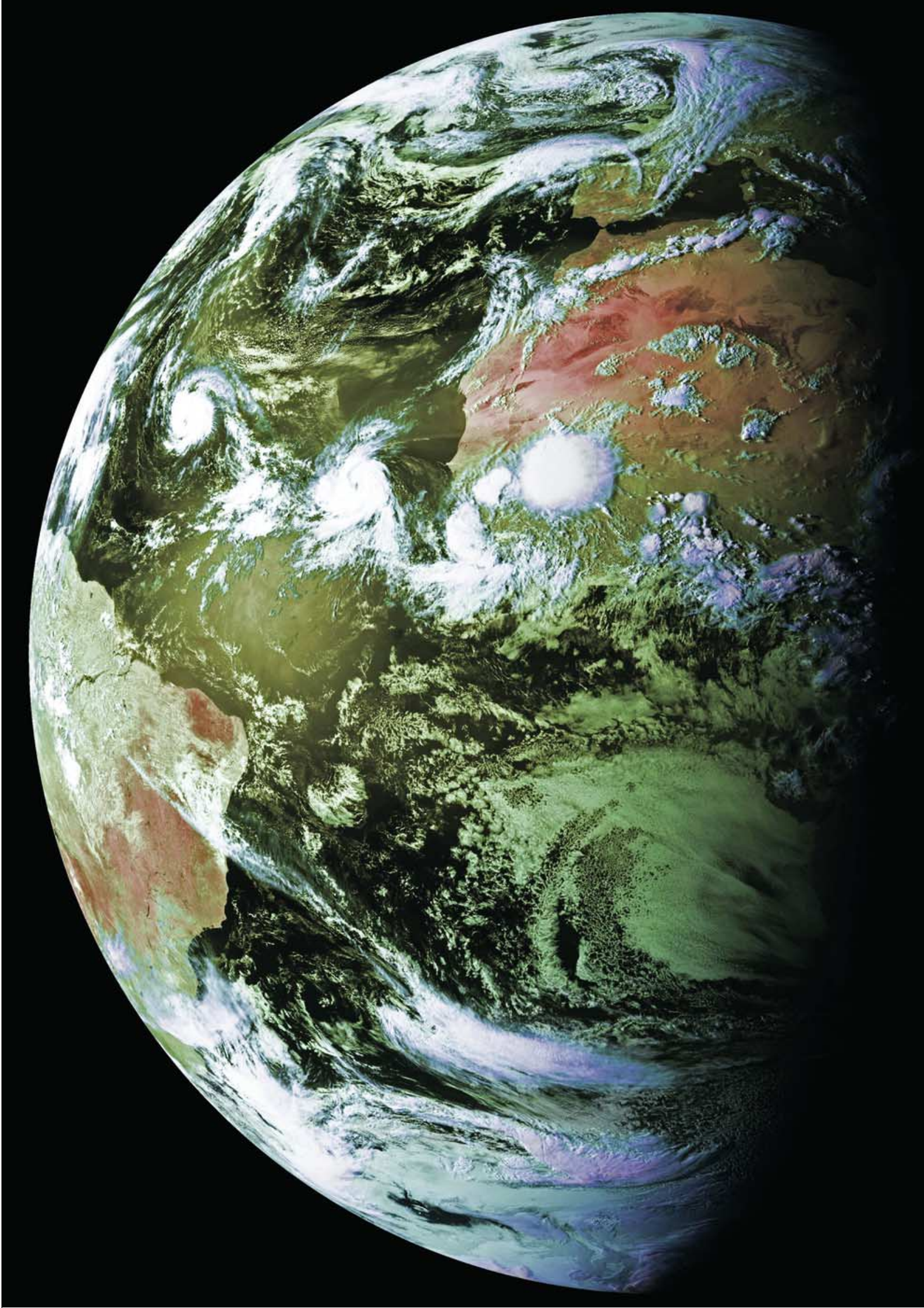
https://registration.eumetsat.int/

If you are not sure about when your license expires, or are worried in any way, you should contact

ops@eumetsat.int

for advice; we will tell you if you need to complete the form, and if necessary talk you through the process.

Rob has a pair of swallows that fly over from Africa every year to Bulgaria. One of their favourite roosting spots is on the coaxial cable, just below their nest, under the verandah. Last summer they produced two broods of chicks.



DWDSAT

Fred van den Bosch

Since September 2006 it has been possible to receive free meteorological data, the so-called Global data set (GDS), via *EUMETCast*. If you are interested in receiving this data, which includes meteorological charts and satellite images, here's how to go about it.

Registration Form

To receive these files, you must fill in a form to register for the service. To do so, visit the *Deutscher Wetterdienst* website at

http://www.dwd.de/dwdsat/

and click the link **Data and Subscription Fees** from the menu in the left-hand panel. Click the link **DWDSAT Registration Form** which appears in the first paragraph to download your copy of the form. When complete, email the form, as an attachment, to

dwdsat.subscribe@dwd.de

and your EKU will be activated for DWDSAT just a few days later.

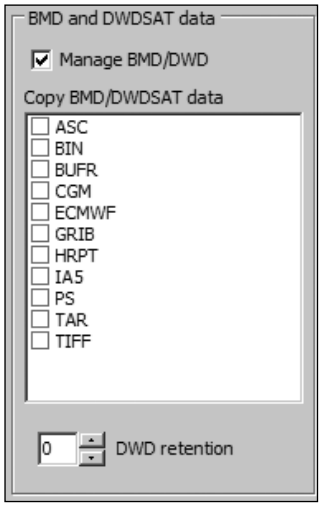
MSG Data Manager Modifications

In order to be able to receive the data effectively, a number of changes must be made in *MSG Data Manager*. Go to the *Setup* tab, then go to the *Channel Selection* tab and select 'Other'. Next, click 'Manage BMD/DWD' in the left-hand panel. To get to know about everything that is available, tick every box in this panel. Later, once it is clear what is being received, you can tick the options more selectively.

So that your hard drive does not fill up with this data, it is recommended that the *DWD retention* field is not set at too high a number. This figure determines the number of days for which files are retained.

Files

After running for a couple of hours, the DWDSAT folder will contain lots of files and images and it's time to examine the contents. The most used files will be those that begin with 'fx401' (figure 1).

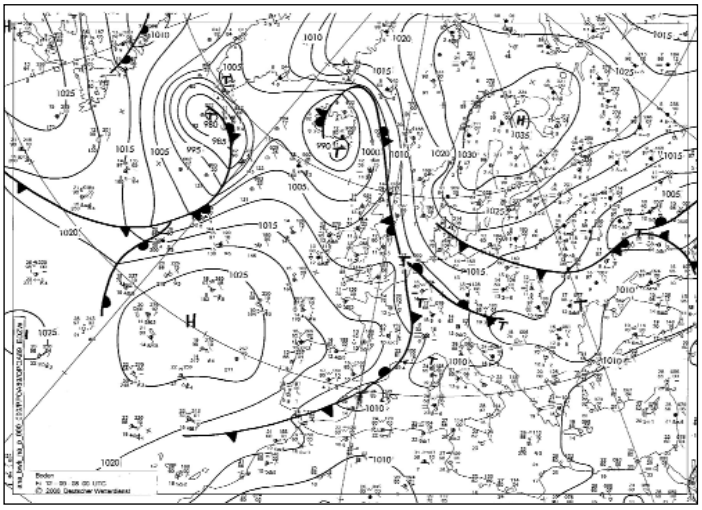


Making your selection in MSG Data Manager

A great help in knowing what these files represent is the *Products Catalogue*, which can be downloaded from the *Deutscher Wetterdienst* website by selecting 'Product Catalog' from the menu for the catalogue and explanations. It is handy to print these out so that you can consult them rapidly.

On the same page, you can find a more detailed explanation under *Explanations to the product catalogue*.

You can find files which start with 'Sat'. These are satellite images, which can be examined with an image viewer or with David Taylor's *DWDSAT HRPT viewer* [1]. This program can also read files with the extension '.BZ2'. Files which start with 'grb' can be read using David's *GribViewer* [1].



A typical fx401 chart from Deutcher Wetterdienst

Everyone can make their own choice from all these files; those which are not of interest can be unchecked from the *MSG Data Manager* setup screen as explained above. In addition, files that you don't require can be erased using *TrimTree* [2]. That's what I do myself with the 'fx301' files. These are charts in A3-format which are also received in A4 (type 'fx401'). I remove these with the TrimTree option -0: this ensures that they are removed directly.

RotateDWDSATjpg

Several charts are received rotated. To make these upright with minimum effort I have written the program *RotateDWDSATjpg* which ensures that all charts are displayed correctly. Also, all corrected files are converted from tiff to jpg format, which has the advantage of making it clear which files have been processed. *RotateDWDSATjpg* can be obtained from the 'downloads' section of my website

http://www.fredvandenbosch.nl/

Automation

I have made two batch files which start up every quarter-hour. The first calls *TrimTree* so that redundant files are deleted; the second starts *RotateDWDSATjpg* to ensure that all rotated charts are set to the correct orientation.

Forum

For questions concerning DWDSAT there is a separate forum at

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

Xrit2pic

This program from Rob Alblas can also receive and display DWDSAT charts and images through *EUMETCast*.

Batch Files

I use the following batch files:

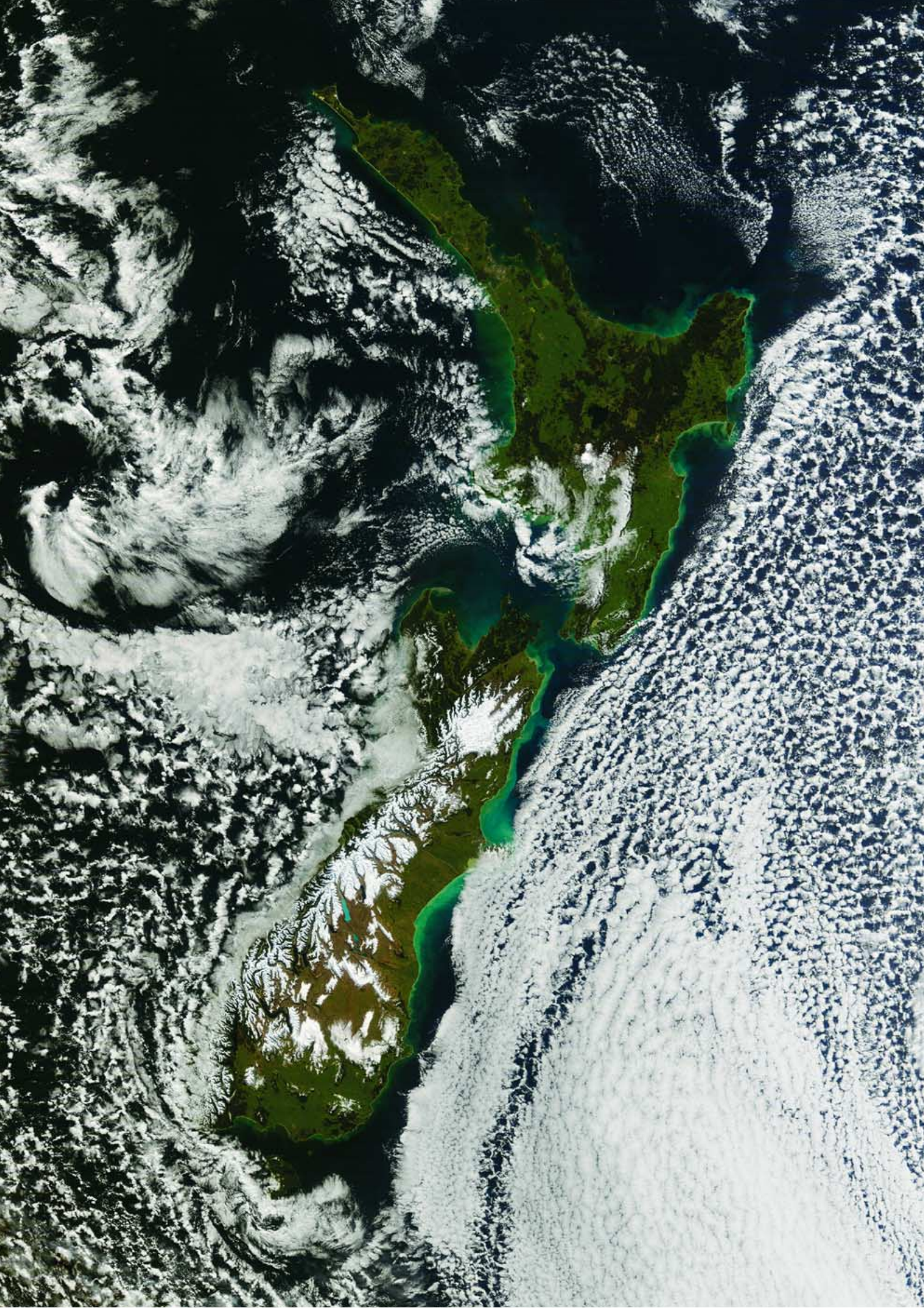
```
@ECHO Immediately delete the non interesting DWDSAT files
TrimTree -0 "C:\DATA\DWDSAT\SAT*.* fx301*.* cgm*.*
```

```
@ECHO Start RotateDWDSATjpg (2 minutes after the TrimTree)
"C:\Program Files\ RotateDWDSATjpg\ RotateDWDSATjpg.exe"
```

In fact I use a task manager with these commands in it. The above two batch files should do the same (although, with computers, there's always Murphy's Law ...)

References

1 David Taylor - http://www.satsignal.eu/
2 Script Snippets – David Taylor - GEO Quarterly No 19, page 30



Earth Imaging News

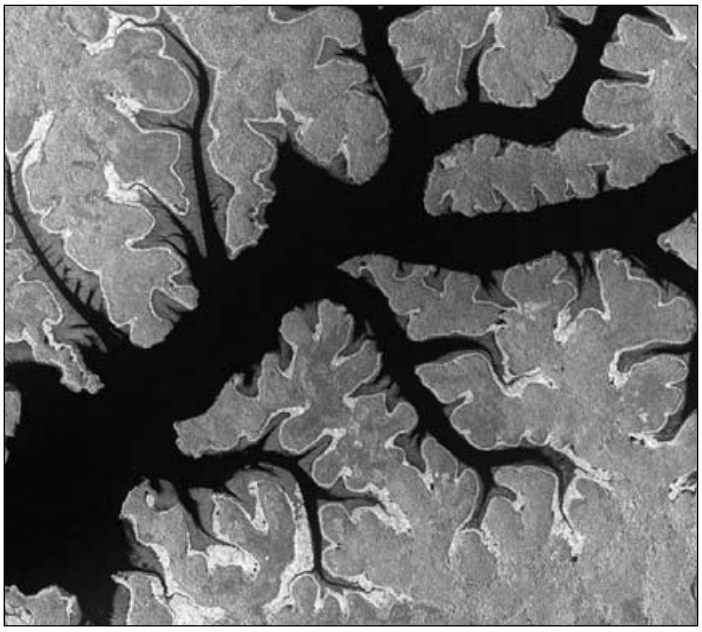
Peter Wakelin

Russia Launches New Class of Photoreconnaissance Craft

The first *Persona* photoreconnaissance satellite was launched from Russia's northern cosmodrome at Plesetsk by a three-stage *Soyuz-2-1b* rocket at 1831 UTC on July 26. The Russians give it the designation *Cosmos 2441*. Believed to be based on the *Yantar* service module, with an optical imaging system similar to that of the *Araks* satellite, this is the first time the Russians have used a sun-synchronous orbit for photoreconnaissance. Early orbit data indicated an eccentric orbit with a 700 km apogee but, four days after launch, perigee was raised to circularise the orbit very close to 29:2 resonance, resulting in near-precise repeat ground tracks every two days. The reported planned operational lifetime is seven years.

COSMO-SkyMed Images Mangrove Swamps

Although COSMO is the acronym for *Constellation of Small Satellites for Mediterranean Basin Observation*, imaging from the current two operating satellites is not confined solely to the Mediterranean region. Their high-resolution radar has resulted in spectacular images from around the world and, following the recent major earthquake in China earlier this year, they were used to look for possible damage to dams.



Mangroves in Guinea Bissau imaged by COSMO SkyMed-1
Credit: ASI

The image reproduced above is of part of the Rio Grande de Buba which flows through the Quinara region of southern Guinea Bissau. The area is completely covered by mangroves and is famous for the production of cashew nuts. Mangroves grow in brackish swamps near the mouths of rivers and are rooted in mud banks formed from silt washed downstream. These banks move, sometimes by several hundred metres a year, depending on changes in river flows and coastal currents. *COSMO-SkyMed's* SAR sensor is the ideal instrument for monitoring this delicate ecosystem. Indeed, there is a very clear contrast between the water's surface—which appears black because it reflects the radar's radiation specularly in a direction well away from the satellite's receiver—and the area covered in vegetation, which appears bright. In places, darker areas can be seen adjacent to the water; these are mud banks uncovered at low tide and are devoid of vegetation.

The *COSMO-SkyMed* programme is funded by ASI (Agenzia Spaziale Italiana) and the Italian Ministry of Defence, and gathers radar imagery for environmental as well as defence and security applications. The first two of four planned satellites were launched on *Boeing Delta II* vehicles from Vandenberg, California in June and December 2007.

Night-time launch of Delta II lifts COSMO-SkyMed 3 to orbit
Credit: Thales Alenia-Space

The 134th successful *Delta* launch lifted the 1,950 kg *COSMO-SkyMed 3* into orbit on October 25 and initial data indicates an orbit very close to the target 620 x 637 km, 97.8° sun-synchronous orbit.

First New-Generation Chinese Weather Satellite Launched

The first of seven *Feng Yun-3* spacecraft was launched from the Taiyuan launch site in China at 0302 UTC on May 27. FY-3A's initial orbit was slightly below the planned 836 km sun-synchronous orbit and crosses the equator at 10.00 local time. The new series replaces the highly successful FY-1 series (FY-2s are in geostationary orbits) and incorporate much improved instrumentation. Direct readout is available via two systems: Medium-resolution Picture Transmission (MPT) is transmitted in X-band on 7775 MHz and includes the full data stream; AHRPT, on 1704.5 MHz, carries selected information. Global data stored on the spacecraft are downloaded to selected ground stations in DPT (Delayed Picture Transmission) format at a high data rate (93 Mbps).

The instrument payload comprises:

- **VIRR** (Visible and Infra Red Radiometer), a 10-channel VIS/IR radiometer for multi-purpose imagery, with a resolution of 1,100 m and a 2,800 km swath.
- **MERSI** (Medium Resolution Spectral Imager), a 20-channel radiometer, primarily for ocean colour and vegetation indices. Five of the channels, including the thermal infrared at 10.0-12.5 micrometres, have a resolution of 250 m and the others are 1,000 m resolution. The swath width is 2,800 km.
- **MWRI** (Micro-Wave Radiation Imager), a 6-frequency, 12-channel conical-scanning radiometer for multi-purpose microwave imagery with a 1,400 km swath width.
- **IRAS** (Infra Red Atmospheric Sounder), a 26-channel radiometer for 17 km resolution temperature and humidity sounding.
- **MWTS** (Micro-Wave Temperature Sounder), a 4-channel cross-track scanning microwave radiometer capable of deriving atmospheric temperatures in almost all cloud conditions.
- **MWHS** (Micro-Wave Humidity Sounder), which operates at four frequencies in the 118 GHz band to determine atmospheric humidity at 15 km resolution across a 2,700 km swath.
- **TOU/SBUS** (Total Ozone Unit and Solar Backscatter Ultraviolet Sounder). These UV spectro-radiometers, one (TOU) with 6 channels for total ozone measurements and the

other (SBUS), a 12-channel, nadir-viewing instrument for ozone profiling.
- **SEM** (Space Environment Monitoring), which measures charged particles from the solar wind in the vicinity of the spacecraft.

It is anticipated that the FY-3 spacecraft will be launched at about two-year intervals and their expected operating lifetime is three years.

China Launches Shi Jian-6 Satellites

The Chinese Xinhua news agency reports than the third pair of *Shi Jian-6* satellites was launched from the Taiyuan Satellite Centre in Shanxi Province at 0115 UTC on October 25. Unlike previous launches in this series, when Xinhua gave a detailed description of each spacecraft's purpose, the news agency reports only that they are performing 'environmental research', which raises the suspicion that they may be military surveillance satellites.

It has been reported that the spacecraft are built by Shanghai Academy of Spaceflight Technology (SAST) and Dongfanghong Satellite Company (DFH) in Shanghai under contract to the China Aerospace Science and Technology Corporation (CAST). The DFH satellite is believed by western analysts to be a small, 300 kg craft whereas the SAST satellite is possibly a development of the Feng Yun-1 weather satellite. The two craft are in near-identical 590 km sun-synchronous orbits.

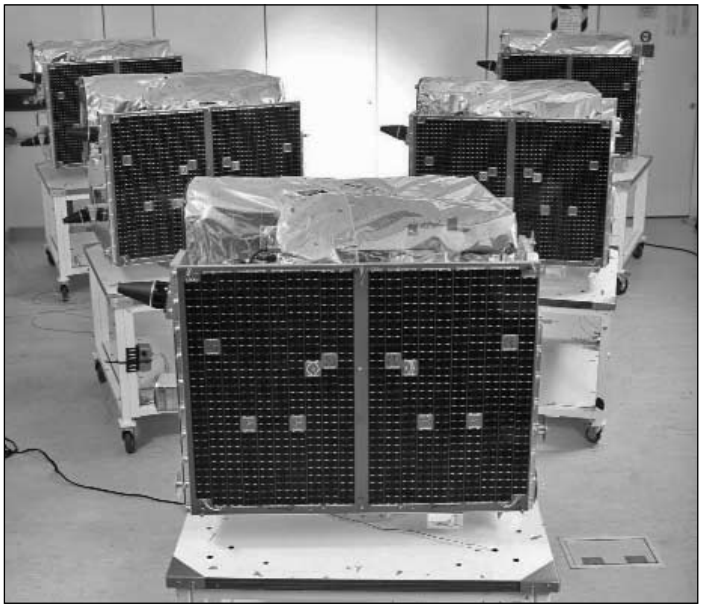
Feng Yun-1C Fragments Still Pose a Hazard to Other Spacecraft

Following the deliberate destruction of *Feng Yun-1C* [1] in a Chinese anti-satellite weapon test on January 17, 2007, well over 2,000 debris objects were catalogued by US sensors. Since then, very few pieces have decayed into the Earth's atmosphere as the spacecraft was in an 850 km orbit. A recent count indicates that 2,339 known pieces are still in orbit, together with an unknown number of pieces too small to detect.

The errant *USA 193* National Reconnaissance Office satellite was much lower when it was deliberately destroyed by an *Aegis* missile over the Pacific Ocean and the last catalogued piece of debris from this incident decayed on October 9.

RapidEye Satellite Fleet Launched for Germany

In the 40th successful space mission world-wide this year, *Kosmotras* launched five identical Earth-imaging satellites on a *Dnepr* rocket for *RapidEye AG* of Brandenberg, Germany from Launch Complex 109 at Baikonur, Kazakhstan at 0716 UTC on August 29. The *Dnepr* vehicle is unusual in that the payloads are mounted below the upper stage rather than on top and protected from the rocket's plume by a 'gas dynamic shield'. This arises because the vehicle is derived from a cold-war-era MIRV (Multiple Independently-targetable Reentry Vehicle) missile capable of carrying several nuclear warheads.



The five identical RapidEye satellites
Credit: SSTL

The satellites, named *Tachys*, *Mati*, *Choma*, *Choros* and *Trochia* are in the same 630 km circular sun-synchronous orbit. The collected imagery will aid *RapidEye's* customers in industries such as agriculture, forestry and cartography. Applications will also extend to disaster relief, and some scientific data returned will be used by DLR (Deutsches Zentrum für Luft-und Raumfahrt - German Aerospace Center).

Built by Surrey Satellite Technology Ltd, each satellite has a mass of 152 kg including 12 kg of manoeuvring and attitude-control propellant. The imager (provided by Jena-Optronik GmbH) has a resolution of 6.5 m and a 77 km swath width but, as the imager's look angle is adjustable, the 5-satellite constellation can image, in total, up to 4 million square kilometers every day at this high resolution, in five spectral bands.

Cluster Watches Earth's Leaky Atmosphere

ESA's formation-flying quartet of satellites, *Cluster*, has discovered the mechanism that is causing oxygen to leak out of Earth's atmosphere into space. New work, by a team headed by Hans Nilsson from the Swedish Institute of Space Physics, using data collected from the four high-altitude polar-orbiting satellites between 2001 and 2003 has shown that the Earth's own magnetic field is accelerating the oxygen away.

Earlier satellite data revealed that the higher oxygen ions were moving faster than those lower in the atmosphere, implying that an accelerating mechanism was involved. The higher orbits of the *Cluster* craft (30,000 to 64,000 km) allowed better measurements of the strength and direction of magnetic field over a wide area, and it was discovered that the changes in direction were sufficient to accelerate the ions out of the atmosphere. The amount of this essential gas escaping in this way is insignificant and there is no cause for alarm.

