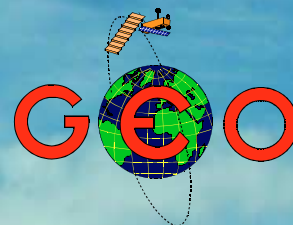


The **GEO** Quarterly

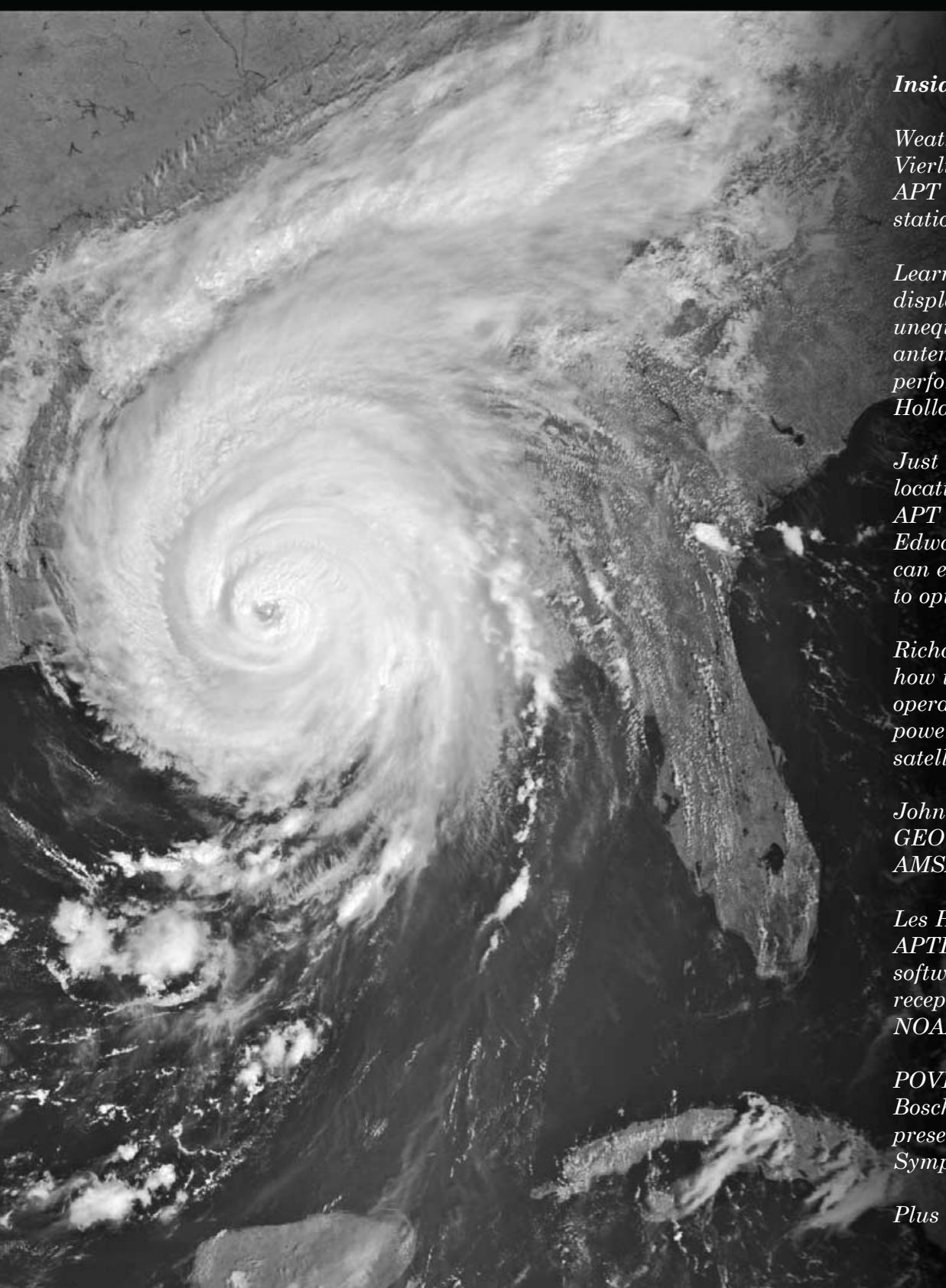
Group for Earth Observation



www.geo-web.org.uk

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

*Number 8
December 2005*



Inside this issue . . .

Weatherman: read about Vierling's new complete APT weather satellite station.

Learn how axial displacement of the two unequal loops of an RQHA antenna affects its performance - Rob Hollander explains ...

Just how good is your location for the reception of APT images? Peter Edwards details how you can evaluate your location to optimise your imaging.