China Launches Disaster-Monitoring Satellites

A *Long March 2C* rocket lifted off from China's Taiyuan space centre at 0325 UTC on September 6 carrying two *Huan Jing* (Environment) satellites, specifically designed for disaster monitoring, into 650 km sun-synchronous orbits.

Artist's impression of Huan Jing 1A in orbit
Credit: Xinhua

Huan Jing 1A and 1B carry infrared and visible sensors and will be joined by *Huan Jing 1C*, which will be equipped with a synthetic aperture radar, at a later date.

The *Long March 2C*, which is derived from an intercontinental ballistic missile, first flew in 1975 and this

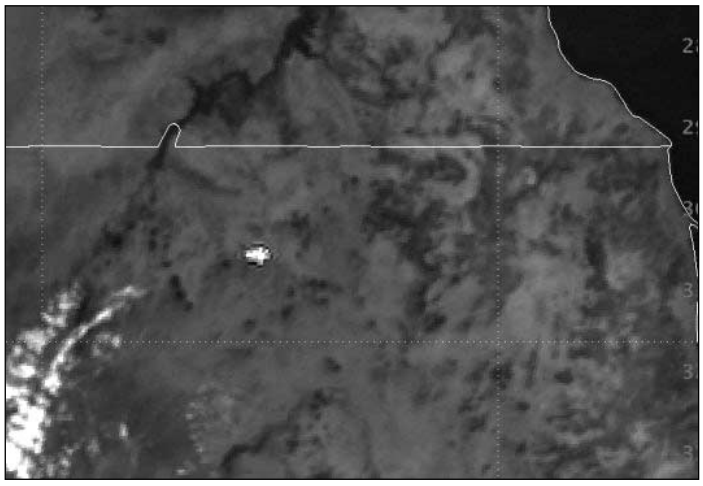
Part of the campus of Kutztown University, Pennsylvania, imaged by GeoEye-1
Credit: GeoEye / Satellite Imaging Corporation

was the 30th satellite launch using this vehicle. No launch failures have been reported.

A large number of debris objects associated with this launch have been catalogued, suggesting that the upper stage of the launch vehicle disintegrated after payload separation.

Meteosat-8 Captures Asteroid Impact

A small asteroid, one or two metres across, was detected on October 6 by astronomers using the Mount Lemmon telescope in Arizona, and given the name *2008 TC3*. It was found to be on a collision course with Earth and was predicted to enter the atmosphere at a shallow angle above Sudan before sunrise on the following day. An hour before impact, Paul Chodas, a scientist at NASA's JPL, refined the impact time to 28 seconds after 0245 UTC.



Meteosat 8's 3.9 micrometre channel captures asteroid impact
Credit: EUMETSAT

Meteosat 8's Rapid Scanning Service captured the huge release of energy as the asteroid heated and detonated many kilometres above the surface, just a few seconds later than the predicted time. The crew of a KLM airliner flying some 1,400 km southwest of the impact point reported seeing a brief, bright flash. The Meteosat infrared imagery showed that maximum heating occurred shortly before the flash detected by the HRV channel.

GeoEye-1 High-Resolution Imaging Satellite Launched

The commercially operated *GeoEye-1* satellite was launched into the planned 681 km sun-synchronous orbit from Launch Complex 2W at Vandenberg, California at 1851 UTC on September 6, by a *Delta II* vehicle. GeoEye-1's sensor, developed by *GeoEye*, is capable of imaging in panchromatic mode at a resolution of just 41 centimetres at the nadir, reducing to 60 cm at a 35° off-nadir look angle. In multispectral mode the resolution is 1.65 m at the nadir. Simultaneous operation in both modes is possible.

Such high resolutions require precision directing of the sensors and *GeoEye-1* can locate targets to an accuracy of about 3 metres. *GeoEye* supplies full-resolution data to the US National Geo-spatial Intelligence Agency but data for commercial use, processed and distributed by *Satellite Imaging Corporation*, is slightly degraded to a maximum resolution of 50 cm. The new sensor is optimised for large projects and, with a one-terabit recording capacity, can collect more than 350,000 square kilometres of multispectral imagery every day.

GeoEye's earlier imaging satellites include the highly successful *Ikonos,* launched nearly 10 years ago, and the more recent, lower resolution, *OrbView-2*.

Reference

1 China's ASAT Destroys FY-1C, GEOQ 15, Sept 2007, page 33.

Signal Plotter

A tool for evaluating APT Antenna Performance

Patrik Tast and Jerry Martes

(Signal Plotter has been a team effort created to evaluate data from the double cross antenna)

It's well over two years since my *APT Decoder* software for capturing weather satellite images was reviewed in GEO Quarterly [1]. In the intervening time, a number of new features have been added, including the *Signal Plotter* which analyses the signal level throughout a satellite pass and creates a graphic illustration of the radiation pattern for the antenna being used. The only restriction on using *Signal Plotter* is that you must utilise either the popular R2FX/ZX [2] or ICOM PCR1000 receiver.

The *Signal Plotter* should be useful to those readers who design and build their own APT antennas. It can be found under the '*Tools*' option of *APTDecoder's* menu. The *Signal Plotter* tool will produce a polar plot of the actual radiation pattern of your APT antenna (figure 1).

The reason for my developing this tool was to produce reliable data to guide my efforts in developing an antenna for use with APT reception. The program plots the actual signal level entering the APT receiver as the satellite passes over. The plots produced by *Signal Plotter* allows me to make direct comparisons between the performances of the various antennas that I build.

Signal Plotter is available, without any cost at all, to anyone who is using *APTDecoder*, which is, as you know, a no-fee APT decoding program [3]. *Signal Plotter* will automatically produce a plot of the antenna radiation pattern when using a *R2FX/ZX* or *ICOM PCR1000 receiver*.

Recording Signal Plots with APTDecoder

To record signal plots you must first enable radio control under **<Settings** → **General settings** → **Radio control>**, where you select *Enable auto tuning* and your receiver type (R2FX or ICOM PCR1000). Next, open **<Tools** → **Radio control>** from the menu bar; you will see a yellow horn icon if you are using the R2FX/ZX and a REC button if you are using the ICOM-PCR1000 receiver. To start recording, click on the icon. The signal file is a text file containing the station information, satellite name, Keplerian elements used and the RSSI (Received Signal Strength Indication) values. The file extension is *.rxt* and it is saved into *APTDecoder's* date-stamped *audio* folder.

> The *Radio Control* window must be open while recording a signal plot. It will record signals only if the satellite is above the station horizon. The icon colour will change to red when it is in recording mode. To stop recording, click the icon again.

To record signals automatically from horizon to horizon you should press the icon when the satellite is approaching you, but still below your horizon. The program will now enter standby mode until the satellite is above your horizon, when it will automatically start recording. It will stop recording automatically when the satellite recedes below your horizon.

Figures 2 and 3 show the radio control windows while recording with the R2FX/ZX and ICOM PCR1000 receivers.

To view the resulting plot, open **<Tools** → **Signal plotter>**. Click **<File** → **Open signal file>** in the *Signal Plotter* window and

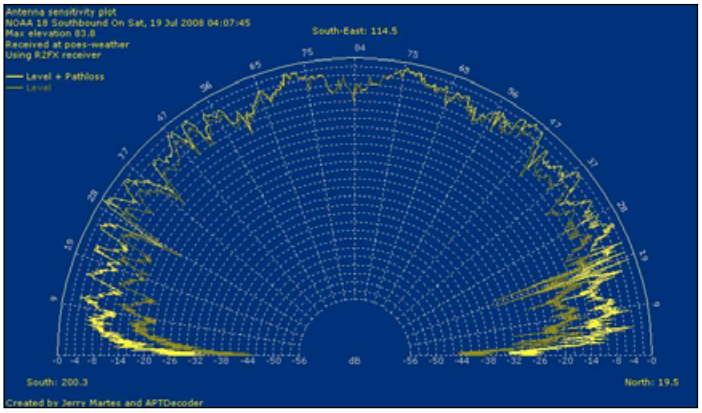


Figure 1 - A typical NOAA-18 Signal Plot

browse to the recorded .rxt file in the date-stamped audio folder tree. You can adjust the scale of the plot from the **<Settings>** option in the *Signal Plotter* window (figure 4).

To view the recorded data in detail click **<View** → **Show data>**. You can also export the CSV data file into *Microsoft Excel* for further analysing.

Recording signals using the DATAQ acquisition instrument is under development and will be supported later this year (2008).

Pass Analyser

Another tool in *APTDecoder* that can be used to analyse your antenna is the *Pass Analyser*. This tool will show you at which azimuth and elevation the signal was weak enough to cause a fade in your APT image. The output is based on how many audio samples were required to display a single line of APT image. The satellite path is rendered in yellow and possible noise in blue, perpendicular to the satellite path.

Figure 2 - The R2FX radio control window

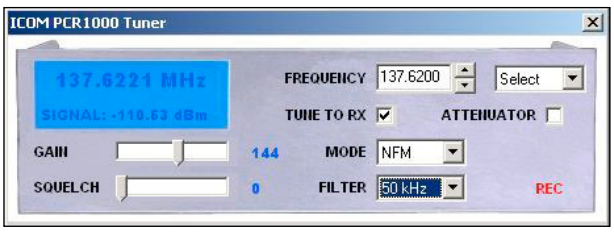


Figure 3 - The ICOM PCR1000 radio control window

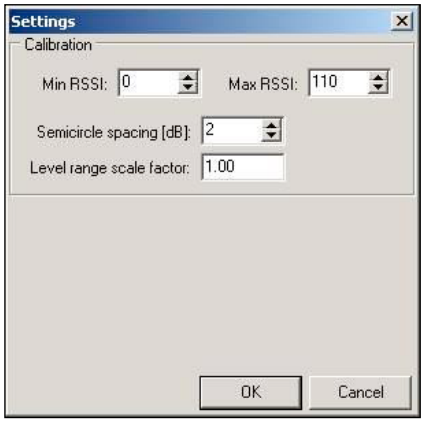
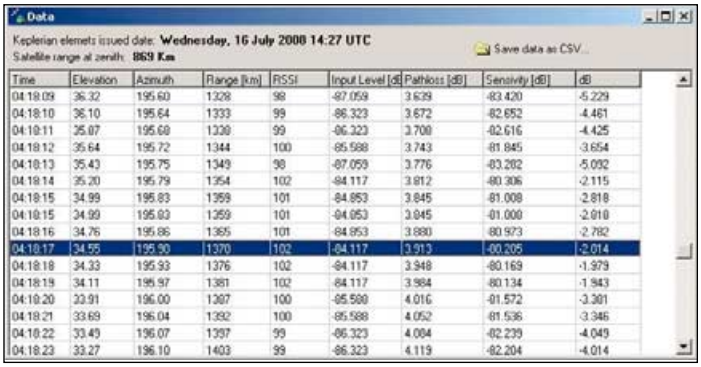


Figure 4

The Settings Window



Time	Elevation	Azimuth	Range [km]	RSSI	Input Level [dB]	Pathloss [dB]	Sensivity [dB]	dB
04:18:09	36.32	195.60	1328	98	-87.059	3.639	-83.420	-5.229
04:18:10	36.10	195.64	1333	99	-86.323	3.672	-82.652	-4.461
04:18:11	35.87	195.68	1338	99	-86.323	3.708	-82.616	-4.425
04:18:12	35.64	195.72	1344	100	-85.588	3.743	-81.845	-3.654
04:18:13	35.43	195.75	1349	98	-87.059	3.776	-83.282	-5.092
04:18:14	35.20	195.79	1354	102	-84.117	3.812	-80.306	-2.115
04:18:15	34.99	195.83	1359	101	-84.853	3.845	-81.008	-2.818
04:18:15	34.99	195.83	1359	101	-84.853	3.845	-81.008	-2.818
04:18:16	34.76	195.86	1365	101	-84.853	3.880	-80.973	-2.782
04:18:17	34.55	195.90	1370	102	-84.117	3.913	-80.205	-2.014
04:18:18	34.33	195.93	1376	102	-84.117	3.948	-80.169	-1.979
04:18:19	34.11	195.97	1381	102	-84.117	3.984	-80.134	-1.943
04:18:20	33.91	196.00	1387	100	-85.588	4.016	-81.572	-3.381
04:18:21	33.69	196.04	1392	100	-85.588	4.052	-81.536	-3.346
04:18:22	33.49	196.07	1397	99	-86.323	4.084	-82.239	-4.049
04:18:23	33.27	196.10	1403	99	-86.323	4.119	-82.204	-4.014

Figure 5 - Output from *Pass Analyser*

To view the audio based analysis plot, first decode an audio (WAV) file then click on **<Images → Spacecraft → Pass analyser>** (figure 5). You will get more options if you right-click the mouse on the image. To save the plot select *'Copy to clipboard'* then paste it in your favourite image editor.

The audio analyser plot in figure 6 shows that between azimuth 200° - 205° and less than 2.6° elevation, and again between azimuth 335° - 340° at less than 2.5° elevation, the recorded signals were weak enough to show noise on the image.

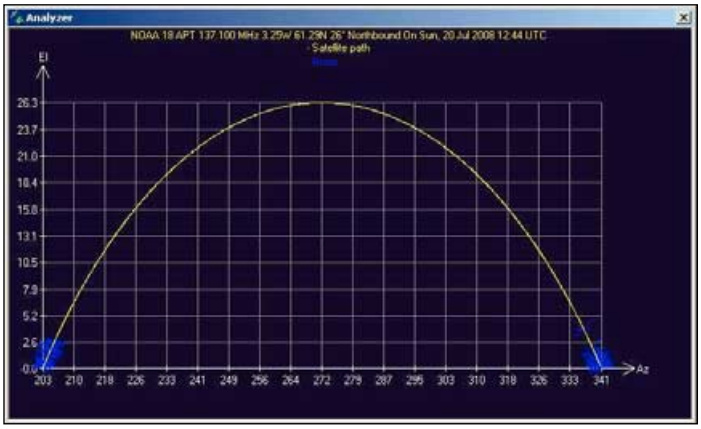


Figure 6 - The Pass Analyser

References

1 APTDecoder - GEOQ 8, page 15
2 R2FX APT Receiver - GEOQ 7, page 19
3 APTDecoder Download - http://www.poes-weather.com/

Development of the Double Cross APT Antenna

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After evaluating several APT antenna designs, it became clear to me that the commonly used APT antenna design concepts perform well enough to produce good images whenever the satellite is above about 10° elevation. For many purposes, a clean image from a satellite down to 10° above the horizon is adequate. But, if the objective is to display a complete satellite image for its entire time at and above zero degrees elevation, some care needs to be taken to build a good APT antenna.

I had been having considerable difficulty constructing such an APT antenna till Jerry Martes introduced me to the *Double Cross Antenna* (DCA) design concept. After building my first DCA, it became clear to me that that this design was more tolerant of my crudeness in antenna design and construction.

The DCA may be of interest to GEO readers who have an interest in homebrew APT antennas. Here are some of the design considerations I used.

The quality of an APT image is dependent on there being no loss of adequate signal from the satellite for the entire time it is above the horizon. Also, the satellite signal is about 12 dB weaker when the satellite is at its lowest elevation than when it is overhead. That low-level signal associated with lower elevations places the greatest need for antenna sensitivity on these low elevations.

For antennas located where there are obstacles that shadow the view to the horizon there is less value in sophisticated APT antennas since the satellite signal is obstructed by buildings, trees and mountains.

When it can be assumed that the satellite is 'illuminating' the Earth with an antenna that radiates equal signal strength at all angles in the directions toward the Earth, the ideal APT antenna radiation pattern would be as shown below.

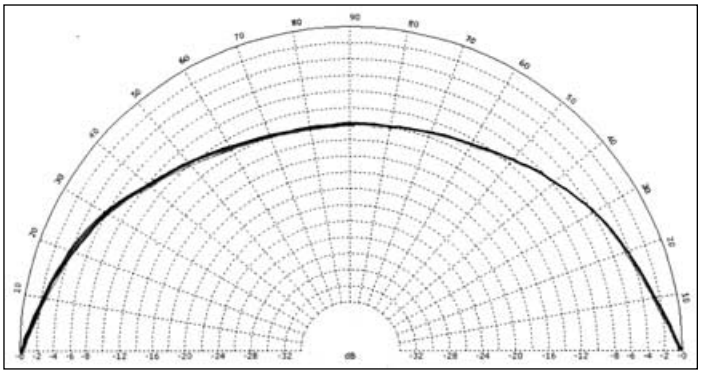


Figure 1 - Radiation pattern for an ideal APT antenna.

The satellite is 4 times closet to the APT receiving antenna when it is overhead than when it is on the horizon. This results in a path loss of close to 12 dB for low elevation satellites as compared with satellites overhead.

It is clear that the satellite signal is about 12 dB weaker when it is at the horizon than when overhead, because the signal travels so much farther when it is at low elevation angles.

If the ground based APT antenna had a pattern as shown in figure 1, the receiver would experience the same signal strength for all elevation angles. As the satellite comes closer while rising, the signal increases, while the APT antenna antenna sensitivity diminishes.

The DCA design concept was developed in an effort to provide a maximum sensitivity to satellite signals from low elevations. An additional benefit of the DCA is its being quite tolerant of being built from nearly any size and shape of materials. It consists of four dipoles, each about 1 metre long as shown in figure 10. The opposing dipoles are spaced about ½ metre apart and tilted about 30° from vertical. These four dipoles in the DCA are fed with a four-way harness so that two dipoles radiate ¼ wave later than the other two.

Development of the DCA for APT

When two dipoles mounted as shown in figure 2 are fed through equal length lines—so that they radiate in phase—spaced ¼ wavelength apart, they produce a free space pattern as shown in figure 3.

This *Cross* array is very sensitive to a circularly polarised (CP) signal perpendicular to the two dipoles (i.e. along the direction of their support arm). The sensitivity degrades to linear when a satellite is overhead but remains quite good since linear sensitivity is only 3 dB less than circular sensitivity.

Such a single *Cross* is a well known, fundamental method of phasing twin dipoles to produce circular polarisation. A problem with the *single Cross* configuration, however, results from its high degree of sensitivity to signals reflected from the ground, since such ground reflections can seriously degrade the sensitivity to satellite signals. The *Cross* has a total null toward its sides and reflections from the ground at low satellite elevations can null the signal and produce a sharp line on an APT image. Such nulls tend to be decidedly location specific.

The only contribution we have made for the APT community is to show that ***two*** Crosses can be nested together so that one pair fills in the nulls of the other: therefore the term '*Double Cross Antenna*'. With a second pair of crossed dipoles located within the first pair, as shown in figure 4, and fed 90° later than the first pair, the radiation pattern for APT reception is greatly improved (figure 5). This relatively uncomplicated set of twin pairs of crossed dipoles can be used for APT with good results since it has good sensitivity to signals from satellites at or near the horizon.

It is expected that the basic DCA concept will be easily understood based on the above explanation. Once the basics are understood, you can refine the design for use with APT reception.

Signal Polarisation

The NOAA satellites are transmitting RHCP (Right-Hand Circularly Polarised) signals. It is therefore necessary that the two dipoles should be connected together so their radiation pattern produces Right Hand Circular Polarisation. This means that, when the electric field of the 'north' dipole is pointing upward, the electric field in of the 'south' dipole points downward. Although the 'east' and 'west' dipoles are fed 90° later than the north-south pair, the east-west dipoles must also be connected to one another so the 'west' dipole's electric field points up when the 'east' dipole points down. This is is shown in figure 6.

When the dipoles are tilted slightly toward vertical, their terminal impedance becomes very close to 50 ohms. So, for APT, the dipoles are tilted at 30° from vertical. When the terminal impedance of each of the four dipoles in the DCA is close to 50 ohms, a relatively simple connecting harness can be made using 50 ohm coaxial cable, and connected as shown in figure 7.

The *north* dipole is fed in series with the *south* one through equal lengths of 50 ohm coax to provide a 100 ohm load. The *east* and *west* dipoles, fed in phase with each other, also produce 100 ohms. These two 100 ohm loads, when connected in parallel, give a good impedance match with the 50 ohm line to the receiver. The additional 36 cm line length to the *east* and *west* dipoles causes them to radiate ¼ wave later than the north/south pair. The theory is shown in the side panel overleaf. Additional information on the concepts associated with under-standing the DCA concept can be found at

http://www.poes-weather.com

Construction of the DCA

If the reader is interested in building a DCA APT antenna and has access to 8 copper or aluminum tubes of approximately 6 mm diameter and each about half a metre in length, a good APT antenna can be constructed by mounting the tubes as shown in

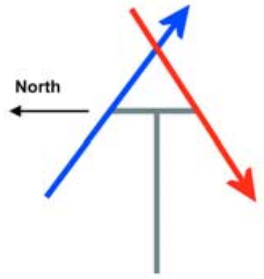


Figure 2
Dipoles, crossed at 90°, a quarter wavelength apart, and fed in phase

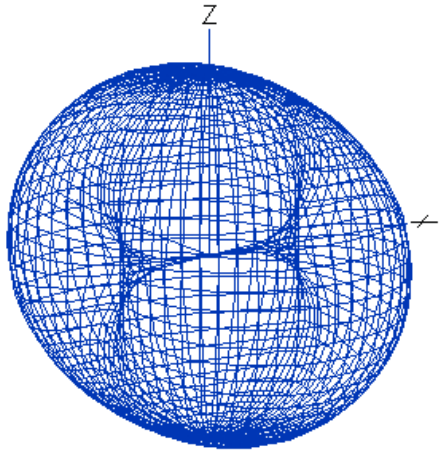


Figure 3
RHCP radiation pattern of two crossed dipoles

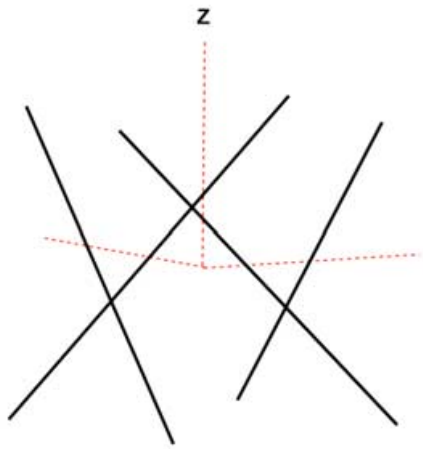


Figure 4
Two pairs of crossed dipoles mounted together

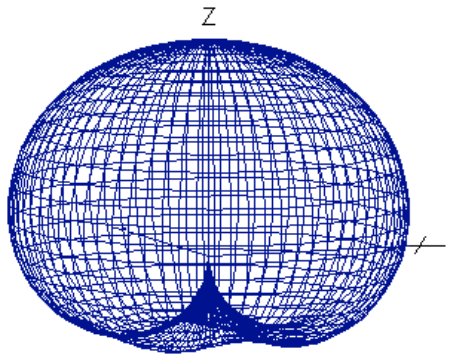


Figure 5
Free space RHCP radiation pattern of the array of four dipoles

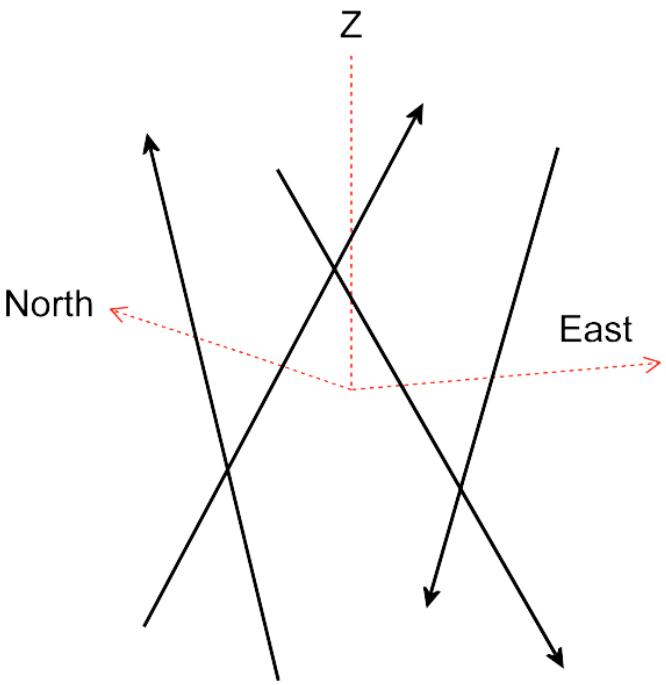


Figure 6
Dipoles with arrows to indicate their connection to provide appropriate polarity

Phasing the DCA Dipoles

Radio waves travel at the speed of light, 3×10^8 m/s. In order to create the desired circular polarisation, the *east* and *west* dipoles must react 90° later than the *north* and *south* dipoles; this means delaying the signal from the satellite by one quarter of a wavelength.

To establish the extra length of coax needed, we make use of the frequency (137.5 MHz) and the velocity factor of the coax (which is 0.66 for RG58U). One quarter wavelength (which equates to a 90° phase change) for RG58 coax at 137.5 MHz is given by

$$\Delta L = \frac{\text{speed of light} \times 0.66}{4 \times 137.5\ \text{MHz}}\ \text{m}$$

$$= \frac{3 \times 10^8 \times 0.66}{4 \times 137.5 \times 10^6}\ \text{m}$$

$$= \underline{0.36\ \text{m}}$$

The coax for the *east* and *west* dipoles are thus each 36 cm longer than the coax for the *north* and *south* dipoles. If the N/S coax is 1 m long, then the E/W coax must be 1.36 m in length.