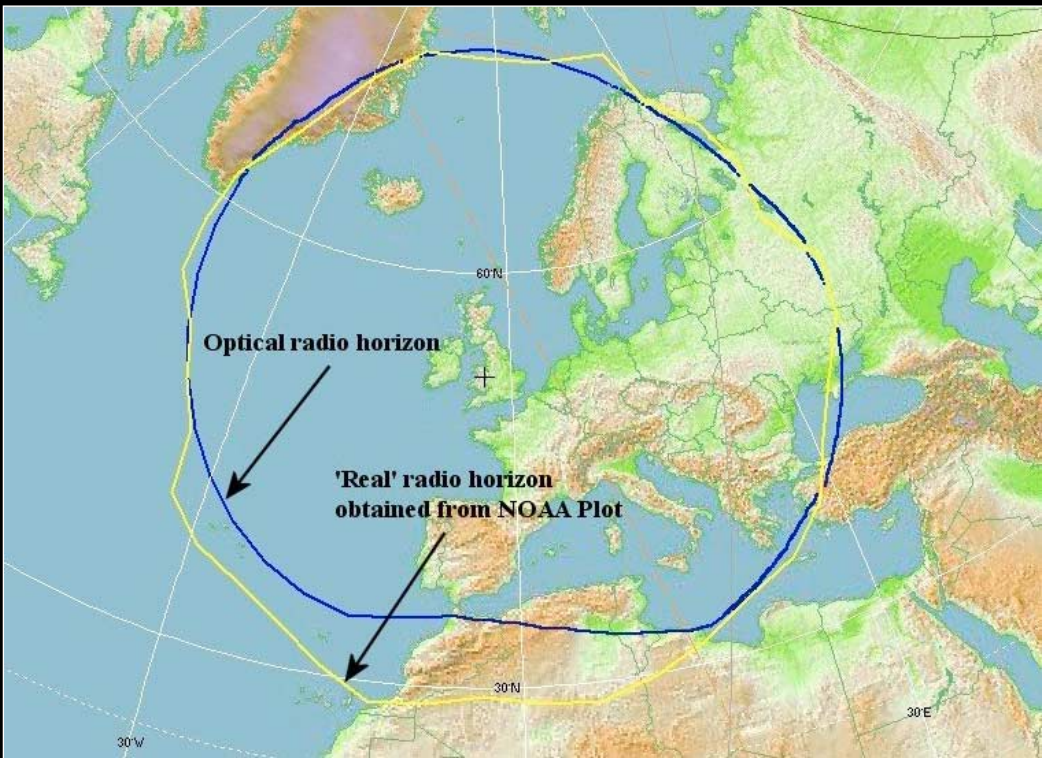
Richard Osborne describes how to construct a battery operated portable PSU to power your weather satellite receiver.

John Tellick reports on GEO's contribution at the AMSAT 2005 Colloquium.

Les Hamilton reviews APTDecoder, a new, free software package for the reception and processing of NOAA APT data.

POVIM - Fred van den Bosch details the presentation he made at Symposium 2005

Plus much, much more ...

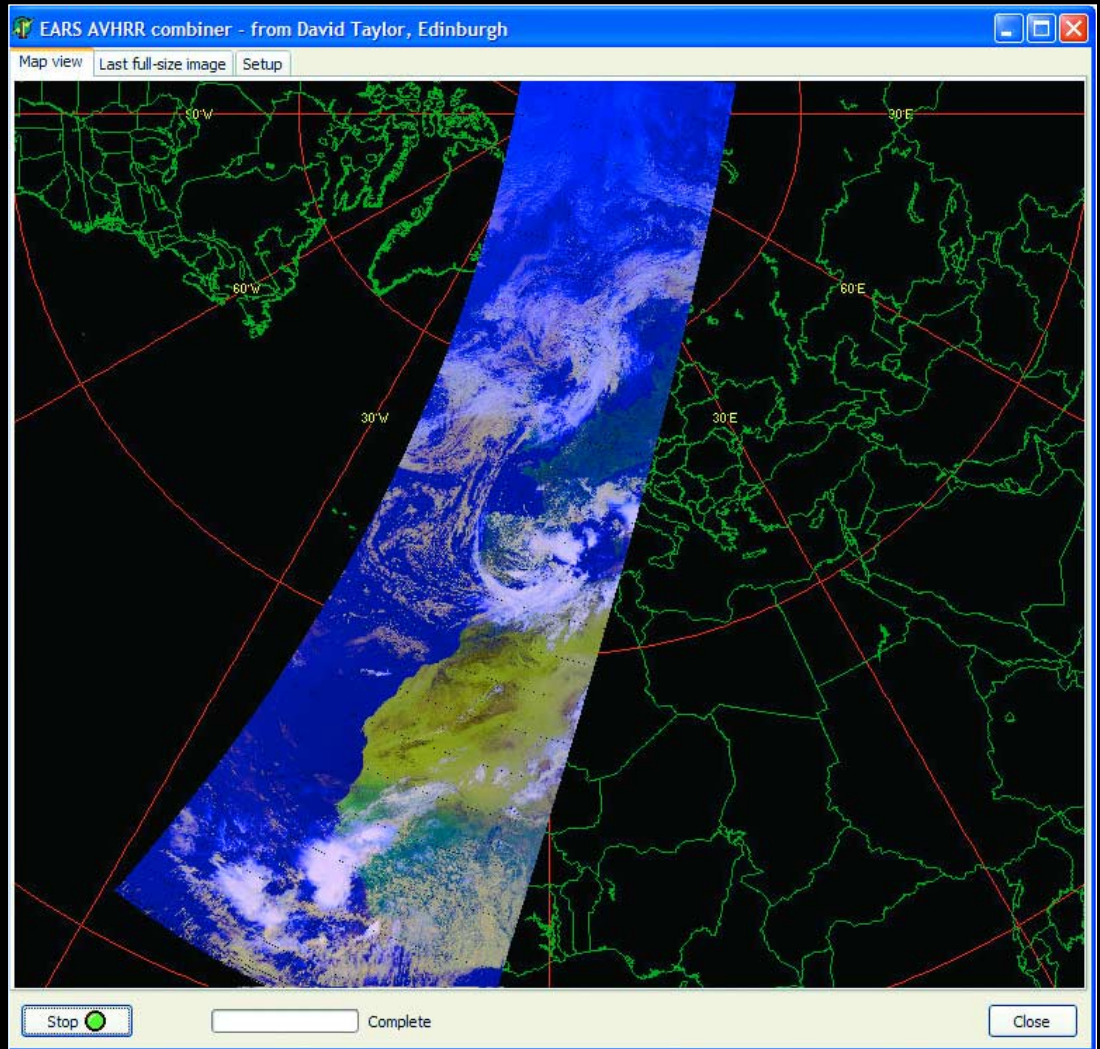


Above

Comparing radio and optical horizons - see 'Evaluation of Location' by Peter Edwards on page 29.

Right

A preview of a new program from David Taylor. This splices together NOAA HRPT segments disseminated via EUMETCast. You can read about this development on page 14.





Last issue we posed the question whether hurricanes could be expected to intensify as the warming trend over our planet continues. We could hardly have guessed then that we were about to experience an all-time record *Hurricane Season*. Our front cover feature is an image of *Hurricane Katrina*; an object of beauty seen from above the realm of Earth's atmosphere but from ground level a cataclysm bringing death and destruction on an unprecedented scale to New Orleans and its environs.

And that wasn't all! For the first time ever, one of the season's hurricanes, *Vince*, forsook the normal route from the eastern Atlantic across to the Caribbean and headed northeast towards the Iberian peninsula. Though downgraded to a tropical storm by the time it made landfall, *Vince* certainly created a splash in parts of Spain and Portugal (see our report on page 7). As we go to press, Hurricane Beta is raging off the coast of Nicaragua.

Readers who monitor APT and welcome a challenge may enjoy trying out *APTDecoder*, new software that both captures and creates images from NOAA APT. This new program from Patrik Tast is still under development. Although not really recommended for beginners, *APTDecoder* can already produce very worthwhile results in the hands of an experienced user. The program is reviewed on page 15.

This issue marks the conclusion of a highly successful second year for GEO. We certainly couldn't have got where we are without the support of our hundreds of subscribers world-wide. The entire GEO Management Team wishes all our readers a most pleasurable Festive Season and continued enjoyment from your satellite imaging throughout the New Year.

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Responsibility for Constructional Projects and Software

Every effort is made to ensure that the technical and constructional articles published in this Quarterly are correct. However, the ultimate responsibility is with the reader to ensure the safety of constructions and for any interfacing with other equipment. GEO cannot accept liability for shortcomings in any published design or any constructions carried out by members or other third parties.

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The **GEO** Report



Francis Bell

Readers' receiving stations in many parts of Britain have been experiencing serious interference on NOAA-18's 137.9125 MHz APT downlink because of commercial pager transmissions within the UK, which use an adjacent frequency. I wanted to know if other countries experienced interference on this frequency. So when I recently spent some time travelling in the eastern Mediterranean, Black Sea and Ukraine, I took my hand-held scanner with me as I wanted to judge the situation in these parts of Europe.

I did not attempt to record or display images but I did listen to the audio from NOAA's satellites on 137.50, 137.62 and 137.9125 MHz. Without a satellite in the sky these frequencies were silent. With a satellite in the sky I received a strong signal. Lucky Europe!

Travelling with Prediction Tables

While carrying out these tests, I used the table of predictions published in our Quarterly, which I had taken with me. I should have known in advance, but I quickly realised that the table GEO publishes is applicable from anywhere in the world—with one additional piece of information. You need to know your local offset from the published times.

The prediction table relates to a latitude and longitude close to the centre of the UK, but when I was in the Ukraine the local time was three hours in advance of GMT while the latitude and longitude were both very different. This scarcely matters as, for any given position in the world, all you have to know is your local time offset and the table will remain basically correct. At my temporary location in the Ukraine the offset was 27 minutes from their local time, and knowing this figure, the entire table for all the satellites fell into place. Of course, do check your offset for both ascending and descending satellites

Thanks to our Editor who produces these tables. Yes, I do know about Keplerian elements and running them on a computer, but I still value the table GEO publishes.

Notes about my recent travels have reminded me about Istanbul where we stayed briefly: the Blue Mosque, bazaars,

viewing two impressive suspension bridges connecting Europe with Asia and drinking beer overlooking the Bosphorus. All quite straight forward but I didn't realise how many people lived there—about 17 million!

Meteoquake

Here is the connection with GEO. We have recently been asked to act as consultants to *Meteoquake*. This is a new group who are researching into the possible prediction of earthquakes from cloud formations above an earthquake area that is judged to be at risk. I have no idea of the background science involved. I'm a little sceptical but hope this sort of prediction is possible. I'm sure we have seen TV coverage of the earthquake in SE Asia with the subsequent Tsunami and the more recent earthquake in Pakistan. The location of Istanbul is particularly sensitive because a series of earthquakes appears to be progressing across Turkey, making Istanbul with its seventeen million people vulnerable. *Meteoquake* may submit an article about their programme to GEO for possible publication in a future Quarterly.

On the subject of potential disasters, please don't follow me around the world. Places I have visited have been followed within a year or two by hurricanes (several places in the Caribbean and Gulf of Mexico), terrorism (Egypt and Sri Lanka), a Tsunami (Sri Lanka), an earthquake (Australia), a military coup (Gambia) and bubonic plague (India).

On a serious note: our planet *is* subject to 'natural' disasters, so we should be as vigilant as possible, hence our own GEO Group. I remember walking down Bourbon Street in the French quarter of New Orleans and listening to the jazz. Following hurricane Katrina, that area finished under 5 metres of water which will not drain away easily.

Administrative Matters

As a registered company, GEO must submit accounts (which are in the public domain) to Companies House. Accounts for our first year, which ran from November 24, 2003 to November 30, 2004, have now been filed. The accounts were quite

straightforward. Income came from membership subscriptions and the main costs were printing and distribution. There were only a few other small items. To check that I had everything in the right form and that the figures were correct, I asked a good friend, who is an accountant and very skilled in these matters, to have a look at my figures, bank statements and invoices. He agreed on everything except one point: I had valued our stock and assets for the first year as zero. My accountant friend said: 'you do have some stock of back Quarterly issues and you should value them,' and we agreed on a figure of £1700. My view is that stock isn't worth anything unless you can sell it. So here comes the sales pitch!