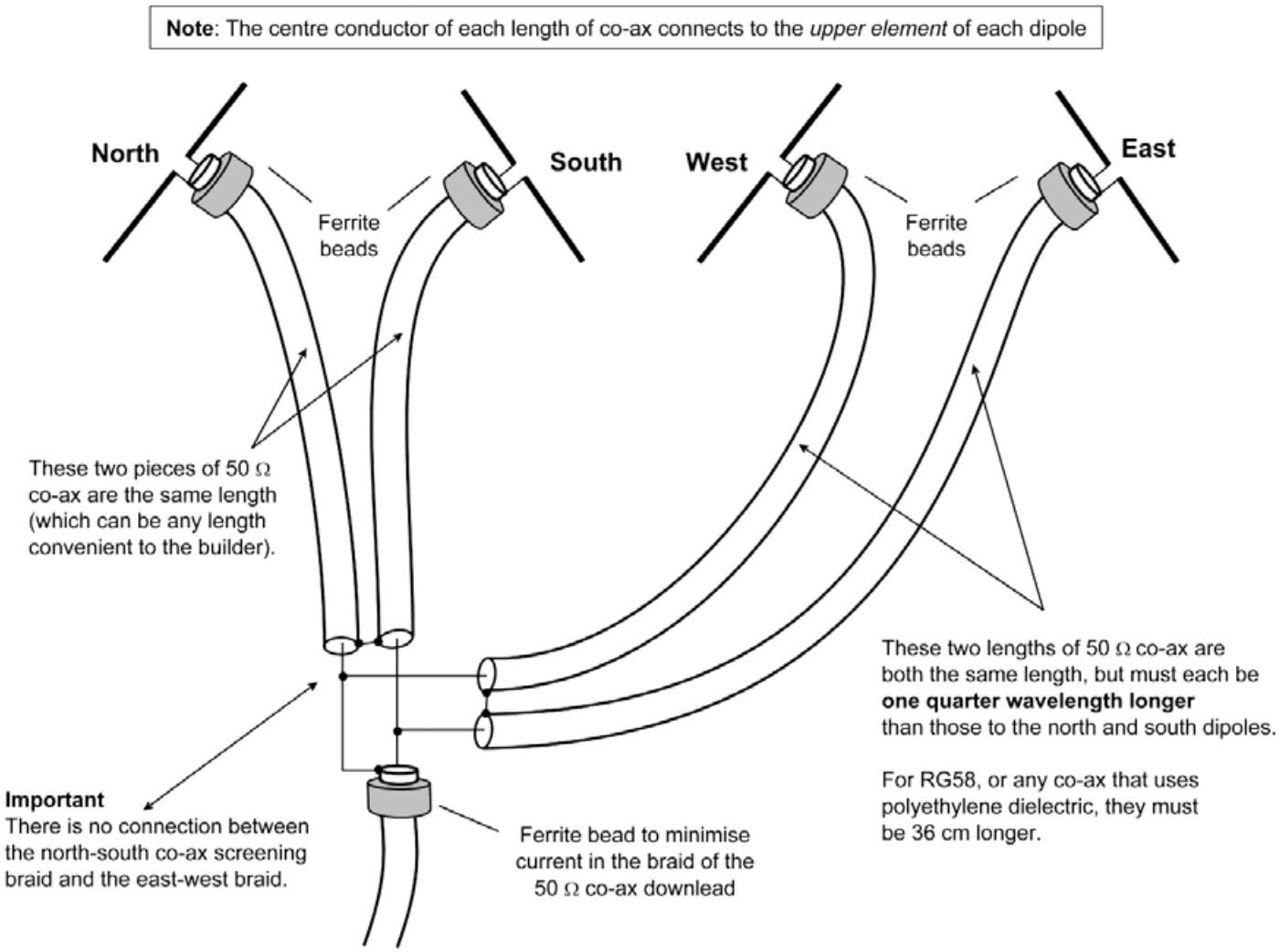


Figure 7 - The DCA harness made from RG 58, 50 ohm coax and ferrite rings

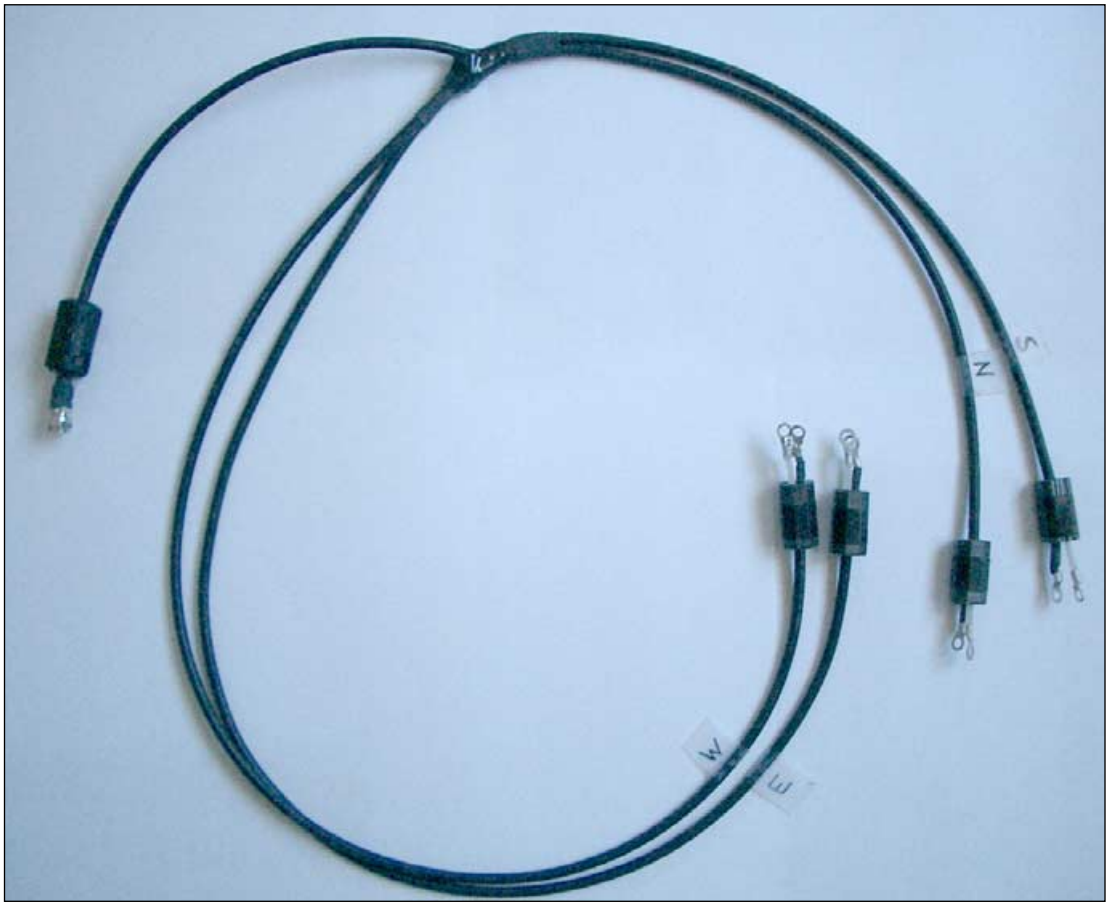


Figure 8 - Photograph of the completed harness, with each length of coax labelled

figure 6. A construction diagram for the harness which connects the four half wave dipoles with the downlead coax to the receiver is shown in figure 7. A photograph of the completed harness appears above in figure 8.

The ferrite beads can be of any ferrite material developed for reducing high frequency RFI. The beads used on computer cables will work OK. Any ferrite bead with relatively high permeability will probably work. The objective of the ferrite beads is to produce a high impedance to currents conducted from the inside of the coax to its the outer shielding braid. Any current conducted along the outside of the coax shield will interfere with the desired radiation pattern of the dipole.

Figure 9
Detailed view of one of the ferrite beads

It is important to pay close attention to the connection of the harness to the dipoles. Notice that *either* of the short lengths of coax can be connected to *either* of the longer lengths (opposite dipoles). The other short coax is connected to that opposite dipole. It is perhaps worth labelling the *north* and *south* two dipoles so that they can be easily identified.

After the coax has been connected to the *north* and *south* dipoles, adjust the dipoles so the upper half of each is connected to the centre conductor of the coax. Then connect the *west* dipole to the long length of coax that has DC continuity to the upper half of the *north* dipole. The remaining coax in the harness is connected to the *east* dipole.

As a double check, be sure that the rear dipole of each pair is tilted to the right (as viewed along the length of the supporting strut) as shown in figure 11. Additionally, check that the upper half of each dipole connects to the centre conductor of its coax.

We have recorded many weather satellite images and signal plots, using designs of the DCA constructed from various shapes and sizes of materials. All have produced excellent images even though their dimensions are not precisely the same as each other. Perhaps there is yet another design configuration of the DCA that can be considered 'ideal'. But to date, the performance of the basic configuration has been good, and additional refinement of the design may not be needed. We will be delighted to receive comments from readers who undertake the construction of a *Double Cross Antenna*.

Mounting the DCA

The final mounting of the DCA dipoles is left to the ingenuity of each individual constructor. Jerry has used a wooden framework to support his metal dipole pairs while figures 10 and 11 illustrate two designs based on plastic tubing and connectors.

Jerry has produced a PDF document detailing many of the stages in the construction of his double cross antennas.

http://shop.poes-weather.com/pub/137-DCA-Kit.pdf

Fred Piering has produced an even more detailed assembly manual which also includes a parts list.

http://www.poes-weather.com/media/DCA-Assembly-Hints.pdf

A DCA Constructor's Comment

From Mike in North Carolina: '*I had tried many times to build a QFH, with no luck. I just could not get it to work properly. The DCA worked the first time, with great pictures. Easy and cheap to build.*'

Imaging

The false colour NOAA-18 image (figure 8) was recorded by Jerry on January 9, 2008 at Los Alamitos, CA. The minute markers included on the image show that 15 minutes of imaging were possible. Bearing in mind the fact that Jerry

Figure 10
This Double Cross Antenna constructed by Tom Baldwin (W6MDX)

This antenna consists of four ½-wave dipoles
with ¼-wave spacing between opposing dipoles

Figure11 - The Double Cross Antenna

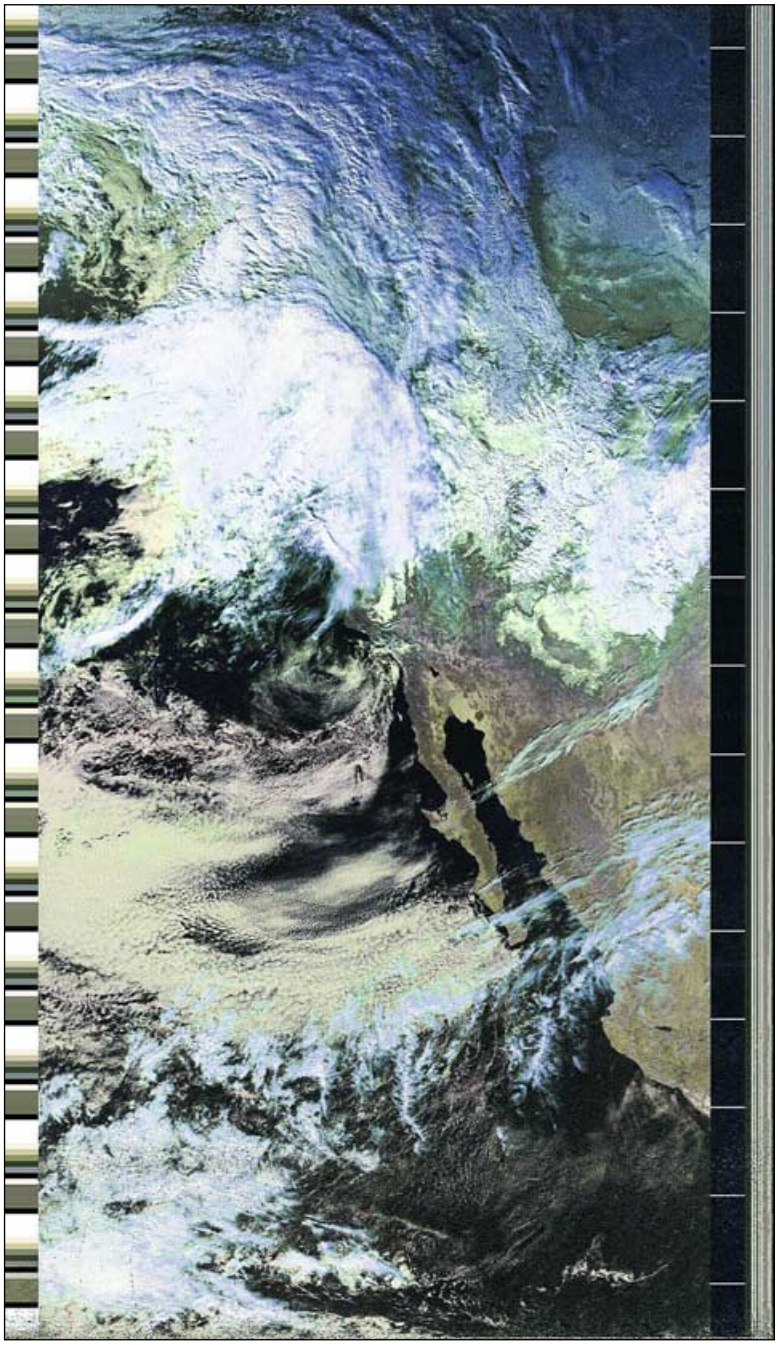


Figure 12
A 15-minute NOAA18 pass received by Jerry Martes
using his DCA antenna at 21:08 UT on January 9, 2008

Figure 13

Jerry Martes' location, showing the power lines directly behind his property

has overhead power lines just 10 metres from his location, this image is testimony to the effectiveness of the Double Cross Antenna.

Patrik took another DCA, constructed from plastic and aluminum tubing, to a remote site in Vasa, Finland, where there are clear horizons and therefore minimal shadowing of satellite signals. The NOAA-18 opposite, with a maximum elevation of just 51°, was received on July 6, 2008, using the DCA, R2FX and laptop computer. Excellent imagery is displayed, stretching all the way from the far northwest of Greenland to Turkey.

Figure14
APT imaging from a remote location at Vasa, Finland. The Double Cross Antenna is mounted prominently on the roof of the vehicle at left.

Figure15
Patrik's R2FX and laptop APT station in the rear of the vehicle:

The colour image of Greenland and the Arctic on our front cover comes from the 09:42 UT NOAA-15 pass acquired earlier the same day, which had a maximum elevation of just 11° from Vasa.

There are many other images available to the readers, which can be found in the *Portable APT Blog* section at

http://www.poes-weather.com

These images and their associated *Signal Plotter* patterns indicate that the DCA is a good antenna design concept for APT reception.

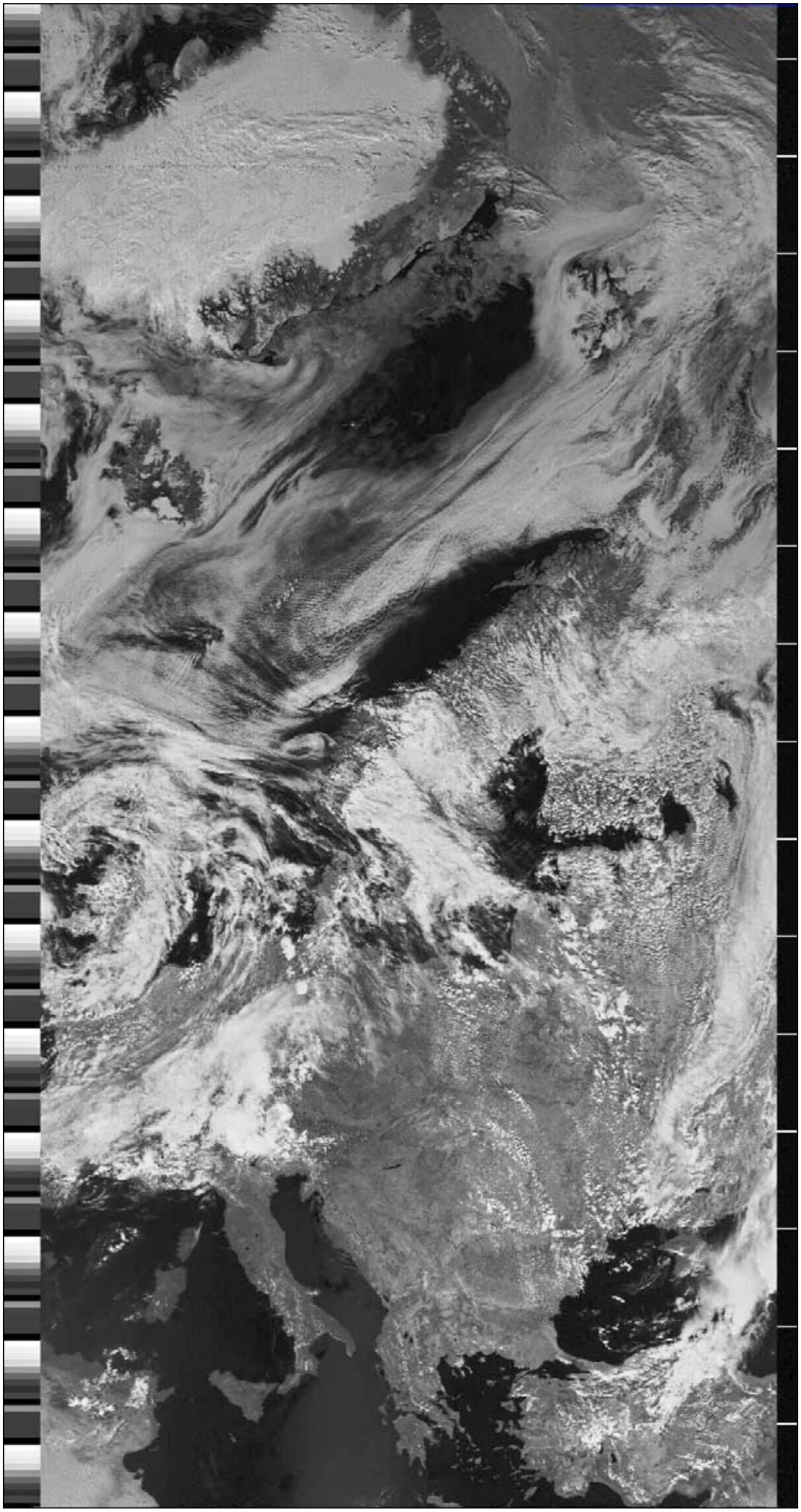
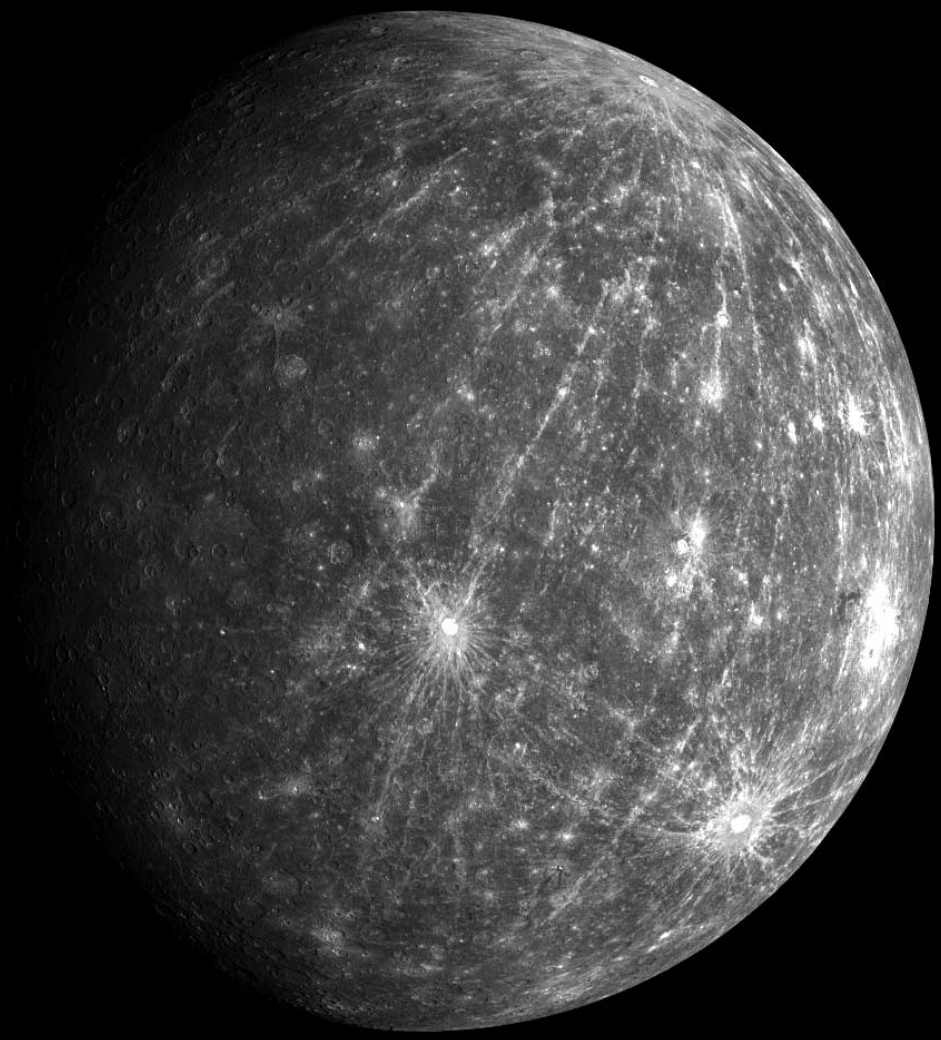


Figure16 - A 15 minute 51° elevation NOAA-18 pass acquired from Vasa, Finland at 11:41 UT on July 6, 2008

New Images from MERCURY MESSENGER

NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington



On October 7, 2008, NASA's ***Messenger*** spacecraft flew past Mercury and photographed a broad swath of never-before-seen terrain. The spectacular image opposite was acquired by the spacecraft's Wide Angle Camera (WAC) about 90 minutes after closest approach to Mercury, at an altitude of about 27,000 kilometers: This photograph of Mercury's unseen side reveals a dramatic system of globe-straddling rays.

The most striking characteristic of this area is the large pattern of rays streaking downward from the planet's northern regions. The ray system appears to emanate from a relatively young crater previously seen in Earth-based radar images and now photographed by a spacecraft for the very first time.

In the mid-1970s when Mariner 10 made three flights past Mercury, less than half the planet was photographed and *Messenger's* initial flyby on January 14 added an additional 20%. Messenger's October 6 flyby of Mercury (its second so far) unveiled a further 30% of the planet's surface that had never before been seen.

Scarps

As the *Messenger* team continues to study the high-resolution images taken during January's Mercury encounter, scarps that extend long distances have been discovered. The frame at lower right, taken by the Narrow Angle Camera (NAC) of the Mercury Dual Imaging System (MDIS), shows a long scarp crossing the scene vertically on the far right of the image. The width of this image is about 200 kilometers, showing that scarps on Mercury can be hundreds of kilometers long.

The presence of numerous long high scarps, originally discovered during the Mariner 10 mission in 1974-5, suggests a history for Mercury that is unlike that of any of the other planets in the solar system. These giant scarps are believed to have formed when Mercury's interior cooled and the entire planet shrank. *Messenger* images like this are providing the first high-resolution views of many regions on Mercury's surface and science team members are busy mapping these newly discovered scarps to see whether they are common everywhere on the planet.

Image Credits: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington

Figure 1 - Committee members of Werkgroep Kunstmanen consult prior to the main meeting. (*Photo: David Taylor*)

Figure 2 - A pre-meeting discussion: David and Cecilia Taylor and Ferdinand Valk prior to the main meeting. (*Photo:Ben Clevers*)

Figure 3 - Fred van den Bosch demonstrates his software
Photo: David Taylor

Figure 4 - Testing different LNBs on Arne's 80 cm antenna
Photo: Cecilia Taylor

Figure 5 - Experimenting with Dish Alignment
Photo: Cecilia Taylor

Figure 6 - Relaxing in the Delphi Restaurant
Photo: David Taylor

Figure 7 - Metop

Figure 8 - Jason-2

Report from Utrecht - September 2008

David Taylor

A small group of UK amateurs travelled to the Netherlands for the September meeting of *Werkgroep Kunstmanen*, who are well known for their high level of activity and technical knowledge. As the September meeting was held on the Saturday following the EUMETSAT Users Conference, David and Cecilia Taylor actually travelled up from Darmstadt, and were slightly surprised when their passports were inspected on the train after crossing the border from Germany to the Netherlands. I thought that stopped years ago?

For those who haven't been to a *Werkgroep Kunstmanen* meeting before, the formal start is around 11 am but there's plenty to do before then. For example, the committee use that time for their own meeting, to help keep the group running smoothly. As there are about five meetings a year, the committee meetings (figure 1) can be short and to the point. While the committee is meeting, others can get round the table for some earnest face-to-face discussions (figure 2). Several members were interested in the new version of Fred van den Bosch's POVIM software (figure 3) and this version, written in Borland's Pascal-derived *Delphi* language, was most impressive.

After the usual 'hand the microphone round' session, where group members can describe progress on their current projects and ask questions to the group, I gave a talk about the newer products available on EUMETCast, and an update on the most recent EUMETSAT announcements straight from the Users Conference in Darmstadt. It was a 'first' for me to use my laptop on the train from Darmstadt to update my presentation with the latest news! I noted that the ICE train even had a power point in the arm-rest between the seats, although I didn't check for Wi-Fi Internet access as I didn't want to get distracted! You will find the highlights of the news elsewhere in this *Quarterly*. Many thanks for the unexpected gift at the end of my presentation!

David Taylor
Photo: Ben Clevers

After the formal part of the proceedings was completed, we decanted to the terrace where some important tests concerning the move of *EUMETCast* Europe from *Hot Bird-6* to *Eurobird-9* at an orbital location some 4°W of the current location were taking place. The lower total energy from this satellite can make it more difficult to locate using a simple satellite finder (RF energy meter); so members had brought along a variety of satellite finders and different LNBs, all to be fitted to Arne van Belle's 80 cm antenna (figure 4). Arne demonstrated how to swing the dish once the receiver had been set to the 11977 MHz transponder frequency—which is used on both satellites. Getting the 'feel' for how much the required 5° swing actually means in terms of moving the dish was very helpful, although other methods such as solar alignment or measuring the edge-of-dish movement are also feasible (figure 5).

Certainly, if you don't have the high-band Ku frequency selected, there is almost no indication from the new satellite (figure 7).

Figure 9 - Where's that signal gone?
Photo: Cecilia Taylor

The responses of the different meters were quite surprising. My very cheap meter was very sensitive but had a rather exponential response, so that a doubling of voltage produced rather more than a doubling of the meter indication. This meant that you needed to be approximately correct with the coarse sensitivity setting to be able to see the peak from the satellite. When the peak came, it was well defined, though. Some meters had a more logarithmic than exponential response, so the peak was difficult to see. Several meters had a sound output, but this was mostly fixed in frequency so you needed to detect the change of level with your ears, rather than the change of pitch which might have been much easier and precise.

One meter simply had three LEDs, one of which was the power indicator, so you almost had three conditions, no-signal, some-signal, and more-signal. The audio output on that meter had just three volume steps (IIRC). One dead LNB was discovered, and people could compare what results their LNBs gave on exactly the same receiver system. There was quite a long cable run to be coiled-up afterwards! Our software gurus must have found all this hardware rather puzzling (figure 10).

After the meeting a group went out for an evening meal in Utrecht (figure 9). A short list of four restaurants had been selected, based, I understand, on recommendations found on the Internet. Well, it certainly worked, because the Greek meal we had at the *Delphi* restaurant was amongst the best restaurant meals I have ever eaten in the Netherlands—Rice Taffels excepted!

Figure 10 - Pensive Software Gurus
Photo: Cecilia Taylor

My thanks to *Werkgroep Kunstmanen* for allowing me to speak at their meeting and to those who brought equipment to allow the testing. Thanks to Cecilia Taylor and Ben Clevers for their photos. All-in-all, a thoroughly enjoyable and interesting day. I'm already looking forward to my next visit to the Netherlands!

News from the EUMETSAT Users' Conference

Darmstadt - September 2008

David Taylor
SatSignal Software (www.satsignal.eu)

Figure 3 - The Darmstadtium

Following the recent EUMETSAT Users Conference in Darmstadt during September 2008, it may be helpful to summarise the present state of European weather satellite broadcasting and give hints about developments expected over the next few years. The conference itself was held in the newly built *Darmstadtium,* a large and impressive building incorporating both the known castle walls when it was planned [figure 3) as well as further ancient walls which had been discovered during its construction [figure 5). The planned evolution of EUMETSAT services was introduced by Mikael-Rattenborg [figure 1), the Director of Operations for EUMETSAT.

Figure 4
Andrew Monham

Figure 5 - More Old Town Walls

Zero-Degree Service

The 0° service (covering Europe and Africa) is currently provided by Meteosat-8 (MSG-1), which supplies the rapid scanning service and acts as hot-standby, and Meteosat-9 (MSG-2) broadcasting the production service. In the short term, no change is expected until MSG-3 is launched, when it is possible that Meteosat-8 will be moved to provide the Indian Ocean service. The only near-term change is that the MPEF (meteorological products) from the 5-minute Rapid Scanning Service will move from trial to production status.

Figure 1
Mikael-Rattenborg,
Operations Director,
EUMETSAT

Foreign Satellite Data

The present foreign satellite data on the *EUMETCast* service (GOES-west, GOES-east, Indian Ocean from Met-7, and Australasia from MTSAT-1R) are likely to be supplemented by data from the Chinese FY-2C satellite which provides coverage at 104.5°E. This data includes a 1-km resolution visible channel which could make for some super images.

EARS

Anders Meier Soerensen (figure 2) described the plans for the EARS service, which provides near-real-time data from polar orbiting satellites from a set of HRPT receiving stations within an extended-European region. There are already stations in Spain (Maspalomas), France (Lannion), Greece (Athens), Norway (Svalbard) and Canada (Gander), and this service is working well relaying both the sounder data (ATOVS) and the images data (AVHRR) with which readers will already be familiar.

Figure 2
Anders Meier
Soerensen

This service is likely to be enhanced by the addition of a Moscow receiving station soon, and perhaps stations in Muscat, Africa and Siberia at a later date. It is hoped that the service will carry NOAA-19 data once that satellite is launched, but to do so may mean dropping NOAA-17 or NOAA-18 data, or at least reducing the priority of collecting data from these earlier satellites.

Metop

Andrew Monham [figure 4) gave a most interesting talk on the progress to date of Metop-A, Europe's polar orbiting satellite. There will be no 137 MHz LRPT transmissions from either the current Metop-A satellite or the follow-on Metop-B and Metop-C craft. This is because the LRPT system causes interference to the HIRS sounder. Radiation has also caused some satellite-reset events, but EUMETSAT can now recover from such events much more rapidly than before.

The failure of the HRPT (actually AHRPT) transmitter has been extensively analysed, and identified with a particular component which is likely to fail at higher radiation levels, such as those near the poles. For the future Metop-B and Metop-C satellites, this component will be replaced; this will require some work on the satellites, which have been in storage ready to launch. For the existing Metop-A satellite, it is proposed to enable the AHRPT transmitter and to operate it in such a way that the likelihood of failure is minimised. This, broadly-speaking, means operating it near Europe and perhaps the USA, on that part of its orbit which doesn't exceed a certain latitude (i.e. near the equator only). The exact details have yet to be finalised but the aim will be to provide maximum service at minimum risk.

It is intended to add Metop data to the EARS service, although development of ATOVS sounder data will have priority over AVHRR image data. New data-dump stations in Europe and Antarctica will be added to improve the timeliness of the data.

TelliCast Service - Ku-band Europe Service

This will be moving to a new satellite, and technical aspects of this change are dealt with on page 29 of this issue. I understand that EUMETSAT is required to put out tenders every few years, and it seems to me that EUMETSAT have managed to choose a solution which, even though it involves a satellite move, retains the same *TelliCast* software and thus minimises upset to the users; at the same time, it provides the expansion capability EUMETSAT needs (recall that MSG-3 and MSG-4 are due to be launched, and Metop-B and Metop-C will increase the data flow yet more). Over the last few years the volume of data sent by EUMETSAT has increased more than tenfold—and this expansion is continuing. There should be a secondary backup link in the event of a major system failure (although switchover time would be days, not hours).

The 12.8 million euro contract securing the availability of EUMETCast services for Europe until 2014 was signed on February 18. Under this contract, *Media Broadcast*, in partnership with *T-Systems*, will continue to provide satellite services to EUMETSAT, supplying a bandwith of 15 Mbits/s

continued on page 36 ...

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 - 184.00 UK non-member's price - £198.00

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 - £159.00 UK non-member's price - £173.00

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)	184.00	188.00	196.00	198.00	202.00	210.00
R2FX APT Receiver (no PSU)	159.00	163.00	171.00	173.00	177.00	185.00
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)	7.50	-	-	10.00	-	-
Dartcom High Quality QFH Antenna	259.00	279.00	-	279.00	299.00	-
Turnstile APT antenna	43.50	-	-	48.50	-	-
John Silver Preamplifier (built)	29.50	30.00	31.00	33.50	34.00	35.00
Bias Tee	15.00	15.50	16.00	19.00	19.50	20.00
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	55.00	58.00	-	65.00	68.00	-
TechniSat SkyStar 2 PCI Card	59.50	61.00	-	65.50	67.00	-
Telestar 80 cm dish with LNB	57.00	-	-	64.00	-	-
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 2004-2007 (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 - £15.00
UK non-members price - £19.00

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 - £29.50
UK non-members price - £33.50

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 - £55.00
UK non-members price - £65.00

Telestar Universal Ku-band 0.6 dB Universal LNB

(or similar model)

Digital satellite TV Universal LNB for use with the SkyStar receivers above or any DVB satellite TV receiver.

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 0.6 dB LNB

(or similar model)

A quality German made aluminium dish and LNB with an AZ/EL mount to fit onto a vertical pole. (Wall or patio mounts are available from local satellite TV dealers)

UK members price - £57.00
UK non-members price - £64.00

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

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

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

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

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: mikeg4cfx@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/

Websites

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

NOAA National Weather Service
Current weather conditions prevailing at locations within a country of choice
http://weather.noaa.gov/international.html

Images from 'Mercury Messenger'
Images obtained during the recent flyby of the planet Mercury by NASA's reconnaissance spacecraft may be viewed at
http://messenger.jhuapl.edu/the_mission/gallery.html

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

The Copy Deadline for GEO Quarterly No 21 is Saturday, February 28

The Editor is always on the lookout for articles and images for inclusion in GEO Quarterly. These can relate to any aspect of Earth Imaging, especially:

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

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

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

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

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

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

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

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

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

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

Group for Earth Observation

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3. UK residents may also pay by **personal cheque** or **Postal Order** made payable to Group for Earth Observation

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Please send your completed form to:
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35 Sycamore Road,
East Leake
Loughborough LE12 6PP, UK

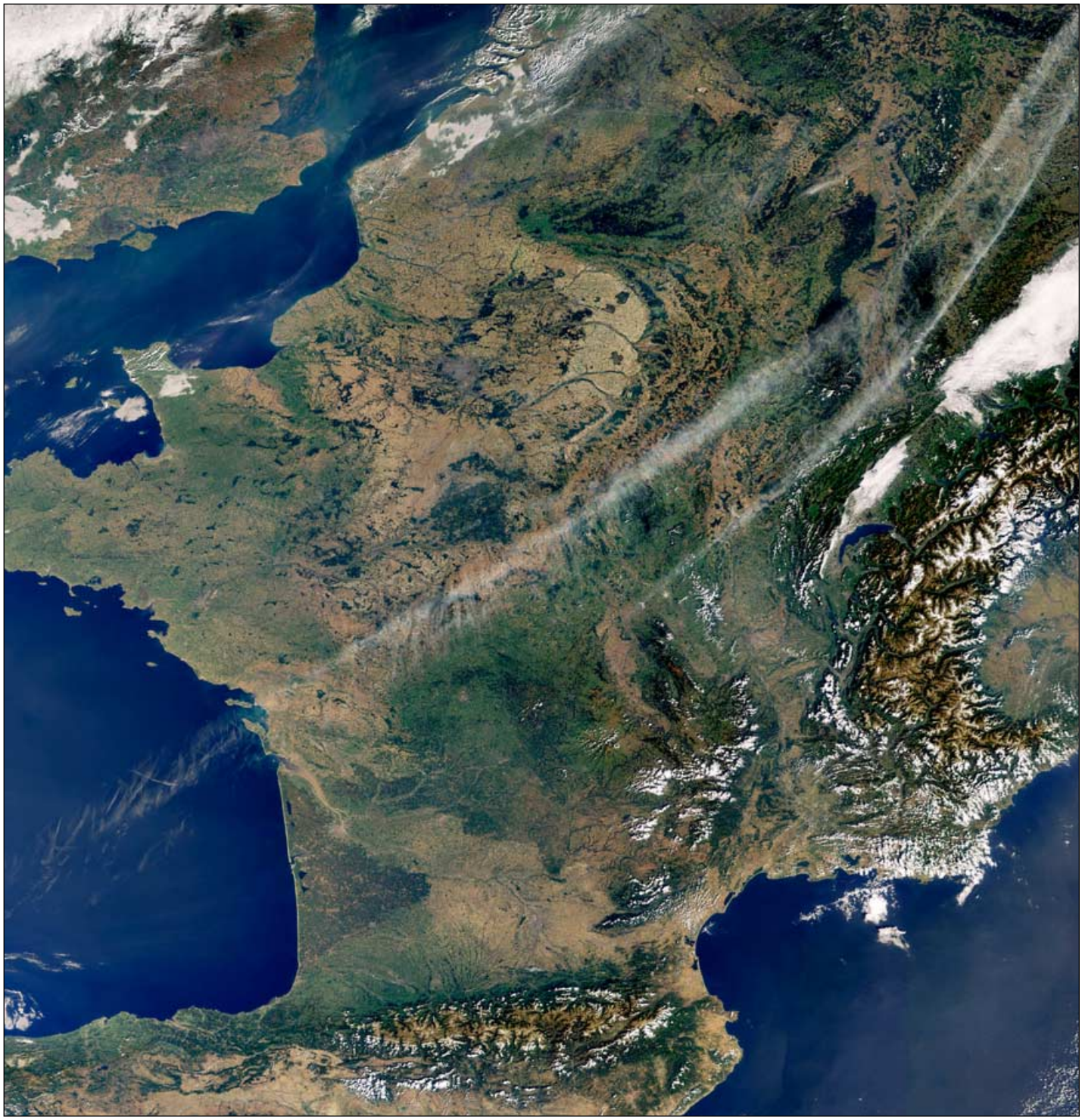
If paying by credit card, you may FAX a copy of this form to +44 (0) 1509 277 220

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

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

Autumn in Europe

ESA - Observing the Earth - *(http://www.esa.int/esaEO/)*



ESA's *Envisat* captured this rare image of Western Europe, in which there are virtually no clouds.

In addition to Andorra, Belgium, England, France, Germany, Italy, Luxembourg, the Netherlands, Spain and Switzerland, three mountain ranges can be seen in the image—the Pyrenees, Massif Central and Alps. The Pyrenees (lower centre) form a natural border between France and Spain in southwest Europe. The Massif Central, northeast of the Pyrenees, is France's third biggest mountain range behind the Alps and the Pyrenees.

The western portion of the Alps is visible at lower right marking the border between France and Italy. The Alps extend some 1200 km through France, Switzerland, Italy and Austria and occupy an area of about 200 000 km^2.

The English Channel is visible at upper left corner with the Bay of Biscay at lower left and the Mediterranean Sea at the bottom right.

This image was acquired by *Envisat's* Medium Resolution Imaging Spectrometer (MERIS) instrument on September 28, 2008 working in Full Resolution mode to provide a spatial resolution of 300 metres.

APT Image Competition

Nigel Evans - Email: *nigel@geo-web.org.uk*

It has been some years since a competition has been held for APT enthusiasts to show off their skill in the capture and processing of images. The last one I entered was when NOAA-18 was launched. Many readers of the Quarterly operate their APT equipment every day whilst others like me, trying to fit in the work/life balance, run their equipment less frequently. I hoped that by running the competition this would encourage our readers to once again dust off their receivers and have some fun.

My receiver is the trusty RX2, built probably fifteen years ago. I use David Taylor's software to process my images. You will see from the competition gallery the range of equipment and software used. The entries are displayed at

http://www.m0nde.co.uk/gallery.htm

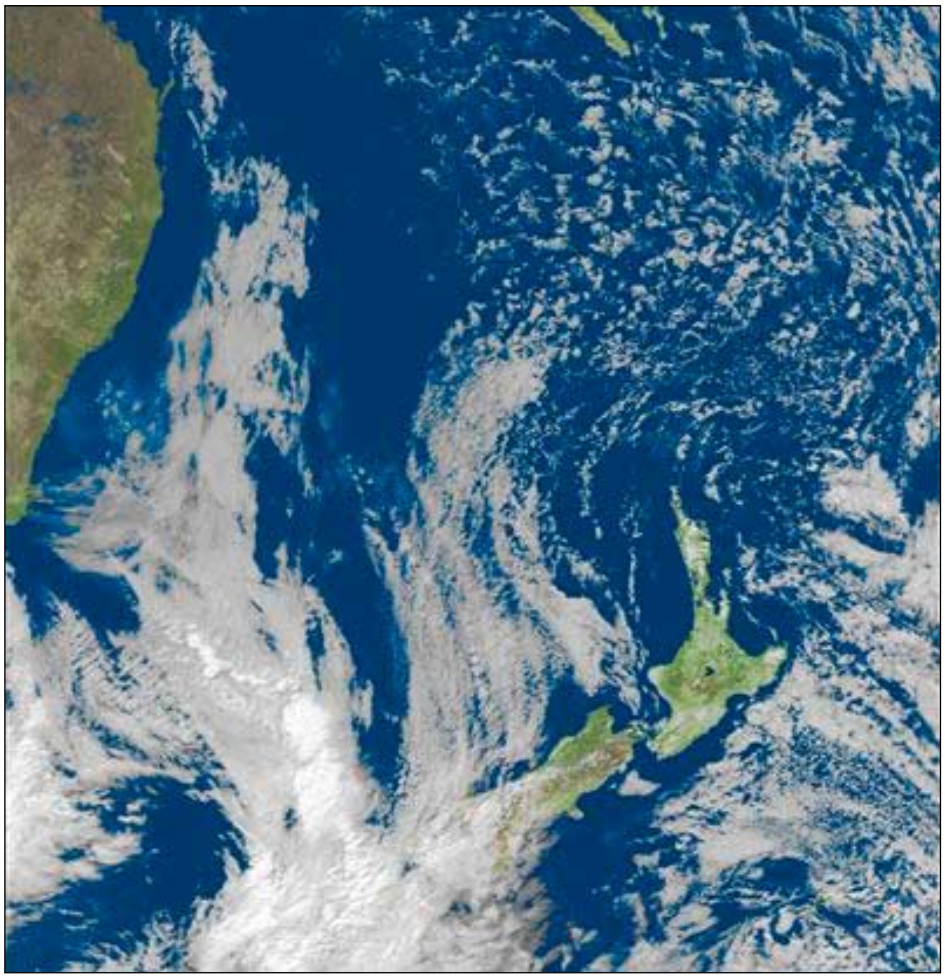
I noted on *eBay* recently, APT equipment available for sale. The GEO shop of course sells some splendid equipment.

I received entries from seventeen individuals. When judging the entries I looked at the length of image, quality of the image and the final processing applied to enhance the image. I have to say that it was not easy to select one image as the winner, because the standard was very high.

Some images showed signs of man made interference, in particular pager interference, with which David Taylor's location in particular is plagued. Some images are quite short showing that the individual's location makes horizon to horizon capture impossible. I looked closely at the final processing of the images and some show thick grey edging around the country outline or misplaced outlines of the countries.

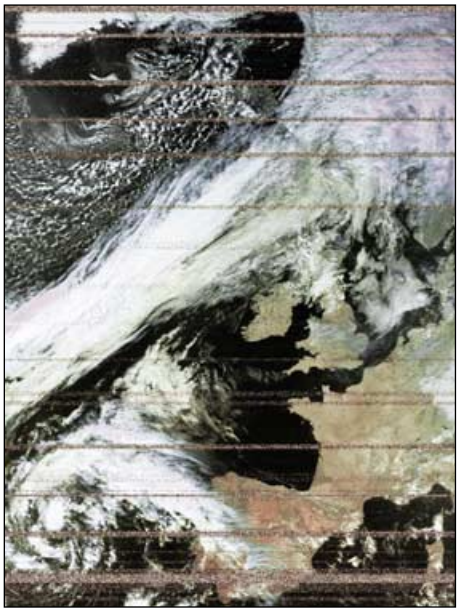
So my final decision was that the winning image was that submitted by the trio from the *South Downs Planetarium and Science Centre*. The runner up was Brian McNabb from New Zealand.

Hopefully, those who took part had fun recording and processing their images, and others will be encouraged to continue to improve their skills. Let me know if you would like GEO to run another competition in the future and write in to us about your APT successes and failures.

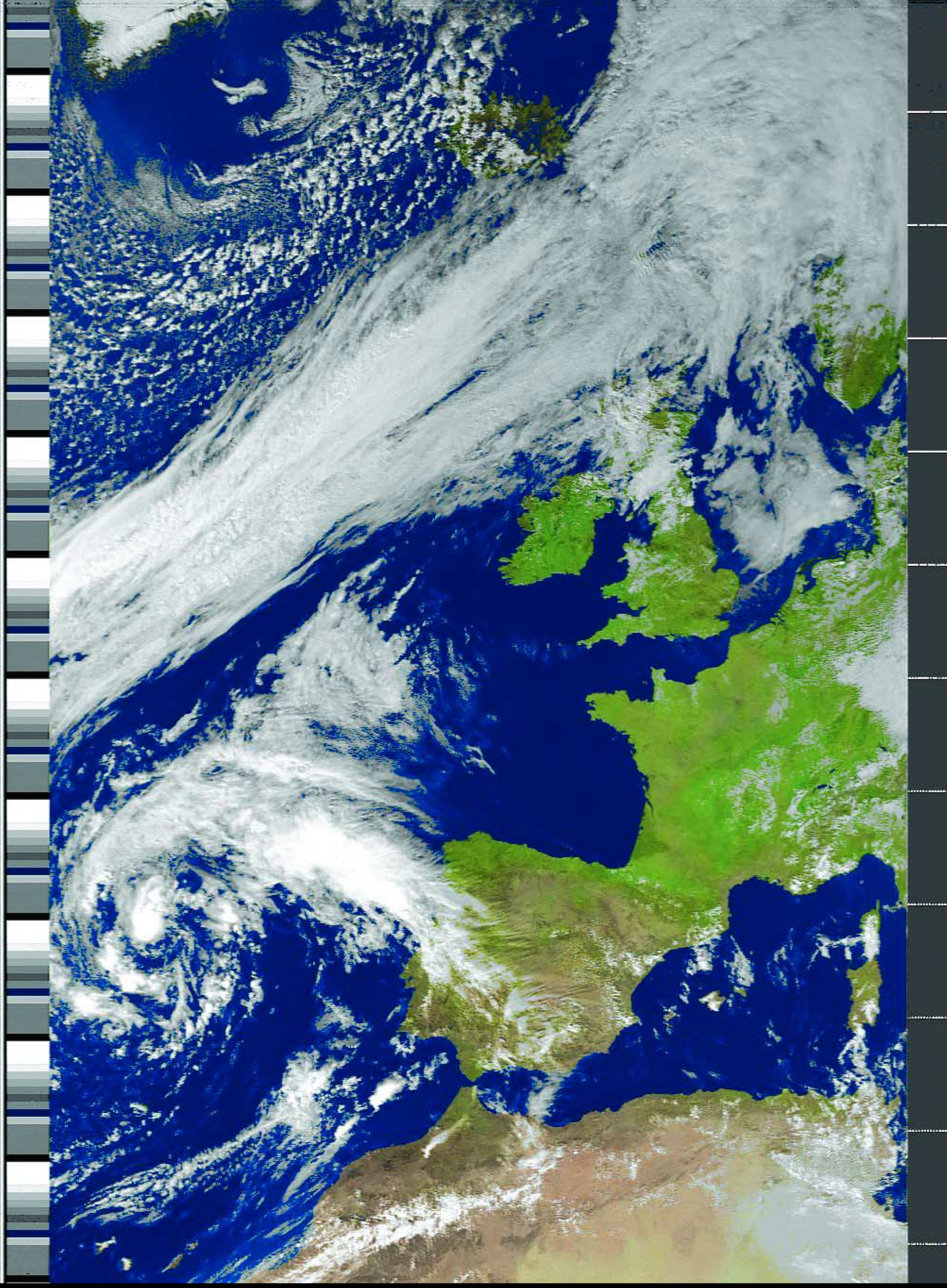


The runner-up, from New Zealand, was Brian McNabb's 02:50 UT NOAA-18 image. Brian used a *Hamtronic R-139* receiver and homebuilt tall-narrow QFH antenna to capture this image of his homeland. Image processing was accomplished using a registered copy of *WXtoImg*.

Fred Piering from Maitland, Florida, USA captured this image at 18:30 UT, using a homebrew crystal-controlled receiver and double-cross antenna. The software was *WXtoImg*.



David Taylor from in Edinburgh used his RX2 and Paul Hayes QFH antenna to obtain this NOAA-18 image, showing that the 137.10 MHz frequency has not solved his pager problems.



The winning NOAA-18 image, submitted by John Barfoot, Dick Barton and Gavin Myersat The Southdowns Planetarium and Science Centre in Chichester, was acquired at 13:31 UT on September 20, 2008, using an RX2 receiver and crossed dipole antenna fitted with a preamplifier. Processing was accomplished using the freeware version of WXtoImg.