I believe GEO members should be much more ambitious in buying back issues of the printed Quarterlies which we hold in stock. This will help GEO's finances: remember we have to be financially viable otherwise there will be no GEO. Such action may also help inform other individuals and groups if these back issues fall into the right hands.

Here are some suggestions where everybody comes out a winner.

- Buy back some back issues to complete your own collection. (Stocks of our Launch issue i.e. Quarterly number one are exhausted.)
- Buy one or more issues and give them to your local radio club
- Buy sets of back issues and give them as Christmas or birthday presents. That may be cheaper than a book token.
- Buy one or two back issues and just give them to your friends.
- I like this one very much; it would be great if it happens. Every member buys one additional copy of our latest Quarterly and then takes it and gives it to their local library.
- If you are a school, university, business or any organisation with a reception area, buy a back issue for your reception area (this would provide more interesting reading than the average doctor or dentist's waiting room offers).

Symposium and other Conferences

GEO's plans for next year include our own symposium on April 29, 2006 at the National Space Centre in Leicester. Do please put this date in your diary. Details concerning this, our third symposium, will appear in our March 2006 issue.

We also hope to be represented in Helsinki during June 2006 at the EUMETSAT conference and I already have a draft paper ready for presentation, subject to its acceptance. Though a date has yet to be fixed, the next NOAA conference is likely to be held in the USA during 2007, and GEO will try to be there.

It is important that we represent the UK and our international membership at these events.

Multi-Language Flyer

On the international dimension, GEO have produced a short document briefly describing our group, its membership and the benefits of membership. This has been translated into Spanish, French, Dutch, German, and Portuguese. Each occupies about a single A4 side of paper. The text of these documents should be on our web site by the time this Quarterly reaches you.

Encryption

I still find the subject of encryption frustrating. I am opposed to encryption of weather satellite data. Nobody has ever presented me with an argument that it is a rational policy to use public money to build launch and operate a superb satellite with sophisticated instruments, with dedicated, skilled people on the ground looking after the dissemination of data, and then to encrypt the data. The logic defeats me. I may be in trouble for writing the previous few sentences but I don't care. I have been in trouble before with my views about encryption but I have broad shoulders and I'm not going away! The philosophy of encryption is alien to me. It is profoundly wrong.

In Conclusion ...

As usual I will finish this piece with a thanks to our supportive membership and those who contribute copy to this Quarterly. I would also like to extend an invitation to others to share their experiences, images and technical skills with our group. Every contribution or question relating to weather satellites, whether from experts or absolute beginners, is valued.

And do please remember to renew your membership and encourage your friends to join. A statement of the obvious: no members, no GEO.

My Amateur Radio and Weather Satellite Workstation

Mike Stevens. G4CFZ

If you read my articles in GEO Quarterlies 3 and 4 you will realise that I have extensive interests in the fields of both amateur radio and weather satellite imaging. Since we are always encouraged to send in articles describing in detail our workstations and how we achieved them, I decided to do just that. I hope the following description of how I organise everything might be of interest to other readers.

My workstation consists of a *Proscan* receiver for polar orbiting satellites, the signal from which is fed to an *Acer 233* laptop where images are produced using either *WXtoImg* or *WXsat*. My *Meteosat-8* system consists of a 60 cm satellite dish (now pole mounted and more rigid than previously following last years storms) which feeds the *TechniSat* receiver which in turn sends its output into the *E-Machine PC*. All software for image production is by David Taylor.

I have separated *GeoSatsignal* from the main PC. With the network system that operates on the *Acer* laptop running all the time in conjunction with the *MSG-Animator* software, everything runs very smoothly.

The photograph shows my workstation, enclosed in a smart cabinet so that everything is hidden when the doors are closed. On the top shelf inside the cabinet sits the PC monitor, alongside my scanner with the satellite receiver at the top right. The keyboard and mouse occupy the narrow shelf below.



The combined workstation, housed in a neat wooden cabinet

The next section down contains my two amateur radio rigs with the *Yaesu* on the left hand side. To the right of these is the *E-Machine* main console with the *Proscan* on top of it and, below that again, are the power supply system and PC printer. The laptop is located on the very top of the cabinet.

I am located on the Isle of Portland at about 500 feet above sea level where it is very exposed to winter conditions, but reception is excellent and so far I have no interference with NOAA 18, which is a bonus. I hope this has been of interest to you all. I am sure there are many people out there who have much more interesting stations. If so let's hear about them—it's all part of our fantastic hobby, sharing experiences and ideas.

MEMBERSHIP REPORT

Nigel Evans

As at October 11, 2005, the current paid up members number 524. Of the members who have chosen not to renew, 32 have memberships which have only just expired so these are members who may have forgotten to renew. Around 100 have not renewed for the current year having received the first issue for 2005; there is no direct feedback from these members. Since the beginning of this year GEO has attracted 137 new members and the current membership is:

- UK membership 375
- Europe 79
- Rest of world 70

I am not altogether surprised by the turnover of membership as other similar clubs have similar experiences. This indicates that GEO will have to continue with its drive for new members just to maintain the current membership level, which is necessary to support the quality of service we provide. It also indicates that our membership seems unlikely to reach 1000 members, and GEO will have to budget for a membership income in the range 500 - 600 members per annum but recognising that there will be additional income from GEO's shop.

QUARTERLY QUESTION

Francis Bell

The Quarterly competition in our last publication did attract entries. To remind you of the question, it related to Einstein's famous formula $E = mc^2$. The question was: 'Why use a lower case c to represent the speed of light?' The commonest answer I received was that it was derived for the Latin 'celeritas' meaning speed. I have heard this answer given before which is why I asked the question and it was the answer I expected. Whether it's true or not I just don't know.