GEO takes to the Road

Reports from the Kempton, West Sussex and LARS Shows

Francis Bell

Kempton

As usual, GEO manned a stand at the autumn 2008 *South West London Computer and Amateur Radio Show* in Kempton, where our target was to provide interesting weather satellite displays. This demands a certain resourcefulness on our part to establish a dish with feeds to two computers while at the same time keeping the vigilant health and safety officers happy regarding the potential for a clumsy public to trip over cables.

We try to display appropriate literature and satellite receiving equipment. The literature consists of our own publications, supplemented with posters and technical items from EUMETSAT and BNSC, both agencies being very supportive of our attendance at rallies, conferences and rallies: a formal thanks to both for their materials, which we do endeavour to make available to interested members of the public. It's astonishing how quickly literature is taken from the stand if its free! It still pleases me to think the materials are in the hands of potentially interested people. Posters on bedroom walls, radio stations, classrooms or study walls is where it is best appreciated.

For myself, the most important dimension for these rallies is the opportunity to meet people whom you would otherwise miss. It's great to explain to them the potential of weather satellite reception and give a live demonstration using modestly priced equipment set up only a few minutes before.

Of those who visited this show, I specially remember one couple who, unprompted, took an interest in our stand. I tried to explain to them GEO's activities and weather satellite reception when the lady smiled and politely said: "Oh, yes. I remember NOAA 4". My jaw sagged, but on my recovery I asked about her background knowledge of NOAA 4. It turned out that her father had once held a senior position with the UK Met Office which included three-year postings to Gibraltar and Singapore. He presumably took his family with him, because at that time his daughter must have been old enough the appreciate the meteorological context of her father's job. She related to me her father's excitement when he showed her live fax images from NOAA 4. She told me that she probably still had some of those images in her loft.

I did invite her to join GEO but she said: "With a background like mine the last thing I want to do is take up weather satellite reception as a hobby!" I suggested that she might write up her experiences for *GEO Quarterly* but I don't think that will happen. The compromise was that I gave her some recent Quarterlies for which she thanked me and said she would enjoy looking at them.

Another couple turned out to be teachers, working in different schools, but who were very interested in introducing meteorology into their respective curricula. We were as supportive as possible with literature, and for their part they joined GEO on the spot. The couple are talking to John Tellick at the right hand side of the photograph below.

The GEO stand at the Kempton Show

Another visitor to the stand ran an Air Cadet Force group. He wanted to establish a related technical activity for his cadets when they were not flying and we we judged live weather satellite reception to be a highly appropriate option. He also joined GEO on the spot.

My thanks to John Tellick and David Simmons who gave up a day of their time to attend the show and to Clive Finnis who was their for part of the day; also to all the GEO members who visited us during the day. The total number of visitors to our stand was difficult to judge, perhaps 200, but my thanks to all of them for showing an interest in GEO's activities.

West Sussex

It was almost by chance that my friend Paul Le Feuve, a fellow member of the *Three Counties Amateur Radio Club* told me of his visit to the Amberley Open Air Museum with its extensive amateur radio exhibition area. During his visit, Paul was attracted by the sound of Morse code coming from a building, so quite naturally he investigated the source. In doing so he met Sandra Grindley, who for that particular day of the week was looking after the amateur radio exhibition area and running the radio station. During their conversation weather satellite reception was mentioned as a potential display and attraction for the general public.

A few days later, Paul reported to me the interest expressed by Sandra on behalf of the museum. I live just 40 minutes drive away so I arranged a visit with my promise to demonstrate live APT reception using my mobile equipment. I did this, and on the day received two clear images of Europe from NOAA 18. The general public instantly took an interest in what I was doing, encouraged by information about the potential to receive such images for themselves at home. The small amount of literature I had with me was quickly taken.

Live NOAA-18 reception set up just outside Amberley Open Air Museum

Sandra was on a learning curve about weather satellites so I volunteered information about geostationary satellites. Well that was a trigger! “Can you come back and demonstrate geostationary satellite reception?” I agreed, and three weeks later turned up with my mobile dish and geostationary system. Again, a very successful demonstration received appropriate interest from the general public.

Francis Bell with assistant curator Sandra, showing live EUMETCast images at Amberley Open Air Museum

The outcome of my visits is that the museum now plans to install its own equipment, running on the days they are open to provide the general public with a demonstration of live weather satellite images. I will do my best to support and advise them as they progress their ground station plans. Live displays of our planet’s weather systems to the general public I judge to be very worthwhile.

The Amberley Museum has about fifteen exhibition areas of which two are of special interest to me. One is the extensive amateur radio exhibition with its licensed station GB2CPM; the other is the comprehensive BT Earth Telecommunication Hall. The museum can be reached by rail or car but is not open every day. If you are planning a visit, which is well worthwhile, check that it will be open on your planned day. The address is

Amberley Working Museum,
Amberley, Arundel,
West Sussex BN18 9LT
Telephone:-01798831831

ISS

In late October I took my mobile equipment on the move again—for the Guides’ and Brownies’ *Jamboree On the Air* (JOTA) weekend. This event involves establishing an amateur radio station at a local headquarters thus giving the potential for girls around the world to talk to each other. I set up my EUMETCast ground station at the event because it always creates genuine interest. But this year there was an additional goal: making radio contact with the International Space Station (ISS) because. If the dates and timing were correct, there was to be an amateur radio enthusiast aboard the ISS at this time.

Some years ago I had live radio conversations with Helen Sharman on the MIR space station followed by voice contacts with NASA's space shuttles. Without a fixed schedule these contacts are always unpredictable. I’ll let you know if the girls succeeded in making contact with the ISS in the next issue of *GEO Quarterly*.

LARS

Our final rally appearance of the year was at the Leicester Amateur Radio Show (LARS) at Donington Park on Friday/Saturday, October 23-24.

Visitors waiting to get into the exhibition hall
Photo: Francis Bell

GEO had been allocated a stand towards the end of the large exhibition hall, where we established live EUMETCast reception from an outdoor satellite dish by means of a coax cable run, much of it routed through the overhead steelwork. A howling gale outside kept upsetting our dish's carefully adjusted azimuth until John Tellick went into ballast mode and located some bricks to stabilise it. Our thanks to the co-operative exhibition staff who helped us with the long cable and provided mains power from somewhere in the roof space.

A visitor examines literature on the GEO stand
Photo: Francis Bell

The GEO stand supported a laptop computer displaying live APT weather satellite reception and two desktop PCs running live EUMETCast displays; on one of these, John Tellick demonstrated the use of twin monitors. John, Peter Green and David Anderson helped at the stand on both days, which meant that there were excellent opportunities to talk to anyone taking a more than superficial interest in GEO. It's difficult to judge the numbers who visited our stand: perhaps a thousand people. From my perspective, most visitors took some interest and many went away with our own GEO literature, together with materials provided by BNSC and EUMETSAT. Visitors included established GEO members whom it was great to see again; others took the opportunity of renewing their membership while some first time visitors joined on the spot. This is always satisfying and makes all the effort of attending the show worthwhile.

Among those who showed an interest in the GEO stand were a young lady, about 20 years old, who had just passed her first radio licence exam and an older gentleman who had not only designed and built his own APT receiver and mast-head preamplifier, but was a retired RF engineer who in the past had designed military radios!

One on the commonest questions I am asked at these shows is: 'How do I get started doing this?' To this end, I had written a beginners guide to home APT reception, together with a disc containing appropriate software and some other background papers, which proved very popular. The supply on the stand was exhausted by the end of the first day and had to be replenished by making more copies overnight. Not surprisingly, a further common question related to getting started at a basic level with EUMETCast. The *DVBWorld* satellite receiver and the *R2FX* VHF APT receivers that we displayed were well handled by visitors but unfortunately we had no stock for sale on the day.

Peter Green (left) and John Tellick (right) show live *EUMETCast* images to two visitors
Photo: David Anderson

Overall, we were pleased with our display and the interest taken by the public. We must have made some impact because we were twice invited to attend the Telford Radio Show next year. Of course, GEO's manpower resources will dictate a decision whether we attend or not. **If any GEO members in the Telford area are willing to help GEO at their local show, I would be delighted to hear from them**.

Email: francis@geo-web.org.uk.

Our collective judgement was that it had been well worthwhile meeting so many delightful and interested people, with the bonus of recruiting a number of new members. My thanks to John Tellick, Peter Green and David Anderson for their sterling efforts on both days.

Francis Bell (farthest right) with two visitors to the GEO stand
Photo: David Anderson

International Dimension at the Scottish GEO Group Meeting

David Taylor and Arne van Belle

Readers will know that several Scottish GEO members regularly have lunch meetings where the latest views and news are exchanged. By chance, I discovered that one of the EUMETSAT Help Desk staff—Debbie—was passing through Edinburgh in late August, and invited her and her husband Dave to join one of our regular Scottish lunches. Knowing that Arne van Belle was doing a lot of testing on the new *EUMETCast* service over the *Eurobird-9* satellite, I invited him to come to Edinburgh for the meeting too, and stay over for the weekend.

On the Saturday of Arne's arrival, Cecilia and I took him to see the renovated Port of Leith, where the old warehouses have been converted into flats and there is a splendid choice of eating places! Wandering back from Leith, we took the chance to explore part of the Water of Leith walkway, showing the importance of water power and mills to the area in earlier times; the area now provides a quiet retreat within the noisy city. Arne showed us his techniques for making panorama images using a specially-made camera adaptor mounted on his tripod.

On Sunday, Douglas Deans and Ian Deans joined Arne, Cecilia and myself to welcome Debbie and Dave to the city. We took lunch in the excellent *Gallery* restaurant, right in the centre of town, and many topics and viewpoints were discussed. Debbie's husband, Dave, also works at EUMETSAT and had previously worked at ESOC, so he has a wide experience of space-related activities. For all the questions Debbie so competently fielded, it must have seemed like another day at work for her—without any extra pay! We followed lunch with a walking tour of the Old Town of Edinburgh, from the Castle right down to Holyrood Palace and the new Scottish Parliament building.

On Monday, Arne visited the famous Forth road and rail bridges between North- and South Queensferry, having got all the best viewpoints already programmed into his GPS. One of Arne's panoramic images, showing the bridges, is shown below.

The participants in the Edinburgh luncheon get-together, *Left to right*: Douglas Deans, Arne van Belle, Dave Richards, Cecilia Taylor, Debbie Richards and Ian Deans.
Photo: David Taylor

TZ3 camera on lightweight tripod and homemade 'panohead' adaptor
Photo: Arne van Belle

Santa comes early in North Queensferry. Could it bring us a new satellite ?
Photo: Arne van Belle

Arne's Comments

Using the two spirit levels, the camera and 'panohead' are set parallel with the horizon. The camera is then rotated in 30° steps along the nodal point of the lens and the resulting images stitched and blended together using *Panorama Factory* or *Auto Pano Pro*. At only 750 grams, the tripod and panohead can easily be carried around allowing professional looking panoramas to be created using only a standard digital camera and powerful software. You can learn more on creating panoramas at

http://archive.bigben.id.au/tutorials/360/photo/index.html

Finally, thanks to David and Cecilia for inviting me and showing me around Edinburgh. I enjoyed the weekend very much.

Moving Your EUMETCast Dish

from Hot Bird at 13°E to Eurobird at 9°E

Arne van Belle

On February 18 this year, Director General of EUMETSAT, Dr Lars Prahm, and the Head of Large Enterprises at T-Systems Business Services, Paul Laumann, signed a 12.8 million euro contract securing the availability of *EUMETCast* services for Europe until 2014. Under the contract, *Media Broadcast*, in partnership with *T-Systems*, will continue to provide satellite services to EUMETSAT, supplying a bandwith of 15 Mbit/s with an annual increase of 1 Mbit/s to distribute weather data. To increase service availability, an additional link will eventually be provided through a new secondary ground station. *Media Broadcast* will be responsible for operating the system, which has been specially developed for meteorological applications, and will also manage communications between the weather satellites and the EUMETSAT control centre in Darmstadt [1].

As a result of this agreement, the **EUMETCast-Europe** service will move from *Hot Bird-6* at 13°E to *EUROBIRD-9* at 9°E during the final quarter of 2008 [2]. From November 17 to December 17, 2008, the service will be fully operational on both *EUROBIRD-9* and *Hot Bird-6*. This time period is set aside to transition reception to the new satellite and to avoid loss of data; all users must make the transition before December 17, as the EUMETCast-Europe service will be suspended on *Hot Bird-6* from that date.

Pointing your dish to *EUROBIRD-9* is not as easy as locating *Astra* on 19.2°E or *Hot Bird* on 13°E. The satfinder meters commonly used to align dishes measure the received power from all combined satellites and transponders within a dish's beamwidth. At 9°E there are a lot less transponders active compared with 19.2°E or 13°E. And to make things worse, there are also satellites active at 7°E and 10°E, which makes locating *EUROBIRD-9* with a satfinder tricky. On dishes smaller than the recommended 85 cm (like 60 cm), a satfinder may not show a peak at 9°east due to the wider beamwidth. Luckily, the new frequency is not used on the 7°E and 10°E neighbouring satellites, which does mean reception with a smaller dish is still possible once it has been aligned.

Currently, the received signal strength from *EUROBIRD-9* (launched in 1996 and previously named *Hot Bird-2* on 13°E) is lower in central Europe compared *to Hot Bird-6* at 13°E, but higher outside the centre. Although Ian Deans reports an equal or stronger signal in Scotland, my 37 cm dish (in The Netherlands) proved to be insufficient to receive *EUMETCast* on *EUROBIRD-9, although* it is able to receive the service from *Hot Bird-6*. But *Eutelsat* plans to move the more powerful *Hot Bird-7A* to 9°E once the new *Hot Bird-9* is launched and commissioned successfully at 13°E. This will also provide a backup satellite at 9°E.

Although switching to *EUROBIRD-9* means a move of only about 4° to the west, there may be trees or other obstacles that did not interfere before. To calculate pointing angles and to do a line-of-sight check, go to the innovative *Google Maps* dish pointer at

http://www.dishpointer.com/

Enter your country prefix (UK), postal code or city and street name, and select '9.0E EUROBIRD 9'. Zoom in and drag the green marker to your exact dish location. Write down true azimuth, elevation and skew value, then do the same for *Hot Bird* at 13°E. Now you can calculate the required change in azimuth, elevation and skew.

If you see an obstacle in your path mark 'show obstacle', read the pop-up and close it. You can now drag the red marker to the obstacle and read out the height needed to clear it.

Another issue is that the transponder used on *EUROBIRD* is on the high band of your LNB whereas 10853 MHz is on the low band. To receive the new 11977 MHz transmission, your receiver has to add a 22 kHz pulse to the supply to the LNB to make it switch to high band (figure 1). On one of my receivers, the switch to high band did reveal that the receiver was faulty and did not lock on to 11977 MHz.

This guide has been written with all these factors in mind and will guide you through tried and tested methods.

Before Moving the Dish

Before moving the dish you have to set the receiver to the new transponder frequency. As this is different for the various types of receivers, it is described in a separate section.

On 13°E, *Sky Italia* currently uses 11977 MHz. So without moving the dish you should see Network Information '|Sky' appear instead of 'T-systems' in the *Technisat* status screen.

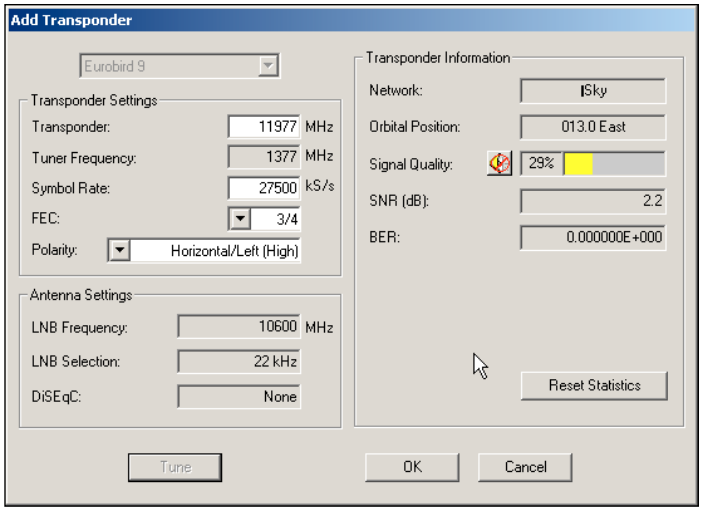


Figure 1 - Adding the new 11977 MHz transponder frequency

Please note that the *DVBworld/Dexatek* receiver does not show network information.

If you cannot lock on to 11977 MHz while still pointed to 13°E, or if the signal level is very low (as shown above), then your LNB or receiver may have a faulty high band or there may be strong interference on the 1377 MHz intermediate frequency. Check your cable, connectors and LNB before moving the dish to 9° east. Please do verify on

http://www.lyngsat.com/hot bird.html

to see if *Sky Italia* is still on 11977 MHz as channels regularly move to different transponders or satellites.

Using a Satfinder

With 11977 MHz set and a satfinder connected between your LNB and downlead, loosen the azimuth bolts/nuts but don't loosen the elevation setting yet. Slowly rotate the dish to the west: on an 80-85 cm dish you will see the signal fade first, then come up again. You will pass *Eutelsat W1* at 10°E but this barely uses the high band, so we are looking for the first peak on the satfinder to the west of 13° east.

You will need to turn the sensitivity setting on your satfinder up a bit to notice the peak at 9°E; during tests, I found my satfinder readout on 9°E only half of that on 13°E. The next peak, from *Eutelsat W3A* at 7°E, will be a bit stronger.

If you don't have a satfinder, get a friend to help you by reading the signal level from your PC screen and keeping in touch with you by mobile phone while you gently turn your dish to the west. Move the dish very slowly so that the receiver has time to lock on to the new transponder and refresh the level readout.

Verify EUMETCast Reception

Once you have found the highest signal level at 9°E, verify that you are receiving EUMETCast. Although PIDs are unchanged, I recommend that you stop and restart *Tellicast* and wait for the purple on white 'T'. If you did end up on the wrong satellite, the receiver might lock and show a signal but the 'T' would remain black on yellow (status connecting).

Unfortunately at the time of writing, 11977 MHz on *Eurobird* does not transmit network information, so you won't see 'T-systems' pop up in your *Technisat* status screen.

Optimise Azimuth and Elevation

If elevation and LNB skew had previously been set correctly on 13°E, they should be within range to receive *EUROBIRD-9*. Do not alter them before you have confirmed reception of *EUMETCast* on 9°E. Elevation is only 0.6 to 1.0 degree greater at 9°E, depending on your latitude. Once you have confirmed reception using *TelliCast*, you should optimise azimuth and elevation carefully using the satfinder. The skew (LNB rotation) can only be optimised using the signal quality readout on your PC. On 9°E, skew should be set 2 to 3 degrees less. If in doubt, use the LNB skew value and direction reported by

www.dish pointer.com

and note that the direction is as seen from the dish towards the LNB.

What if you are Unsuccessful?

If you have been unsuccessful in locating the satellite at 9°E, there are two alternative ways to move your dish from 13°E to 9°E.

Method A

You can calculate the displacement of the outer edge of your dish based on the angular dish rotation that is required between 13° and 9° east. Aligned on 13°E, measure the distance from the western outer edge of your dish to a fixed object like a wall; then rotate the dish westwards until the western edge is 3.4 cm closer to the object. This distance is based on an 80 cm dish in the UK.

You can calculate the exact edge displacement for your location and dish size as follows:

X = sin (azimuth for 9°E – azimuth for 13°E) x ½ of your dish width
= sin (167.3 – 162.4) x ½ x 80
= 0.0854 x ½ x 80
= 3.4 cm (for an 80 cm dish in Leicester)

Method B

Calculate the Sun/Satellite Azimuth coincidence time using the *SatMaster Pro* demonstration at

http://www.arrowe.com/index.html

Go to 'Table', 'Sun/Satellite Azimuth Coincidence' and enter the required data (figure 2). A table will now be listed showing the coincidence times for that month.

At the time found in the table for your location, the sun should be exactly perpendicular to your dish. For a precise alignment, tape a nylon thread from the top centre of your LNB to the top centre of your dish.

Draw a vertical line on the middle of the dish surface (or use tape to mark the vertical centre line). When the calculated time arrives,

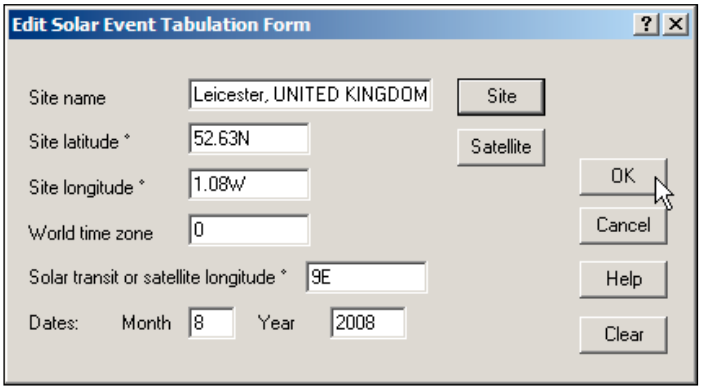


Figure 2 - Coincidence Times

the shadow of the nylon thread should coincide with the centre line marked on the dish. Adjust the Azimuth to match. Your timekeeping should be accurate within one minute (figures 3,4). Check the time zone—SatMaster Pro uses UTC by default.

Figure 3
Dish showing the nylon thread shadow and line

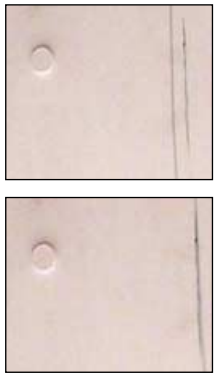


Figure 4
The shadow and line 10 minutes before they coincide (top) and at coincidence (bottom)

To double check, you can first check the Sun/Sat azimuth coincidence with the dish still pointed to 13°E; about 12 minutes later the coincidence will occur with 9°E.

This method will give you a coarse direction for *Eurobird*. Because of tolerances in your dish geometry, a fine adjustment should be done using the signal quality readout on your PC.

Receiving EUROBIRD-9 and Hot Bird 13°E on the same Dish

With *EUMETCast* on *Hot Bird* at 13°E, users who have been using the same dish to receive TV and radio channels from the *Hot Bird* satellites will lose this option when the dish is pointed towards 9° east.

The 80 cm GEO dish—and other standard dishes—is designed to yield maximum gain using only a single LNB mounted at its focal point. The beamwidth (-3dB or half power) of an 80 cm dish at 11 GHz is only 2.4 degrees, so you cannot receive *EUROBIRD-9* and *Hot Bird* at 13°E on the same dish/LNB combination. When you tune to 11977 MHz without re-aligning the dish you will see the receiver locking to *Sky Italia*; this transponder on 13°E must not be mistaken for the new *EUMETCast* frequency on *EUROBIRD-9*!

If you want to keep receiving TV channels from 13°E *and* get *EUMETCast* on *EUROBIRD-9*, you can put a second LNB next to the centre LNB to receive both positions simultaneously. If the angle between the two satellites that you want to receive on the same dish is limited from 3° to 10°, it is possible to adapt a standard dish. Most dish manufacturers have multi-feed brackets that can be mounted in place of the original single-LNB bracket.

The best approach is to re-align the centre LNB to 9°E and use a second offset LNB for the stronger signal from 13°E. Adding offset

LNBs is not advised on dishes smaller than 80 cm; these don't offer enough gain and, due to the shorter feed arm, the separation between the LNBs is too small. For this purpose you are best to use a specially designed multi-feed dish, larger and wider than a standard dish in order to yield a fairly constant gain over the required offset range.

The horizontal and vertical spacing between the two LNBs depends on satellite positions and your dish location. For a standard dish, you can calculate the required LNB spacing yourself using the *SatMaster Pro* Demo at

http://www.arrowe.com/index.html

Go to 'Table', 'Dual Feed Spacing' and enter the required values: 9°E for the primary LNB and 13°E for the secondary. Enter 'Antenna aperture' as 0.8 m and keep 'f/D ratio' and 'beamfactor' at their default values. For the UK, this gives an average offset of -52.4 mm horizontal and +8.9 mm vertical. Seen from the satellites (looking towards the dish), your 13°E offset LNB should be mounted 52 mm left of the centre LNB and 9 mm above it.

Unfortunately, many LNBs have a feedhorn diameter of 56 to 60 mm which makes it impossible to mount two LNBs this close together. But LNBs with a smaller 44 mm (*ALPS*) or 50 mm (*Inverto Silver Tech single*) diameter feedhorn are available nowadays.

Monoblock LNBs

A monoblock LNB consists of two LNBs molded together. These units will fit on the original single-LNB bracket, but apart from the higher costs there are some disadvantages. Most have a built-in switch and can only feed one receiver at a time. You need a dual output version for parallel *EUMETCast* and TV operation. Furthermore, the distance and skew are fixed for popular dual satellite constellations like those at 19.2° and 23.5°E. The distance required for 9° and 13°E may come close, but the skew of both LNBs differ for this position. They are too expensive to find out if they work; buying a second LNB and a multi LNB bracket, or making your own bracket, is more flexible and cheaper!

When looking for a multi-feed bracket, make sure that the clamps used are not too wide to place two LNBs within 4 degrees of each other. Cheap plastic clamps may crack or lose strength after only a few years outdoors. Metal clamps are preferred.

Eutelsat mentions 'ClipSat', a bracket that mounts a second LNB on your existing LNB but I could not find details nor suppliers for this product.

http://www.eutelsat.com/dual-reception-9-13/CLIPSAT_soln.html

Triax offers 'FlexiFeed' for two positions with 3° to 10° separation (figure 5). The bar can tilt slightly to handle vertical offset. Note that the clamps do allow close mounting but have been mounted the wrong way around on this photo making the clamping screws inaccessible!

Figure 5 - The *Triax* 'FlexiFeed'

Triax also offer a 'Multi-feed' bracket for up to four positions/LNBs but adjusting skew on the inner LNBs is not easy due to restricted access to the clamping screws (figure 6).

Figure 6 - The *Triax* 'MultiFeed' bracket

A much better option is the Universal Multi-feed bracket (figure 7) for up to 4 positions/LNBs, of all-metal construction and with easily accessible clamping screws and adjustable height for every LNB.

Figure 7 - The *Triax* Universal 'MultiFeed' bracket

Multi LNB dishes

If you are interested in receiving satellite TV as well as *EUMETCast,* you probably need more than 4 positions. Setting up more dishes is not a pretty sight and may not be allowed. And using a motorised dish is not an option as you lose the *EUMETCast* signal when you turn it towards another satellite. Luckily, there are special multi-LNB dishes on the market that can receive multiple satellites simultaneously over a wide orbital position range without signal loss.

Visiosat BiSat dishes can operate with 2 to 4 LNBs. The dish surface has been shaped so that the outermost LNBs still have a fairly good signal. Unfortunately, the current *VisiosatG4* dish has a fixed configuration for Astra-2 (28.2°E), Astra-3 (23.5°E), Astra-1 (19.2°E) and Hot Bird-6 (13°E). Receiving EUROBIRD-9 on this dish may be possible but does need some DIY. Furthermore, with its 64 cm height and 75 cm width, the received signal quality is lower compared with an 80 cm standard dish. During heavy rain, the reception may drop out completely.

The ultimate solution is the *WaveFrontier Toroidal T90*; this dish has a specially formed sub-reflector to achieve a fairly constant gain over a wide angle of 40 degrees. The signals are reflected twice (figure 8) before entering the LNBs, which has the advantage that the LNBs are pointed towards the 'cold' sky (Cassegrain principle: gives less background noise from overshooting the dish edges). Special LNBs with a small diameter feedhorn are not required because, in this model, the LNBs are placed farther apart from each other.

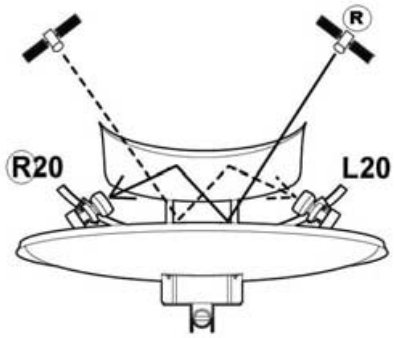


Figure 8 - The Wave Frontier Sub-Reflector

Wave Frontier Toroidal dishes are available as the T55 (60 cm tall) and T90 (96 cm tall by 109 cm wide). The entire assembly is constructed from polyester-powder-coated galvanised steel, but weighing 14 kg (without LNBs), you must have a strong mounting. The T55 is not recommended because it provides weaker signal than an 80 cm dish and the LNBs are difficult to position. The T90 can receive all satellites within a range of 40° orbital location—for example, from 28.5°E to 11.5°W—and comes with 5 LNB holders that slide along a rail. You can buy extra holders to receive up to 14 different satellites at the same time!

A disadvantage, though, is that this dish (figure 9) must be adjusted very accurately. Besides azimuth and elevation, the dish must also be tilted to receive all the satellites well. Luckily, you can

Figure 9 -The *Wave Frontier* Toroidal T90 Dish

calculate this tilt angle and the positions of the LNBs on the rails, using a program on

http://www.satlex.us/en/wavefrontier_calc.html

This tilt angle must be set very accurately (to 0.5° precision). I have done this using a digital spirit level. Afterwards, you place an LNB at the calculated position and aim the dish for maximum reception. A SatFinder meter is handy here. Once the dish is aligned on one LNB/Satellite, all other LNBs/Satellites should be aligned too. But this does depend on the correct tilt angle being set; so checking alignment on the outer LNBs with a Satfinder is advised. The LNBs can be adjusted horizontally along the rail. If you find that a vertical adjustment is needed on the outer LNBs, then your tilt angle is not set correctly.

Once the dish has been positioned correctly, you should not have to touch it again; for the reception of new or different satellites within the calculated range you only have to slide the LNBs to the calculated positions on their rails. Because of the tilt angle and the curvature of the rails, the skew angle of the LNBs relative to the LNB holder is almost zero, but alignment for maximum signal quality is always advised.

If the distance between two satellites is 1.5° or less you can receive both with the <u>same</u> LNB, by positioning the LNB centrally between the two calculated positions.

For mounting, a 60 mm diameter pole is required. Because I had made a sturdy 38 mm wall clamp for my old dish, I adapted the support with a 20 mm steel U-section, two car exhaust clamps and two screw-threaded eyes from the local DIY shop (figure 10). Now the dish sits close against the wall, where it is less exposed to wind and vibrations, and where I can adjust the elevation easily.

DIY Wall-Mounting instead of the Standard Pole Mount

The dish surface is rather large and, at 109 cm wide, is not a very attractive sight. Because the original dark grey colour stood out from the background, I painted the complete assembly with an inconspicuous frosted lacquer in a colour matching the wall. The rail along which the LNBs slide was not painted.

Through the use of LNBs with two or four outputs, and a pair of DiSEqC switches mounted on the back of the dish, I now have *EUMETCast* on two PCs and can also watch four TV satellites (*Astra* 1, 2, 3 and *Hot Bird*) on two satellite receivers—and these all independently of each other! Adding *EUROBIRD-9* was a matter of sliding the vacant LNB holder to the calculated position and placing a 6th LNB in it.

The LNBs from left to right: Astra-2 (28.2°E), Astra-3 (23.5°E), Astra-1 (19.2°E), Hot Bird-6 (13°E), EUROBIRD-9 (9°E), AtlanticBird 3 (5°W). The Multi-LNB dishes are not yet available everywhere but *Cardwriter* shops have them (*www.cardwriter.nl*)

References

1 http://www.eumetsat.int/Home/Main/Media/News/031615
2 http://www.eumetsat.int/Home/Main/What_We_Do/EUMETCast/SP_1217320833376

Figure 10 - The DIY wall mounting used instead of the standard pole mount

Figure 11
The author's multi-LNB Dish, fitted with LNBs for (from left to right) Astra-2, Astra-3, Astra-1, Hot Bird-6, EUROBIRD-9, and AtlanticBird-3.

Some Early Birds from Beyond the Iron Curtain

Marciano Righini, I4MY

The 1970s were fabulous years for APT; and they were exciting because they posed a new challenge to amateurs. Guido Emiliani and I accepted it with more enthusiasm than awareness of the problems involved. At the time, little was known about APT, and nothing was available on the market, but Guido, I4GU, a dear friend of mine, is a wizard with electromechanical construction. We built a 4-turn helical antenna for 137 MHz (figure 1) and a 137-26 MHz downconverter as a front end to a *BC 603*, 20-28 MHz World War II FM receiver (figure 2).

As a display device, Guido built a drum rotated by a step-motor for the horizontal scan; another step-motor made a crater tube traverse the drum for the vertical scan of the image—which formed on a sheet of photographic paper wrapped around the drum (figure 3). With this equipment we received and displayed our first weather images in September 1969; these were from *ESSA-8* and *Nimbus-3*, satellites which were always active, and about which the US Department of Commerce had sent us a lot of literature.

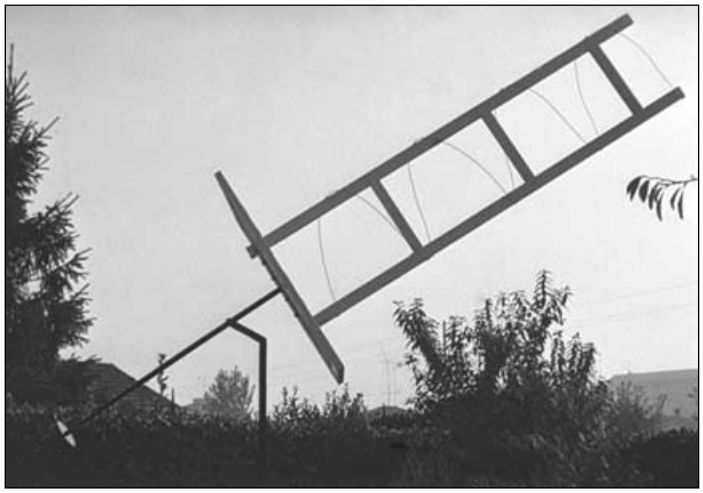


Figure 1 The 137 MHz 4-turn helix antenna used to receive ESSA 8 and Nimbus 3 in 1969.

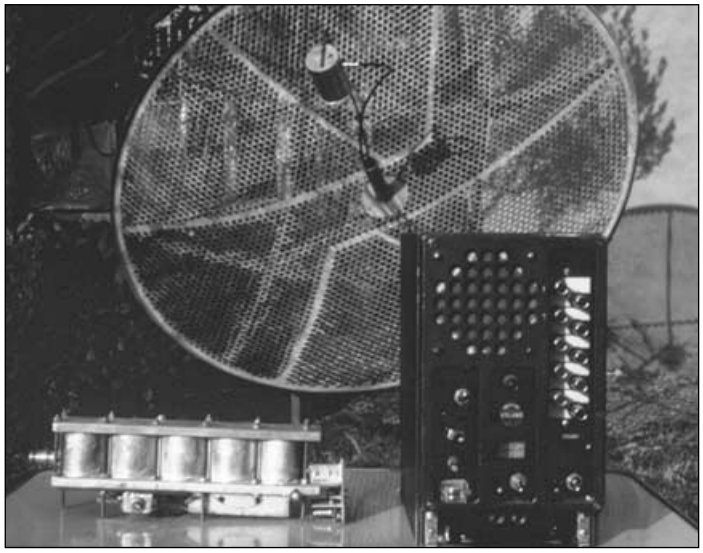


Figure 2 A 5-cavity downconverter for 1691 MHz with the BC 603 FM receiver used to receive both APT and WEFAX signals. In the background you can see a 2-metre dish for Meteosat.

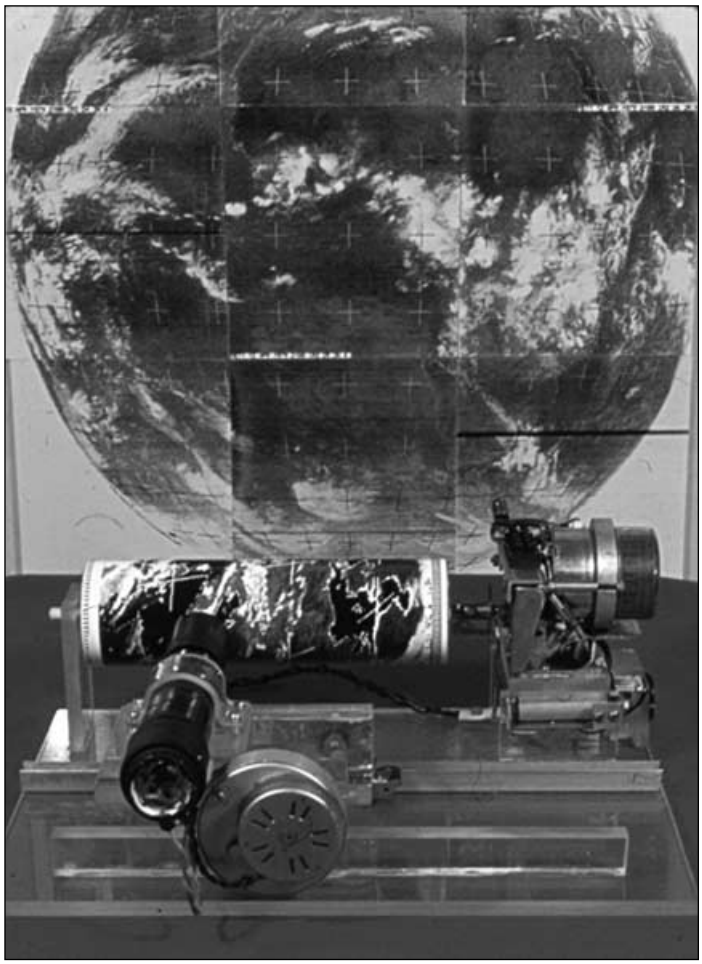


Figure 3 Our home-built readout device consisting of a rotating drum wrapped with photographic paper. A beam of light generated by a crater tube and modulated by the incoming signal is focused on the paper. In the background, an IR mosaic from Meteosat 1.

An Exhibition of Soviet Space Technology

We knew there were also Russian weather satellites named Meteor. The first of the Meteor-1 series was launched on March 26, 1969, but only from Meteor 1-10 (launched December 29, 1971) onward did they have APT downlinks. Receiving the satellites of the USSR has never been easy, firstly because they were activated discontinuously and secondly for the complete lack of information about them. However, in December 1975, at Bologna Fair, there was an exhibition where the USSR Academy of Sciences displayed various spacecraft: Vostok, Soyuz, Venera, Mars, Luna,

Lunokhod, Molniya and Meteor. I took photographs of all these pieces of equipment, but chiefly of Meteor (figure 4).

I then managed to speak to someone on the exhibition staff and, through an interpreter, asked him if he could give me some information about the Meteor on show: its orbit, downlink frequency, characteristics of the images, etc. He told me that I could not receive any image from the Meteors because only a network of ground-based stations in the USSR was able to acquire the meteorological data sent by the satellites. I tried to contradict him saying that several amateurs had already copied pictures from Soviet weather spacecraft, but soon after I realised that what he had said was all he knew, or that he could say. In the 70s the iron curtain was shut tight.

Figure 4 A Meteor-1 series satellite on show in Bologna in 1975. It is 3 m tall and the aperture of the two panels is 7.5 m.

Meteosat 1

Guido and I decided to devote ourselves to the acquisition of satellites about which we knew everything; for instance Meteosat-1, launched on November 23, 1977, although receiving its signal was not easy at the time. I succeeded in getting a 2-metre dish and Guido built a 1691 MHz downconverter (figure 2). The receiver was still the *BC 603*; in fact as early as 1979/80, R. Tellert, DC3NT, described an FM receiver for 137 MHz in *VHF Communications*, a German journal which also supplied the kit.

Meteor 1-30: A Pleasant Exception

There were 31 satellites in the Meteor-1 series. The first 27 were in a direct orbit with an inclination of 81° over the equatorial plane; therefore, they were not sun-synchronous. This means that the orbital plane slowly moved westward. As a consequence, there were periods when the satellites were placed in stand-by mode when flying over areas unfavourably illuminated by the sun.

Only the final four satellites of the Meteor-1 series occupied orbits that had an inclination of 98° and were therefore sun-synchronous. The most interesting was Meteor 1-30, launched on June 18, 1980, which transmitted fine APT images with considerable regularity till 1988. From an altitude of 630 kilometres, Meteor 1-30 took a 1500 km wide swath with some panoramic distortion. On the scan line there was a single visible light image whose resolution was very good. An unusual feature was that the frequency of the audio subcarrier was exactly 2400 Hz, which helped a lot to display the images. It is inexplicable why all the other Meteor-1 series, all the 21 Meteor-2 series and the first three Meteor-3 satellites transmitted a subcarrier of about 2400 Hz (±10%), whereas the horizontal scan was exactly two lines per second. As a result, a reception system like ours, which derived its FAX motor speed control by locking on to the subcarrier, did not work properly.

In most of the Russian satellites that carried imaging equipment there was a numerical code along the edge of the swath (figures 6 and 7). The first number of each block marked the minutes elapsed from Moscow midnight. The Moscow time zone (MST) is 3 hours ahead of Greenwich. In the 70s I did not know the meaning of that number but learned it from Geoff Perry a few years later.

Cosmos 1500

Another interesting Soviet satellite carrying imaging equipment was Cosmos 1500, launched into a direct orbit (82.5°) at an altitude of 650 km on September 28, 1983. It sent APT pictures on 137.400 MHz, with two side-by-side images, one in visible light (VIS) and the other in Synthetic Aperture Radar (SAR). The radar swath was 460 km wide with a resolution of 1.5 km (figure 8). Moreover, the satellite could store 6.5 minutes of image for later transmission to special ground stations when flying over Russia. This is what many western amateurs supposed, but there was no proof of this capacity.

On August 10, 1984 I received an ascending pass from Cosmos 1500 in which one could see the usual VIS and SAR images and the numerical edge-code (figure 9). As the pass was northbound, I wrote 'north' on the upper side of the image. I was not able to identify the structure portrayed in the image but nevertheless sent it to an American APT amateur to show him a picture of Cosmos 1500, a satellite which was never active over the States.

He sent the photograph to England, where a school group in Kettering, led by Geoff Perry, had become famous for often providing details of the Soviet space programme long before official announcements. Geoff Perry was an authority on Soviet satellites and his studies on the Russian space programmes, always shrouded in secret, earned him the MBE.

The Kettering Group had already succeeded in decoding downlink telemetry without prior knowledge of the content or format. So when Geoff received my Cosmos 1500 picture he realised that the time indicated by the numerical code (876 minutes after Moscow midnight) did not correspond with the time when I had received the image; rather, it applied to 264 minutes (two and a half orbits) earlier—

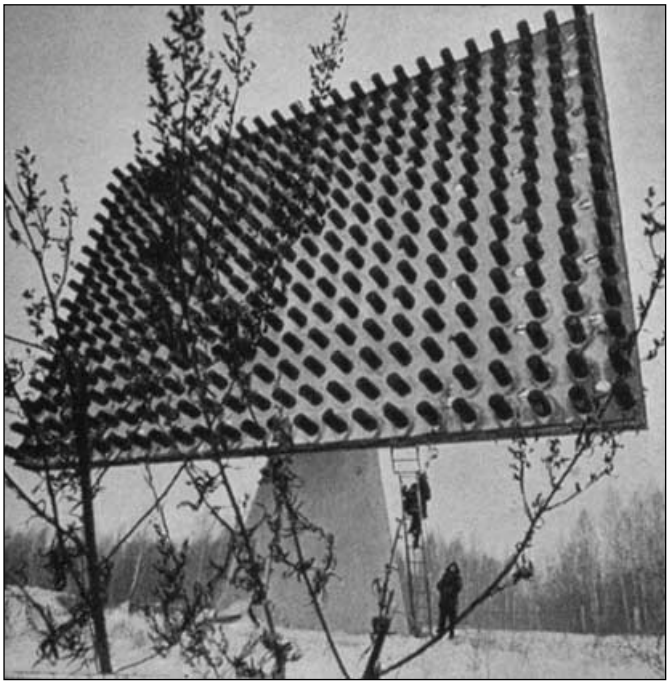


Figure 5 - A huge Russian antenna for the reception of the Meteors
Credit: APN (1975).

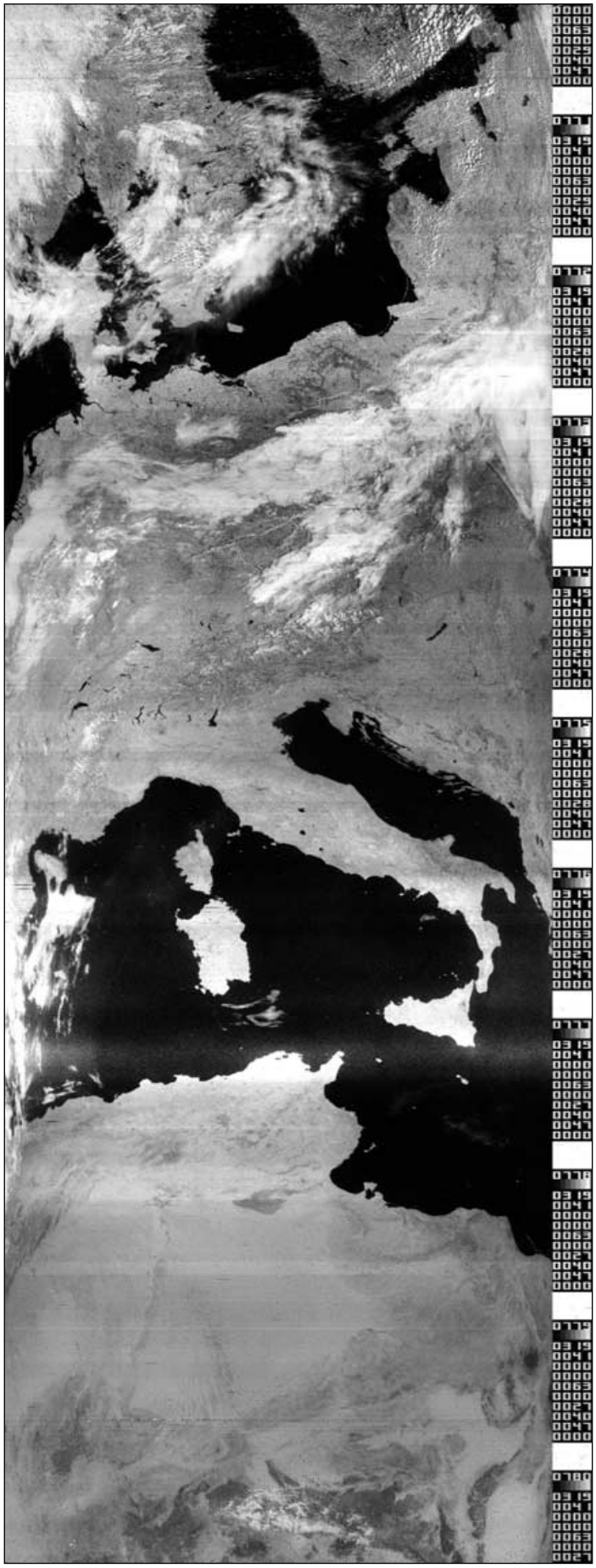


Figure 6 A descending pass of Meteor 1-30 received between 09:47and 10:00 GMT on August 3, 1981. To the right of Italy, the minutes after Moscow midnight were 775, 12:55 MST or 09:55 GMT, the time when I acquired the image. It shows central Europe from the Gulf of Bothnia to Tunisia.

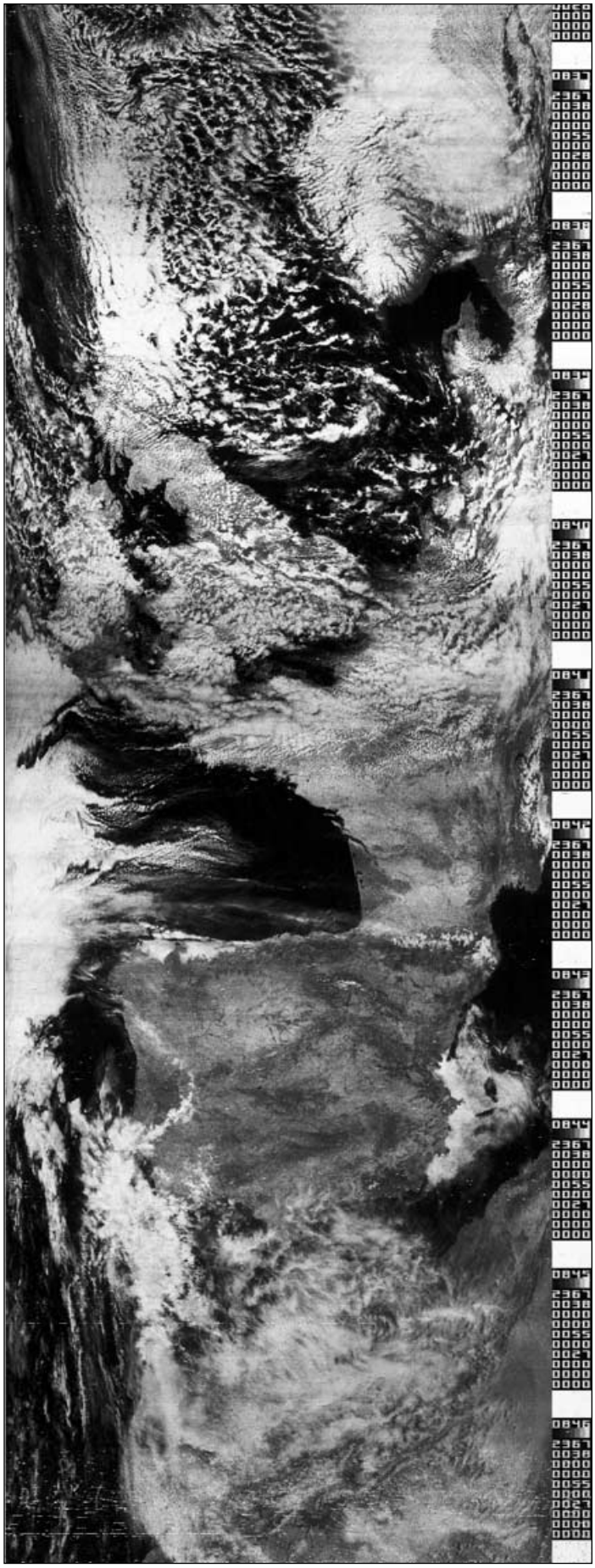


Figure 7 A descending pass of Meteor 1-30 received between 10:55 and 11:07 GMT on April 10, 1982,. Beside the Alps, the minutes after Moscow midnight show as 842, (14:02 MST or 11:02 GMT), the time of acquisition. The image shows the British Isles with some clouds, France and Spain.