I did receive the following comprehensive entry from our editor, Les Hamilton.

The Speed of Light - 'c'

There is a popular belief that this physical constant derives from the word 'celerity' (Latin celeritas - meaning speed), but this is almost certainly little more than an urban myth propagated by Isaac Azimov.

During the 18th century, a number of German physicists including Gauss (1835) and Weber (1846), attempted to

combine the laws of Coulomb and Ampere into a single action-at-distance force law. The ratio between these units had the dimension of a velocity and Weber and Kohlrausch published the first accurate measurement in 1856. It first appeared with the symbol 'c' in Weber's Force Law, and has been referred to in numerous subsequent papers by German physicists as 'Weber's constant'.

It later transpired that this constant, divided by the square root of 2, was very close to the velocity of electrodynamic waves. Subsequent workers such as Maxwell and Drude subsumed this conversion factor so that 'c' now became the symbol for the speed of light itself (Maxwell having shown that light was itself an electrodynamic wave).

Throughout the later years of the 19th century, a dichotomy persisted, where the symbol 'v' was applied specifically to the velocity of light, and 'c' to the velocity of electrodynamic waves. Around the end of the 19th century, influential workers in the field, such as Planck and Lorentz started to use 'c' to symbolise the velocity of all forms of electrodynamic radiation. In 1907, Einstein, who had originally formulated his law as $E = mv^2$ (squared), switched from v to c, leading to its adoption as the standard symbol for the speed of all forms of electromagnetic radiation through a vacuum.

It does, therefore, seem that the origin of the use for 'c' as lightspeed was no more than a fortuitous choice of a constant by Weber, many years ago.

Our hobby deals with electromagnetic radiation: visible light, IR and radio so some background history of their discovery is always interesting to know.

Quarterly Question 8

I know I said I wouldn't do this but I can't resist. Recently my travels took me through the eastern Mediterranean and beyond into the Black Sea. I took with me my hand-held scanner to listen to weather satellites although I did not attempt to download the images. I also took with me a map of the area. Looking at the map I was astonished by a statistic for the Caspian Sea which was not far away. In the past I have received images of the Caspian Sea from Russian weather satellites at my home in SW Surrey UK but the NOAA satellites I am currently receiving are in orbits too low for me to receive images from the area of the Caspian Sea directly. Perhaps some of our Italian friends could send in an image for us. That is a request!

And now the question. 'With respect to the Earth's mean sea level, what is the surface level of the water in the Caspian Sea?' Answers, either in imperial or metric units (and I will take answers plus or minus a little) to me via e-mail

francis@geo-web.org.uk

or my postal address. I will pick a winner on December 25, 2005.

A clue:- the answer will surprise you! It surprised me.

The reward will be free admission to our symposium in Leicester next April for the winning entry or to their nominee.

Cover Images

Front cover

This NOAA-17 channel-2 HRPT image shows Hurricane Katrina poised over New Orleans at 16:24 UT on August 29, 2005.

*Image: NOAA CLASS Library
Processing: HRPT Reader/Groundmap
Projection: Orthographic*

Inside Back Cover (top)

Rob Denton was intrigued by two of the cloud features in this NOAA-18 image which he produced from the 12:23 UT pass on September 27, 2005. Rob wrote: 'I found it interesting because the low pressure over the west of the Black Sea has been rotating in the same place for two days now. Note also the unusual straight line of cloud to the north of Italy.'

Received at Worksop, Notts, England on a Dartcom System II receiver with Wimo crossed dipole antenna - processing: WXtolg.

Inside Back Cover (foot)

DAWS temperature chart for the north Atlantic at noon on September 16 - see note on page 10.

Back cover (top)

Antarctica's Erebus glacier protrudes from the coast of Ross Island to form a 12 km long ice tongue stretching across the ice-covered McMurdo Sound in this NASA ASTER image from November 30, 2001.

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

Back cover (foot)

Hurricane Katrina crossing the Louisiana coastline, as viewed from GOES-12 at 16:15 UT on August 29, 2005.

Erratum

Captions to the rainfall analysis maps on page 25 of GEO Q7 should have read 'winter' for figure 1 and 'summer' for figure 2.



Monitoring EUMETCast



David Taylor (e-mail: davidtaylor@write.me.com)

A chance remark by Arne van Belle recently, alerted me to the availability of a program that would read out the status of a SkyStar card (used for receiving EUMETCast via the Hot Bird-6 satellite) and return the results in text format. Of course, this capability is already available in graphical format with the programs supplied by EUMETSAT, but having the data in text format meant that I could use my own software to graph it. Even better, I could add the graphing to my automated data collection so that no daily effort was required. One limitation is that the data is only sampled at 5-minute intervals, so any very rapid changes will not be seen. There are three parameters which I choose to plot, and a fourth which I cannot:

- **Signal Quality** - this is a percentage scale relating to the quality of the signal. A signal could have a high SNR (see below) but still be of poor quality—has anyone ever seen examples of this?
- **Signal-to-noise ratio (SNR)** - typically less than 10 dB on my system.
- **Bit Error Rate** - the instantaneous error rate prior to any correction. Typically the SkyStar hardware will perform one level of correction, and the higher-level TellCast protocols a further level of protection against errors.
- **Uncorrected blocks** - it would be nice to plot this, but as the B2status.exe [1] program resets the count each time it's run, you can't get an accumulated uncorrected block count.