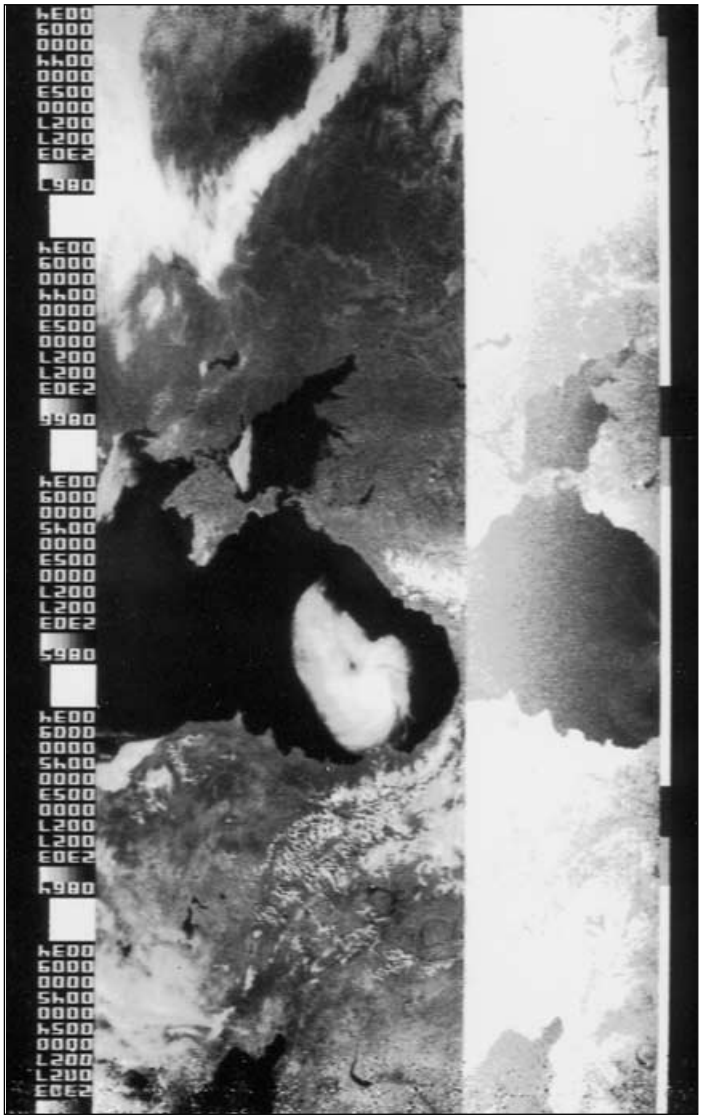


Figure 8 An ascending pass of **Cosmos 1500** received between 11:23 and 11:30 GMT on March 29, 1986. The figure '0865' which appears (inverted) to the left the Black Sea indicates 14:25 MST (11:25 GMT), the time when I acquired the image. The Radar swath is on the right and the VIS image on the left. Both show the Black Sea, Crimea and the Sea of Azov.

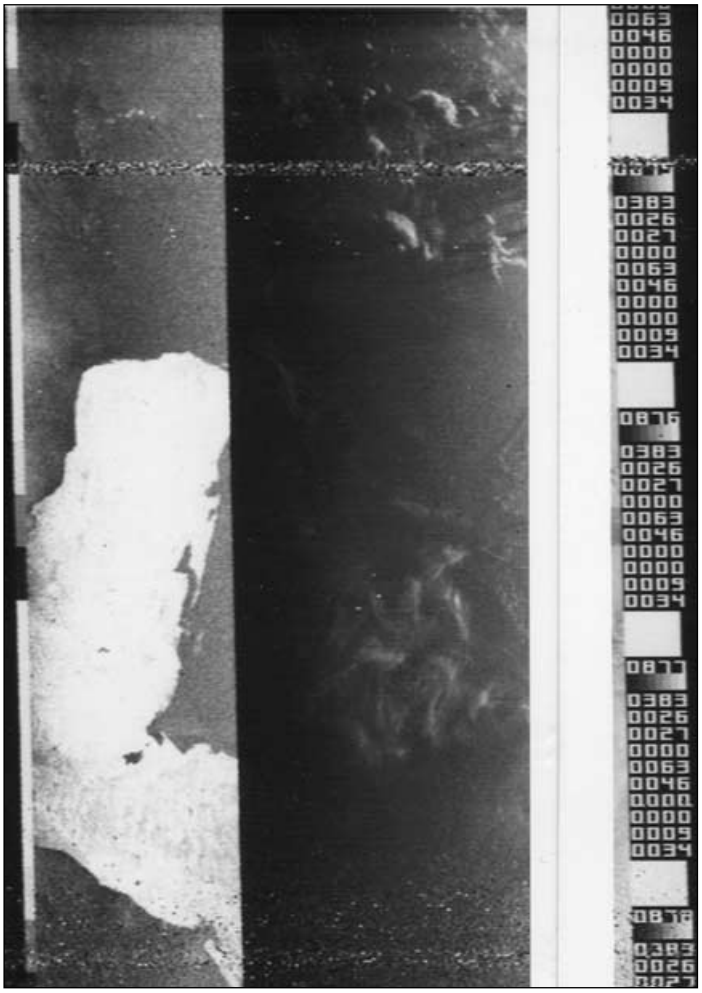


Figure 9 This **Cosmos 1500** image was received in Italy between 15:57 and 16:03 GMT on August 10, 1984. The first edge-number in one of the blocks says that the picture was taken 876 minutes after Moscow midnight. 14:36 MST (11:36 GMT) = 05:36 local time in Yucatan, Mexico.
I received the image at 16:00 GMT, 4 hours 24 minutes after the actual pass over Yucatan; therefore, the picture was stored. The Radar image on the left shows the Yucatan Peninsula while the VIS image on the right shows the cloud tops at dawn.

therefore it applied to a descending pass. He turned the picture upside-down and at once it was clear that the mysterious land was the Yucatan peninsula in Mexico, imaged at 05:36 local time. This was the first evidence that Soviet spacecraft could store recorded APT images.

Perry showed two slides of that image at the Paris Air Show in 1985: one ascending as I had received it; the other descending and therefore intelligible.

Geoff and I met at a 1993 Conference in Daventry. After his lecture on the Kettering Group's monitoring of the Soviet space programme, during which he told the above story without knowing that I was in the audience, we had a long, cordial talk about

'*... the minutes how they run,*
How many make the hour full complete;
How many hours bring about the day;
How many days will finish up the year,
How many years a mortal man may live.'

(Shakespeare, King Henry VI, Pt.3, Act 2, Sc.5).

EUMETSAT Users' Conference (continued from page 22)

with an annual increase of 1 Mbit/s to distribute weather data.

In due course, there will be a new version of the *TelliCast* client software. As well as offering better performance, this software will be able to support the newer eTokens, which will gradually replace the older ones.

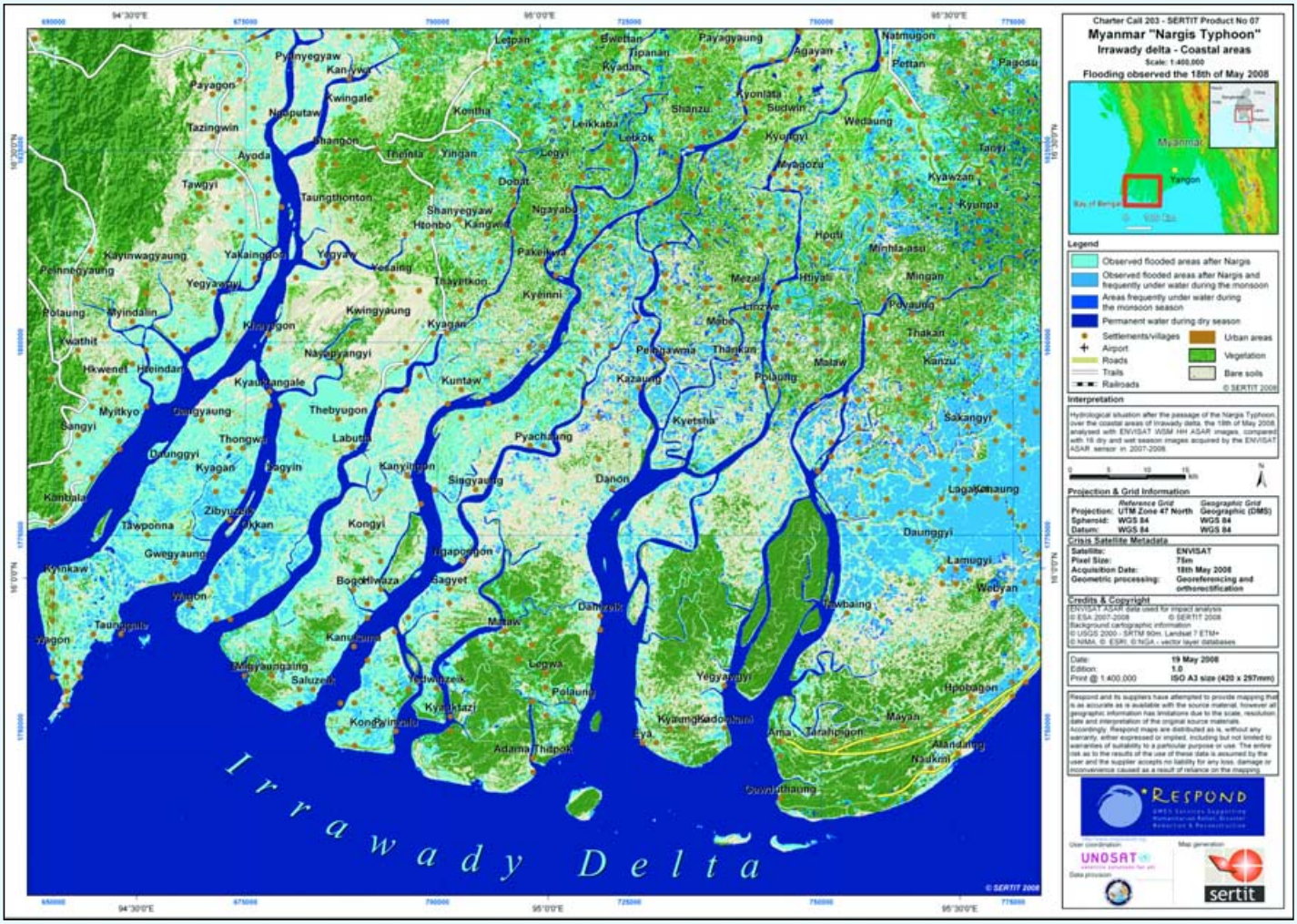
Current Satellites

Models of three of the current EUMETSAT satellites were on display, including the main geostationary satellite, Meteosat Second Generation (opposite), the main polar-orbiting satellite, Metop (figure 7, page 20) and the recently launched oceanography satellite, Jason-2 (figure 8, page 20).

Meteosat Second Generation

UNOSAT

Peter Green



The first I heard of UNOSAT was on the BBC Radio 4 *Today* programme at the time of Typhoon *Nargis*. My first thought was that the UN had its own fleet of satellites but a quick search for their website showed that they use data from a variety of suppliers in a fairly unique way.

We are used to enjoying the beautiful shapes of storms from above; although we know they can be devastating, we still marvel at their power and beauty. However, UNOSAT look at the images and sometimes overlay them on to maps of an area affected by a natural disaster and use them in a purely practical way to assist in rescue, relief and recovery.

UNOSAT is the UN Institute for Training and Research (UNITAR) Operational Satellite Applications Programme, implemented in cooperation with the UN Office for Project Services (UNOPS) and the European Organisation of High Energy Physics (CERN).

UNOSAT is a people-centred programme delivering satellite solutions to relief and development organisations within and outside the UN system to help make a difference in the life of communities exposed to poverty, hazards and risk, or affected by humanitarian and other crises.

The UNOSAT core team consists of UN fieldworkers as well as satellite imagery experts, geographers, geologists, development experts, database programmers and Internet communication specialists.This unique combination gives them the ability to understand the needs of their users and to provide them with suitable, tailored solutions anywhere, at any time.

UNOSAT works with many government, humanitarian and charitable organisations to relay the information gathered from partners such as SPOT, GAMMA Remote Sensing and European Space Imaging (EUSI), who are the pre-eminent suppliers of high quality, high-resolution, global IKONOS satellite imagery and derived information products.

One of their high quality images overlain on a map of Myanmar appears above, showing an area of the Irrawaddy Delta and coastal areas on May 18 this year.

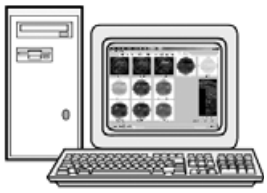
When I first looked at this map I was staggered at the huge area that was affected. Unlike the situation when Hurricane *Katrina* devastated New Orleans, when we saw TV pictures as the event unfolded and heard of the efforts of the richest country in the world to look after its people (and how, in many cases they were defeated by Nature), with Myanmar it was days and weeks before we saw the true devastation on our screens. However, the UN was able to inform its members and start the humanitarian appeals within hours because of the satellite information to which it had access.

It costs nothing to register with UNOSAT and you are free to download their images for your own use. There is a wealth of maps and images that I hope others will find of interest.

Website details

http://www.unosat.org/

Computer Corner



Douglas Deans - dsdeans@tiscali.co.uk

It is hard to believe but already this is the third issue with the new look computer corner. Readers will recall from my opening column that I wanted the content and presentation to be considered as experimental—and subject to review from readers' feedback. Those who have been kind enough to express a view have all been very positive, so for the moment I intend to continue much as before. In particular, I have been encouraged not to set the technical level of the computer *Q and A* section too high (even if I could !), so I hope to continue in much the same vein. Please do remember that *GEO Quarterly* is your magazine so feedback, good or bad, is always welcome to ensure that we provide what readers want.

This quarter I thought I would make a start on looking at some basic *Vista* settings to help those who may be fortunate enough to get a computer upgrade this Christmas and may be facing Vista for the first time. Let me start by repeating something I mentioned in the last Quarterly. I have very much enjoyed my own experience with *Vista.* Do remember that, whilst there are lots of new things to come to terms with, there are also many old familiar features; although sometimes they can be hidden under a cunning disguise.

I have been asked about the use of firewalls and spyware, so have included a quick look at some basic rules about their use. Once again let me remind readers that my computer *Q and A* is written with *Windows* operating systems in mind. I regret that I have no experience with other systems and so am not in a position to help with them.

Computer Q and A

There does seem to be some confusion regarding use of multiple firewall programs and use of multiple spyware programs. There are some clear principles regarding this and I have briefly outlined these below. In addition, I will start to take a look at some of the basic *Vista* settings for those of you still coming to grips with the new operating system. Many will have heard the term '*Aero*' used, so I will look at setting this up although there are those who still consider the chocolate bar to be a much more rewarding experience !

Firewalls and Spyware

It is essential nowadays that, irrespective of your operating system, your computer is protected from attacks. The two main types of attack, and I am greatly simplifying this, are

- intrusion from an unwanted source, hence the need to use a firewall, and
- malicious software being installed on your computer, hence the use of anti-spyware,

although the difference between the two is not as black and white as is being suggested here.

I do not intend to describe firewall and anti-spyware programs per se, other than to say that there is a huge selection available. Indeed, *Windows XP* and *Vista* both have built-in software for this. Many feel that there are far better options available for this kind of software, both free and to purchase, and so choose to disable *Windows* own built in system.

However, what is important to note is that running multiple software firewalls is unnecessary for typical home computers, home networking and small-business networking. Indeed, using two firewalls on the same connection can cause serious issues with connectivity to the Internet or other unexpected behaviour. As a general rule, never run more than one firewall; if you choose to install one of the many available packages, you should find that *Windows* will recognise this and disable its own firewall. However, do not take this for granted and do check that this has been done and go to *Control Panel*, and open Security Centre and also Window's Firewall to check the settings. This method applies to both *XP* and *Vista*.

A single firewall, whether it is the Windows Internet Connection Firewall or a different software firewall, can provide substantial protection for your computer.

If you already have a non-*Microsoft* firewall installed on your computer, you should continue to use it. If not, then you have a choice. If you want a simple firewall that is easy to configure, use the *Windows XP* or *Vista* Internet Connection Firewall.

If you want more advanced control over the traffic that passes through your computer, and also want to block outgoing traffic (that is, the traffic from your computer out to the Internet) then choose a personal firewall from another company.

Spyware is computer software that is installed surreptitiously on a personal computer to intercept or take partial control over the user's interaction with the computer, without the user's informed consent. In the past few years this has become a huge problem with computers and indeed has overtaken firewall issues as the main source of infection.

Once again there is a plethora of anti-spyware programs available, including one provided by Microsoft with *XP* (earlier versions of XP may need it added from the web site) and *Vista*.

Windows own software, called *Defender,* received a very good independent report when it first came out and was available as a download. However, I have more recently read independent reports which suggest that since *Defender* has been integrated into the operating system (*Vista*) it is less effective. Once again there are many anti-spyware programs available, some to purchase, some free, but unlike Firewall software, it is possible—indeed sensible—to run more than one, as different such programs have strengths in different areas of protection.

Vista settings

One of the first things that has to be done with a new operating system is to tailor features such as desktop background, display settings and many other personal preferences. For just this reason it is now called 'Personalise' in *Vista* and equates to 'Display Properties' in *XP*. Many of the headings are identical to *XP* but there are more options and choices. The simplest way to access these settings is to right-click on the desktop and select 'Personalise'.

Windows 'Aero'

Windows *Aero* is the premium visual experience of Windows *Vista*. It features a 'transparent glass' design with subtle window animations and new window colours. *Aero* is an acronym for Authentic, Energetic, Reflective and Open and it is intended to be the most powerful, efficient and aesthetically pleasing user interface ever included in a Windows operating system. There are some mixed opinions about this but there is no doubt it is an excellent visual experience, if that is what you want.

Most, but not all editions of *Vista* include *Aero (t*hose that do are Windows Vista

Business, Windows Vista Enterprise, Windows Vista Home Premium, and Windows Vista Ultimate).

Part of the Windows *Aero* experience is *Windows Flip 3D*, which is a way to preview your open windows in 3D stacks, as well as taskbar buttons with live, thumbnail-sized window previews. A really useful aspect of this is that you can have multiple live windows open. If, as I do, you are running twin instances of *MSG DM* (one for rapid scan), *Metop Manager* and *AVHRR Manager,* then you can view them simultaneously and watch them updating at the same time. The screenshot above shows an example of this. This option is accessed from the 'Switch between windows' button on the bottom left taskbar. Another very useful feature is the use of the tab button to rotate through the group of windows, altering which window is at the front and hence fully viewable.

A word of warning about Aero, though. All those good looks come at a cost and you need a reasonable system to avoid putting a strain on it. There should be no problems with modern up-to-date processors, graphics cards and memory. I have an *AMD* dual 6400 with 3 GB RAM and a good graphics card, and Aero exists effortlessly. As a very minimum requirement it has been suggested that a 1 GHz processor with 1 GB of memory and a DirectX 9 compatible video card with 128 MB of memory should suffice. I for one would like to see something a little beefier than that. If you do not have a very powerful system, there are ways to customise *Aero* to allow you to squeeze a bit more performance from your computer. I'll leave that discussion for another day.

Here is how to set up *Aero*. Select 'Personalise' as described above. This will open a window with seven options listed. Select the top one called 'Window Color and Appearance'. If Aero is not already selected this will open a further window called 'Appearance Settings'. Under 'Color scheme' select 'Windows Aero' and click 'Apply'. When you re-open 'Window Color and Appearance' you will now have a greater choice of options, including a huge choice of colours using the basic selection followed by the color mixer. There is endless fun here! In addition, you have the option of transparency, where other windows below partially show through the window heading bar. It's clever stuff but really not an essential, and disabling it, but still running *Aero*, will certainly help computer performance.

Next quarter I hope to have a look at KVM switches, something that can be really useful when running two or more computers as many do with their *EUMETCast* systems. In addition I will continue with my look at *Vista* settings to help get the best out of the operating system.

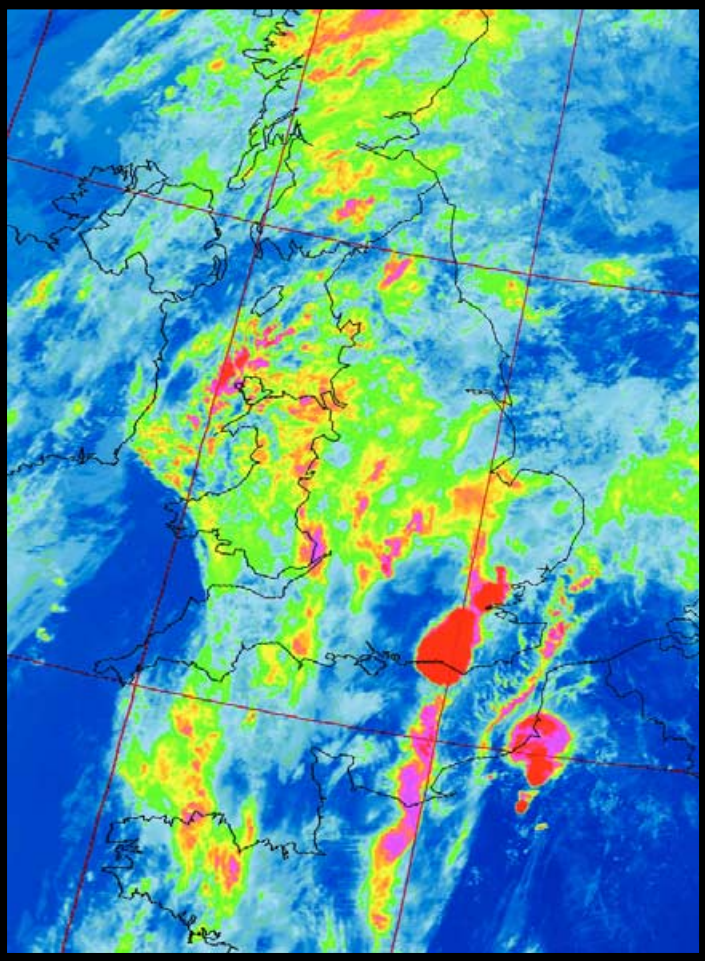
Software Updates.

David Taylor's programs (latest releases)

ATOVS Reader	v 1.1.2
AVHRR Manager	v 1.5.0
DWDSAT HRPT Viewer	v 1.1.0
GeoSatSignal	v 7.0.0
GRIB Viewer	v 2.1.8
GroundMap	v 2.0.6
HDF Viewer	v 1.3.0
HRPT Reader	v 2.8.0
Kepler Manager	v 1.3.0
MapToGeo	v 1.1.6
Metop Manager	v 1.2.4
MSG Animator	v 2.5.20
MSG Data Manager	v 2.5.22
PassControl	v 3.1.0
SatSignal	v 5.1.2
Sea-Ice & Viewer	v 1.3.4
Wxtrack	v 3.6.8

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

http://www.satsignal.eu



Thunderstorms heading across the English Channel

South London

South London

Eastbourne

South London

Hawkshurst

South London

Spectacular Lightning over southeast England

John Tellick

It had been yet another hot and sultry day in SE England, sunny in the morning but clouding over in the afternoon. Overnight rain had been forecast with some thunder storms. What occurred was—for some—a quite spectacular display of lightning, more akin to that seen in parts of America.

I checked the Meteosat-9 HRIT images at 18:00 GMT and they showed a line of storms heading across the English Channel from northern France—not uncommon in summer actually. As these crossed the humid Channel they picked up extra moisture, much of which was dumped on parts of SE England. There were some very impressive flashes of lightning, some of which were photographed and displayed on the BBC website and shown opposite.

As darkness fell on the evening of August 6, I could see clouds towards the SE being illuminated by lightning as the storms moved north. There was a great block of cloud to the east but my location remained clear and on the edge of this mass as it moved north and east.

Considering the spectacular displays they had only a few miles away in south London we really 'missed out' here in west London. It was obvious though, from the cloud illumination, that the 'bolts' were pretty hefty.

The storms tracked across east Sussex, into Kent and eastern parts of Surrey, then on into south and east London and Essex. In places hail-stones the size of marbles clattered down—a very rare occurrence for this size to be experienced in the UK.

The NOAA-17 20:30 GMT image reproduced opposite shows a large storm moving NE from the Channel across Sussex and Surrey. A snake of developing storms in Normandy moved NE into the Channel while a developed storm over the Abbeville area of France headed for the Strait of Dover.