Discussion of some interesting days

It was just by chance that Arne's discovery was made about the time of the Autumn 2005 solar outage period, and I started running the monitoring code just one day after my maximum solar outage. Solar outage occurs when the sun is in line with the Hot Bird satellite as seen from your antenna. Consequently, your system receives not only the wanted signal from Hot Bird, but also the energy radiated by the sun at 11GHz. Indeed, if your system is very poorly designed, this solar heat energy can melt the low noise block (LNB) at the antenna focus! Solar outages occur twice a year, around the Equinoxes.

Friday, October 14

The three graphs in figure 1 represent a screen shot from the Web page

<http://www.david-taylor.myby.co.uk/mrtg/Eumetcast.html>

and show the throughput of the SkyStar-2 card: from top to bottom

- The *quantity* of data it sent to the TellCast receiving software
- The bit-error rate (*BER*)
- The signal *Quality* and *SNR*.

Whilst the throughput is an accurate total, the *Quality*, *SNR* and *BER* are snapshots taken every five minutes, so are not true averages. Nevertheless, the data is quite interesting.

The top graph (throughput) shows a clear increase in data at the middle of the day. This is to be expected, as the data is losslessly compressed so that night-time visual channel data with large dark areas will compress better than daylight data and hence produce smaller files and lower throughput.

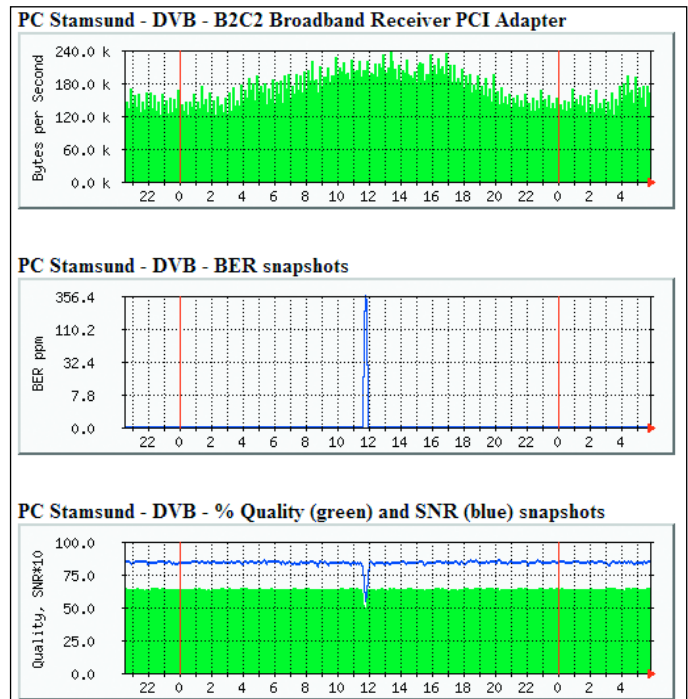


Figure 1 - Friday, October 14, 2005

The middle graph (BER) shows a peak just at the time when the solar outage is predicted. With the sun behind the satellite, the noise in the receiver bandwidth is greater and therefore the error rate of the data is greater. As a matter of interest, the error correction scheme is such that no uncorrected blocks or missing segments were observed. The maximum *BER* is around 400 errors per million, or 0.0004%. Although there appears to be a smooth peak in the data, I think that the *MRTG* plotting routine smoothes the data, so don't read too much precision into these very narrow peaks.

As you would expect, at the same time as the noise increases both the *SNR* and signal quality take a dip, which shows clearly in the bottom graph. There is no significance in the fact that *Quality* is plotted with solid bars and the *SNR* as a line. *MRTG* plots two variables that way, and it means that I don't need to ask the Editor for colour pages for this note! To allow the *Quality* and *SNR* to be plotted with the same scale, the *SNR* is multiplied by 10 and therefore the 0 - 100 scale can be read as 0 - 10 dB SNR.

Thursday October 13

The three graphs shown in figure 2 indicate much the same story as Friday's. However, there are differences. Just as solar outages affect your reception from Hot Bird, they also affect the downlink between Meteosat-8 and its EUMETSAT ground station. Just because they have a bigger antenna doesn't mean they aren't affected—while the sun is in the antenna beamwidth the bigger antenna simply picks up more noise! OK, it's more complex than that, but now is not the time to delve deeper. The net result is that EUMETSAT may lose data from Meteosat-8 too, when the sun passes behind that satellite. As Meteosat-8 is located at 3.4°W and Hot Bird at 13°E, any outage will occur about one hour later for Meteosat-8 than for Hot Bird.

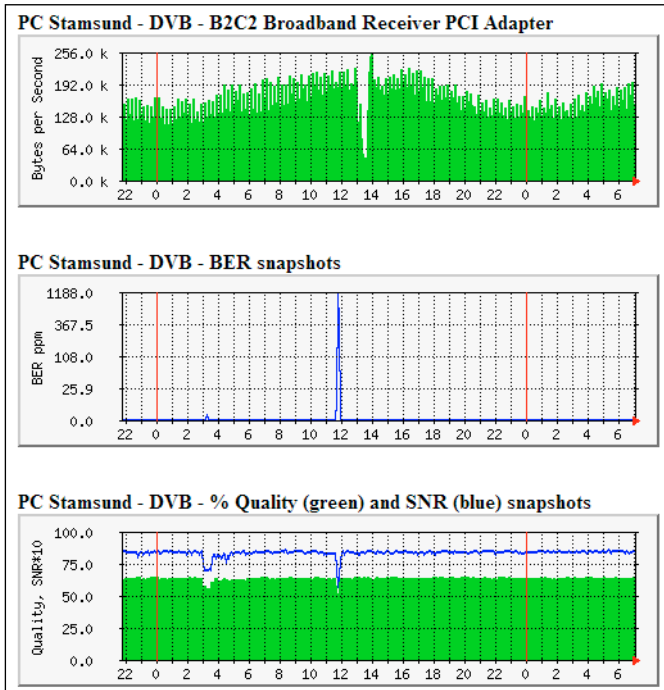


Figure 2 - Thursday, October 13, 2005

- the Meteosat-8 / EUMETSAT outage is clearly shown on the throughput graph (top), where the lack of data for the 12:00 and 12:15 UTC scans shows as a large drop in the throughput at 13:00 - 13:30 clock time (MRTG uses local time, UTC + 1 hour in my case, for display).
- the BER plot shows a peak at local solar outage time, and it's larger than Friday's peak because the sun-satellite separation was less (0.57° on Thursday compared to 0.94° on Friday, according to my *WXtrack* program).
- the *Quality* and *SNR* plots also show the dip due to increased solar noise. However, there also seems to have been a drop between 02:00 and 02:30 UTC, with a slight blip in the *BER* during the same period. I have no idea what caused that drop. In periods of very heavy rain you do see drops like this but I don't recall there being bad weather around at that time (there had been two days before, though).

How to add your own SkyStar data to MRTG

MRTG is a free tool widely used on UNIX systems for monitoring network activity and there is a version available for Windows as well. It comprises a *Perl* script for data collection, and a program called from the *Perl* code which amalgamates the data. You can download MRTG from:

<http://people.ee.ethz.ch/~oetiker/webtools/mrtg/mrtg.html>

and *Perl* (also free) from:

<http://www.activestate.com/>

Look for 'ActivePerl'. You should also enable the SNMP service on your Windows system if you wish to monitor network throughput. There are a couple of steps to adding the signal statistics to your MRTG reports: to write two very small *Perl* programs to convert the output of the *B2status.exe* program [1] into the correct four-line format for MRTG, and to add the lines to your *MRTG.cfg* file to cause the *Perl* scripts to be called and the data to be plotted.

You can also use MRTG to plot a variable which can be obtained from the command-line by running a program which writes it results to 'standard output', i.e. a normal command-line output. I

used the *B2status.exe* program from the *B2C2 SDK* [1] which can return a snapshot of the status of the DVB card. This program can take command-line parameters to limit the displayed data, so I run this with the *-TI* parameter. The first line of each *Perl* script invokes the command and processes the output from the program into a four-line response as required by MRTG. There are two separate scripts—one to get the *Quality* and *SNR*, the other to get the *BER*. To make the values sensible integers for MRTG to plot, the *SNR* is multiplied by 10 so that both it and *Quality* become values in the range 0..100 (at least on my system), and the *BER* is multiplied by 10⁶ so that it becomes an integer 'parts per million' value.

```
$ntp_str = `b2status -ti`;
$ber = (split(/\n/,$ntp_str))[6];
$ber = (split(/ +/,$ber))[3];
$ber = int(1000000 * $ber);
print "0\n";
print "$ber\n";
print "0\n";
print "0\n";
```

File: **SkyStarBER.pl**

```
$ntp_str = `b2status -ti`;
$qual = (split(/\n/,$ntp_str))[4];
$qual = (split(/ +/,$qual))[4];
$snr = (split(/\n/,$ntp_str))[5];
$snr = 10 * (split(/ +/,$snr))[3];
$snr = int($snr);
print "$qual\n";
print "$snr\n";
print "0\n";
print "0\n";
```

File: **SkyStarQualSNR.pl**

All of these files are available by cut-and-paste from my website so there's no need to type them in. Look for this page:

<http://www.david-taylor.myby.co.uk/mrtg/Eumetcast.html>

Once the values are available as integers they can be plotted with MRTG. Plotting the *Quality* and *SNR* requires a fixed 0..100 scale. Plotting the *BER* is best done on a log scale. I'm not an expert in MRTG, so if any GEO Readers have suggestions for improvements of the code below I would welcome them!

Reference

- 1 The '**B2C2 SDK**' is the Software Development Kit for the SkyStar cards, and it can be downloaded from:

<http://www.technisat.com/?site=service/download.php&produktID=1281>

The Zip download includes the *B2status.exe* program. Neither the *SDK* nor the *B2status.exe* file is supplied by EUMETSAT on their CD.

```
#-----
Target[SkyStar_Stamsund_BER]: `perl SkyStarBER.pl`
MaxBytes[SkyStar_Stamsund_BER]: 1000000
Title[SkyStar_Stamsund_BER]: SkyStar V2.3 card on Stamsund
Options[SkyStar_Stamsund_BER]: gauge, nopercent, growright, logscale, withzeroes
YLegend[SkyStar_Stamsund_BER]: BER ppm
ShortLegend[SkyStar_Stamsund_BER]: ppm
LegendI[SkyStar_Stamsund_BER]:
LegendO[SkyStar_Stamsund_BER]: BER:&nbsp;
Legend1[SkyStar_Stamsund_BER]:
Legend2[SkyStar_Stamsund_BER]: Bit Error Rate (BER) in parts per million
PageTop[SkyStar_Stamsund_BER]: <H1>SkyStar BER snapshots - Stamsund</H1>
#-----
Target[SkyStar_Stamsund_SNR]: `perl SkyStarQualSNR.pl`
MaxBytes[SkyStar_Stamsund_SNR]: 100
MaxBytes2[SkyStar_Stamsund_SNR]: 100
Unscaled[SkyStar_Stamsund_SNR]: dwmy
Title[SkyStar_Stamsund_SNR]: SkyStar V2.3 card on Stamsund
Options[SkyStar_Stamsund_SNR]: integer, gauge, nopercent, growright
YLegend[SkyStar_Stamsund_SNR]: Quality, SNR*10
ShortLegend[SkyStar_Stamsund_SNR]:
LegendI[SkyStar_Stamsund_SNR]: Quality %:&nbsp;
LegendO[SkyStar_Stamsund_SNR]: 10 * SNR dB:&nbsp;
Legend1[SkyStar_Stamsund_SNR]: Signal Quality (0..100%)
Legend2[SkyStar_Stamsund_SNR]: SNR * 10 (0..10.0dB)
PageTop[SkyStar_Stamsund_SNR]: <H1>SkyStar Quality & SNR snapshots - Stamsund</H1>
#-----
```

Lines to add to MRTG.cfg

Unique Finale to the 2005 HURRICANE SEASON

First ever Atlantic Hurricane to enter European Waters

During 2004, GEO reported on the first ever Atlantic hurricane to make landfall in South America. Now, just 18 months later, the first ever Atlantic hurricane developed close by European waters.