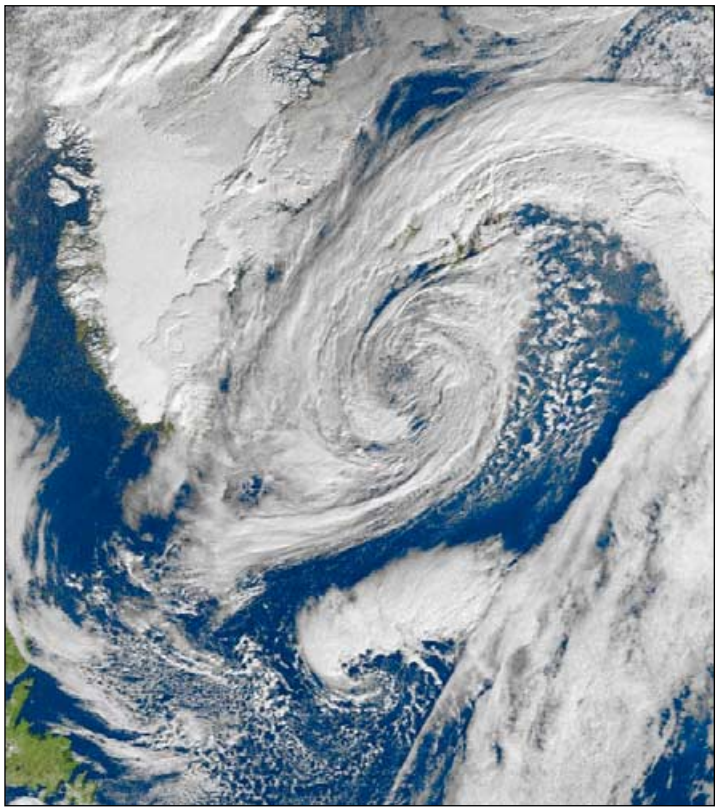
Acknowledgements

The NOAA-17 AVHRR image (© EUMETSAT 2008) was processed in David Taylor's HRPT Reader using the *Palette* tab.

The photographs, from various photographers, originally appeared on the *BBC News*.website, and are reproduced here with permission from the British Broadcasting Corporation.

A Problem with Conifers

Anthony Lowe



Newwfoundland imaged on a NOAA-17 at 12.47 UT on October 9, 2008

Recently, my neighbour cropped a row of conifers that had, for some years now, blighted my western horizon. And what a difference it has made to my APT reception! I can now obtain superb NOAA images like the one illustrated, which includes Newfoundland and part of Labrador in Canada.

I do not have a permanent fixed antenna at my location so make use of two 6-foot lengths of 2¾ inch diameter alloy slot-in tubing clamped to a clothes pole to support my crossed dipole. Twelve months ago, the antenna was raised even further using a length of 1½ inch tubing from an old 4-metre beam, mainly to raise it a few inches over next doors conifers. This resulted in the top elements being approximately 18 feet above ground, which may not sound much—but as my garden rises by almost 4 feet from the back step of the house the top elements are some 2 feet above gutter height. Occasionally, depending on the wind, I extend the height by a further six feet to 24 feet in all, which makes a vast difference to my APT reception.

The conifers were previously cut about six years ago, in the days when I was using *JVcomm32* and an *AOR 5000* receiver, and I did notice an improvement, mainly over Greenland. But being new to the APT game at that time, my first images looked ideal, although it was very rarely that I captured a full image of north Africa or northern Scandinavia. Realising the problem, I increased the height of the antenna, but only as a temporary measure, as I soon found pagers becoming too great a problem.

In early 2005 I switched to *WxtoImg* for imaging, which produced such a vast difference in quality. Looking back into my files I can see where many had been cropped because of a poor signal at the start and end of the pass. As I later found out, this was partly due to the *AOR* receiver.

Its only these past twelve months or so, since I switched over to an *R2ZX* APT receiver, that I realised how far to the east and west I could receive good quality images free from pager interference. Normally I listen to the satellites' audio through the monitor's speakers, at low level. One afternoon, I heard a relatively strong signal, but no image was building up. Glancing at the LEDs on the *R2ZX*, I realised that NOAA-17 was on its 3rd pass of the day. That's when I decided to look at the *WxtoImg* 'Recording Options' and, through trial and error, make changes to the default settings. In particular I set the program to capture all satellites with a maximum elevation above 8° and for recording to start when a satellite was 3° above the horizon. After this, many more satellite passes appeared on *WXtoImg's* satellite pass list.

Following my first image of Newfoundland I raised the antenna to 24 feet, well above the conifers and was both surprised and pleased with the results.

Following their previous trim, the conifers had a very broad and dense flat top, and in time leading shoots overgrew the top elements of my antenna, resulting in the appearance of bands of noise, even on a satellite's second pass. Since they have now been cut by some 6 feet, well below the top elements, this has created a wider angle which allows a much clearer low level path for the incoming signals.

But it's only by changing the software settings that I have realised its worth: satellite images of such quality, so far to the west.

This is all down to the *R2ZX* as the quality of its audio is superior to the *AOR*; the latter allows simply too much radio noise, which in turn swamps the weaker, wanted satellite signals. This was noticed instantly on my very first image using the *R2ZX*. Previously, Svalbard and the Canary Islands had never been visible on any image acquired through the *AOR*. Although the first far west image I ever received was using the AOR, a combination of poor reception and pagers led to me giving such distant passes a miss.

How to add the EUMETCast EUROBIRD-9 Data Service to your DVB Receiver Software

Arne van Belle

The Skystar-2 Receiver

This guide is based on a setup that uses the *Skystar2* receiver and *Technisat* software version 4.3.0 or higher. Open *Setup4PC* by double-clicking the satellite icon in your system tray. Check whether Eurobird 9 E is present in the satellite pull-down menu.

In version 4.3.0 of the *Technisat* software, there is no entry for 'EUROBIRD 9', so you must add the new satellite yourself (Screen 1). Click **<Add>** to open the 'Add Satellite' window (Screen 2), where you should enter the satellite name and click **<OK>** (you should only change the other settings if you use a DiSEqC switch or a non-Universal LNB).

Now click **<Transponder Management>** (Screen 1), then click **<Add>** in the following screen to reveal the 'Add Transponder' window (Screen 3). Here, enter appropriate values for *Transponder frequency*, *Symbol Rate*, *FEC* and *Polarity*. Finally, click the **<Tune>** button. If your dish is still pointed at 13°E, you should see 'Sky' appear in *Network*. Finally, click **<OK>**, then **<Close>**.

Adding the Data Services

Now you have to add data services to the newly created satellite entry. Return to Screen 1, click **<Data Services>** to reveal Screen 4a and select **<Add>** to bring up the 'Add Provider Name' window (Screen 5).

Type in the provider's name (EUMETCast) and click **<OK>**, which displays an 'Add Transponder' window (Screen 6). Select the transponder from the drop-down list (11997 MHz : H/L) and type 'EUROBIRD 9E' in the 'Name' field. Exit by clicking **<OK>**.

Back in Screen 4a, uncheck 'Hexadecimal', then insert PIDs 100, 300, 301, 302, 500, 509, 510 and click **<OK>**. Your new data service has now been created (Screen 4b).

At this point you will be presented with Screen 7, asking you to activate the new data service (this will continue to pop up on subsequent restarts): select it by clicking **<OK>** as illustrated.

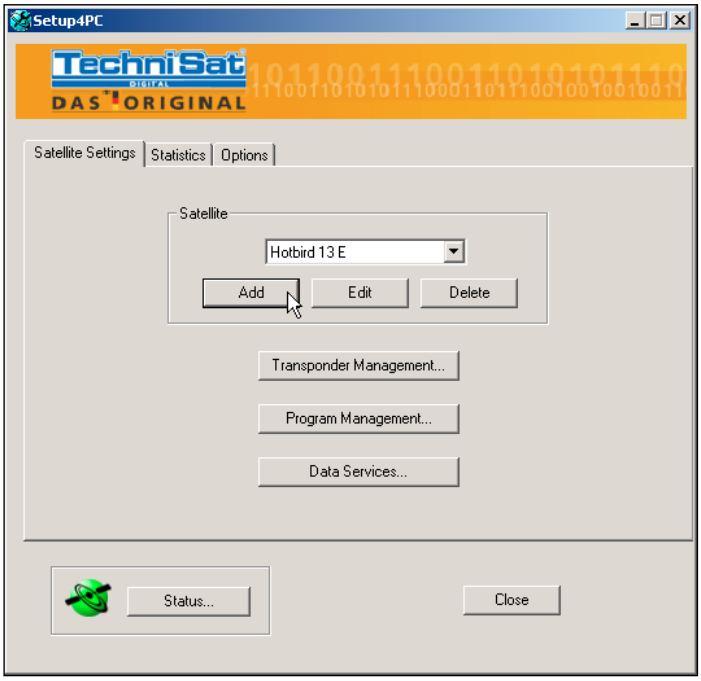
Testing the New Data Service

Now swing the dish from 13° to 9°E as described in the article on page 29. During testing, you can temporarily set the *Skystar* to EUROBIRD-9 using the *b2settuner* command (part of the Technisat SDK).

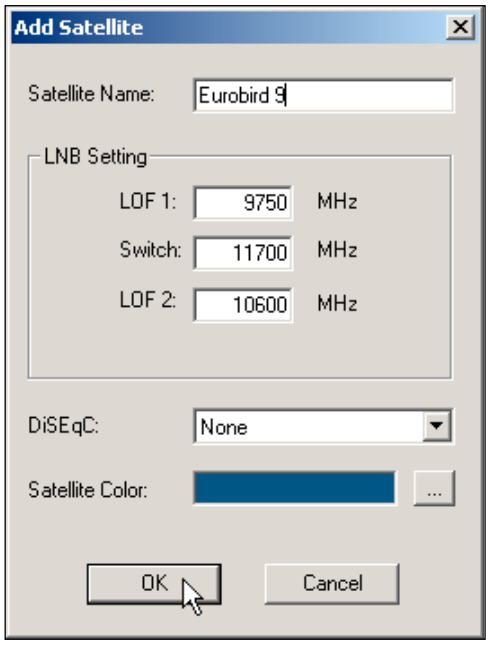
The following command sets 11977 MHz using high band:

b2settuner.exe -a eth1 -i s -f 11977 -s 27500 -l 10600 -e 3/4 -o h -k 22 -d n -pd 100 -pd 300 -pd 301 -pd 302 -pd 500 -pd 509 -pd 510

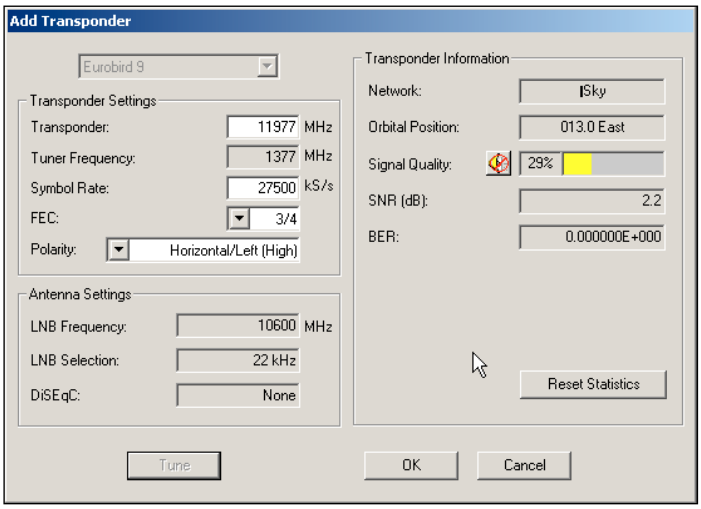
To verify this, you can open the *Technisat* status screen: after issuing the command you should see the parameters change. I also use this command to retune the *Skystar* when *Tellicast* loses connection to the announcement channel.



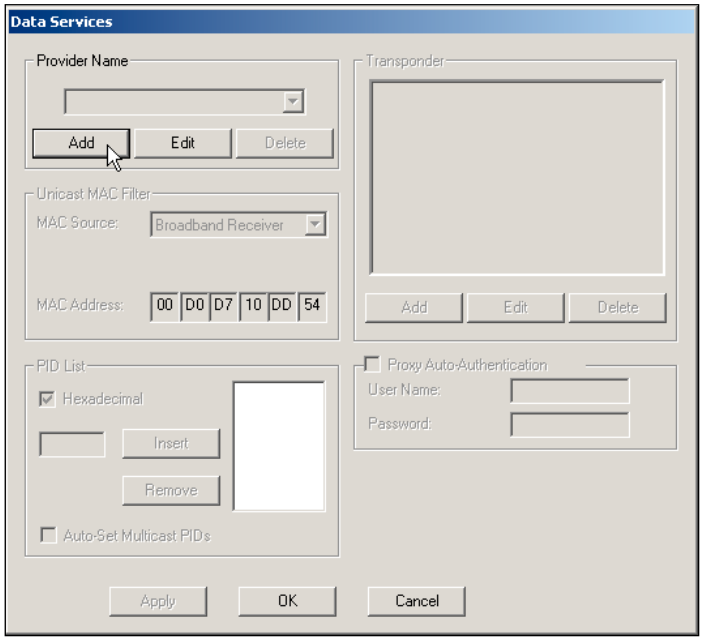
Screen 1 - The *Setup4PC* Window



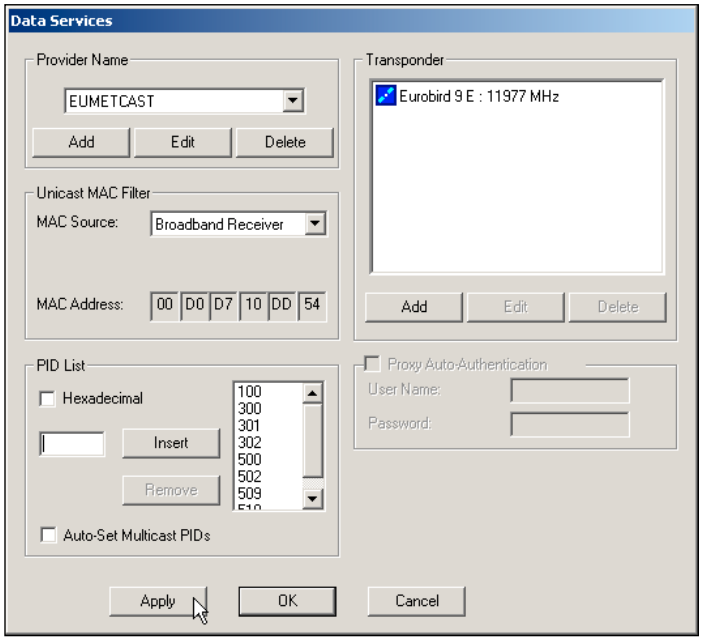
Screen 2 - The *Add Satellite* Window



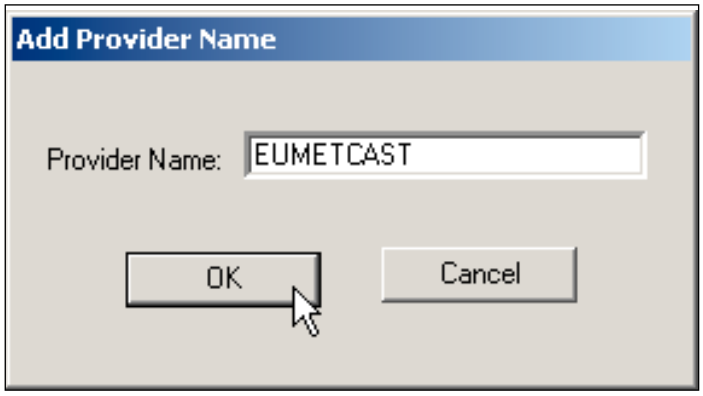
Screen 3 - The *Add Transponder* Window



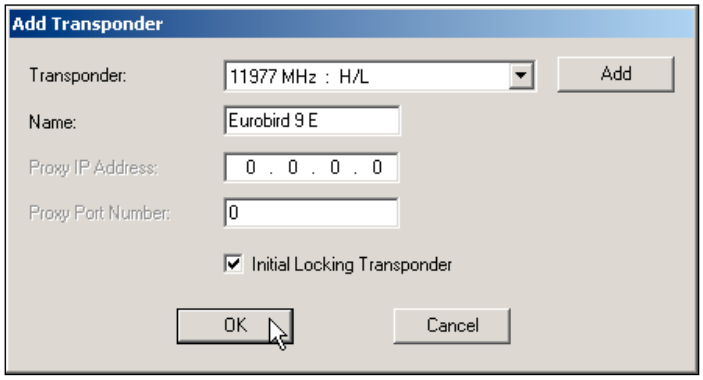
Screen 4a - The blank *Data Services* Window



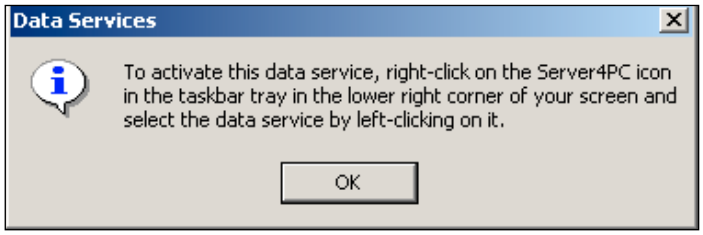
Screen 4b - The *Data Services* Window with the PIDs added



Screen 5 - The 'Add Provider' Window



Screen 6 - The 'Add Transponder' Window



Screen 7 - The 'Activate' Window

For some unknown reason my *Skystar 2.6D* card does not work correctly using the high band and I had to revert to using low band via this command:

b2settuner.exe -a eth1 -i s -f 11977 -s 27500 -l 9750 -e 3/4 -o h -k 0 -d n -pd 100 -pd 300 -pd 301 -pd 302 -pd 500 -pd 509 -pd 510

A disadvantage of using low band is the much higher intermediate frequency of 2227 MHz that runs from the LNB to the receiver. More signal attenuation will appear on this frequency.

To make the receiver use the low band permanently, you have to edit the satellite and change 'Switch frequency' (under LNB settings) from 11700 MHz to 11978 MHz. Now the software will switch to high band only for frequencies above 11978 MHz.

The Dexatek and DVBWorld Receivers

To change your *DVBworld/Dexatek* receiver to the new EUROBIRD-9 transponder, click on this button to enter the *Sat config* tab on the Configuration screen (Screen 8 - see overleaf)

Change 'Sat' to EUROBIRD 9, select Transponder '11977 H' from the list and click **<Apply>** to confirm the new settings.

Next, switch to the *IP Config* Tab (Screen 9) and check that 'EUROBIRD 9' is selected. Highlight the '11977 MHz H' entry in the left hand pane and click the right arrow symbol (==>). Select the new transponder in the right-hand pane and click 'Start IP'

Now add PIDs 100, 300, 301, 302, 500, 509, 510. Use of 'Scan PID' is not recommended as it may not detect all the PIDs you require and may find additional PIDs that you do not want and have to unload and delete!

Restart *Tellicast* and confirm reception of data. To prevent the wrong transponder being set at the next reboot, I recommend you to remove the old '10853' entry by highlighting it in the right-hand pane and clicking the '<==' button.

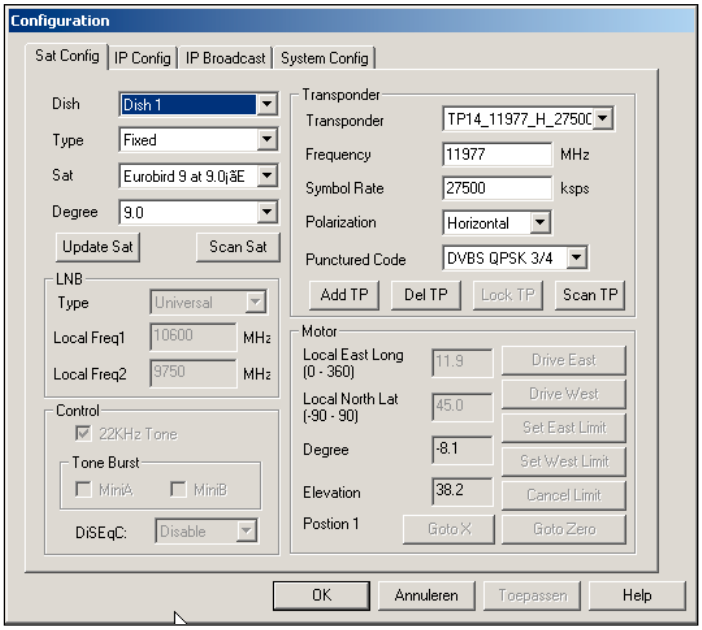


Figure 8
The Dexatec/DVBWorld *Sat config* tab

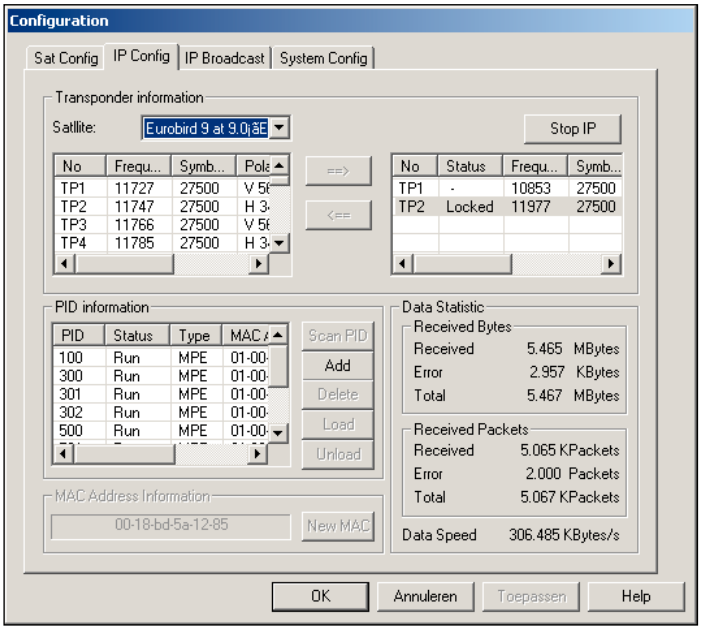


Figure 9
The Dexatec/DVBWorld *IP Config* tab

FEEDBACK

The Column for Readers' Letters and Queries

email: geoeditor@geo-web.org.uk

Basic Satellite Decoding

Well it seems my article on the requirement for a more basic program for decoding the newer satellites has caused a bit of interest—quite a few members have sent in correspondence concerning it.

I would like to say 'thank you' to all the members who wrote in regarding my article, published in June, and the fact that they tended to agree with my comments. At least I can feel that I am not alone on this subject. One comment mentioned, which I also mentioned in the original article, was that all the weather satellites are really there for the professional users, and that we should be pleased and feel privilege to have access to them: for this we thank EUMETSAT and NOAA.

Another comment, by Pete, was that a cheaper and easier method of decoding satellite signals would be appreciated by some of the more backward countries, who do not have the expertise that others have. This I agree with, and was the basis of my article. So how about our experts coming up with a good basic system, with just one average PC, Rx, aerial and easy to use software, and explain how to use it in clear basic English. (Maybe they could even commercialise on the project). I know that similar articles have been published before, but to be truthful, they did not always make sense and it is pointless going backwards. I note from your survey that some 85% of members are over 50 and many are no doubt retired. While we may be able to use computers, programming is often regarded as 'white man's magic' and does not make sense to us; hence a basic operating program is all we require. This was also supported by Peter Edwards with similar comments.

Mike Ennis, at the age of 73, along with many others of the same age group, myself included, enjoy receiving pictures from the satellites and feels that a more basic system would be appreciated. While we are not completely senile, it is a fact of life that our bodies slow down, even although the brain still feels only 21 but other parts of the body tend to have operational failures, often due to reasons beyond our control. We get tired easily, and tend to take longer to do things, although I feel that we are taking more care to get the best results. So therefore we want an easier way to do things and to enjoy our other hobbies; after all, weather satellite reception is not the only hobby. I wonder what other hobbies David Taylor and our experts have?

Mike Stevens suggested that when entering a hobby you should give it all you can. This is fine, but again, we all have different mental abilities and what level is reached by one person, may not be possible for another. For example, I have successfully used spreadsheets, project management and accounts software as well as word processing, DTP and graphics, yet actual programming does not make sense to me.

So before the 'experts' decry-us, let us not forget that we all have our very different skills. I once worked with a very clever gentleman, with a good degree, who was very academic. However, when it came to putting a mains plug on to a cable he had no idea; even worse,, he thought that to remove a piece of toast that was jammed in the electric toaster, it was perfectly OK to use a metal knife, and with the power still switched on. He wondered why it exploded in his face and had to ask me to replace the blown element. I few well chosen words told him how lucky he was still to be alive!

In radio construction projects we are often told to KISS—keep it straight and simple. This surely applies to our request, regarding software. So how about one or more articles, in simple terms, of possible different ways, different software and equipment, that a good basic system can be 'got up and running?'

As well as those members already mentioned, I would like to say thank you to all those who I have not named—your comments have been noted and appreciated.

Laurence Holderness