Hurricane Vince

Events started to unfold on October 8 this year with the appearance of *tropical storm Vince* some 200 kilometres north-west of Madeira. Initially, windspeeds around the eye of this slow-moving storm, tracking northeast at around 10 kilometres per hour (kph), were just 80 kph; but during the afternoon of the following day they briefly exceeded the 117 kph hurricane threshold and prompted the NOAA National Hurricane Center (NHC) to elevate *Vince* to the status of a Category-1 hurricane. The colour image on page 9, acquired by the MODIS instrument aboard NASA's *Aqua* satellite, clearly shows the clear eye in the centre of the storm at the time when it was at its most powerful. The Canary Islands and the coast of northwest Africa are visible at the lower right.

Vince, which had a diameter of only some 180 kilometres, formed farther east and farther north than any tropical Atlantic storm in recorded history. Hurricanes normally form off west Africa where the sea-surface temperature is 27°C or greater. It is extremely unusual for a tropical storm to form off Madeira where, on the date in question, the sea surface temperature was a mere 23°C at noon. This latitude more commonly spawns subtropical storms which are fed by clashing horizontal layers of cold and hot air in the upper atmosphere rather than warm sea surface water and humidity.

Vince was soon downgraded to a tropical storm again and its centre, where winds continued to gust to 75 kph, made landfall at the extreme southwest of Spain, just north of Cadiz, on the morning of October 11, bringing 35 mm of rainfall to the surrounding region in a two-hour spell. *Vince* also gave rise to rainfall totalling 50 mm in Morocco, 40 mm in Andalusia, 26 mm in central Portugal but only between 5 and 15 mm across the drought-stricken Costa del Sol.

The arrival of *Vince* made this year's hurricane season the second busiest on record with 20 named storms, a record previously dating back, jointly, to 1887 and 1995, each with 19 storms. At this time the record was still held by the 1933 season which produced 21 storms (NHC records stretch back to 1851). *Vince* was also the first storm in the Atlantic Basin to begin with the letter 'V' since the naming system was introduced in 1953.

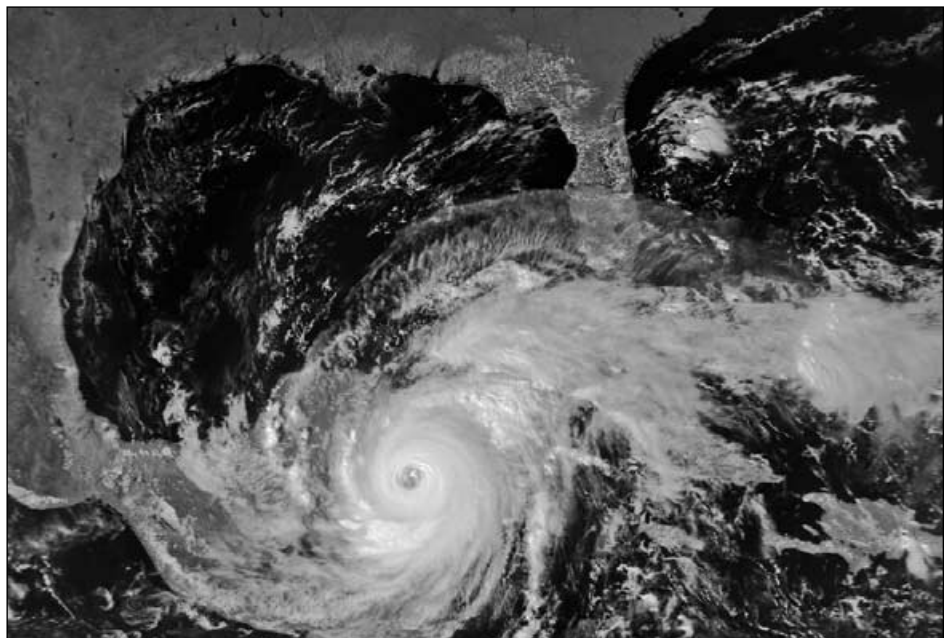
Hurricane Wilma

This year's list of names was completed when tropical storm *Wilma* materialised on October 16 to equal the 1933 tally; and just three days later she had become a full-blown category-5 hurricane with winds reaching 280 kph and a minimum eye barometric pressure of just 882 millibars.

the Mexican offshore islands of Cancun and Isla Mujeres.

Wilma, though soon downgraded to a Category-3 hurricane, pulverised the Yucatan peninsula with sustained 200 kph winds and gusts up to 240 kph, which ripped away storefronts, peeled off roofs and forced tourists and residents alike to seek shelter in upper floors of buildings. Moving at little more than 10 kph, *Wilma* forced Mexico's Caribbean coastline to endure hurricane conditions for some 48 hours, during which time some regions experienced over a metre of rainfall.

At length, *Wilma* picked up speed and gained strength over the warm waters of the Gulf of Mexico before smashing into Florida with 200 kph winds and inflicting a



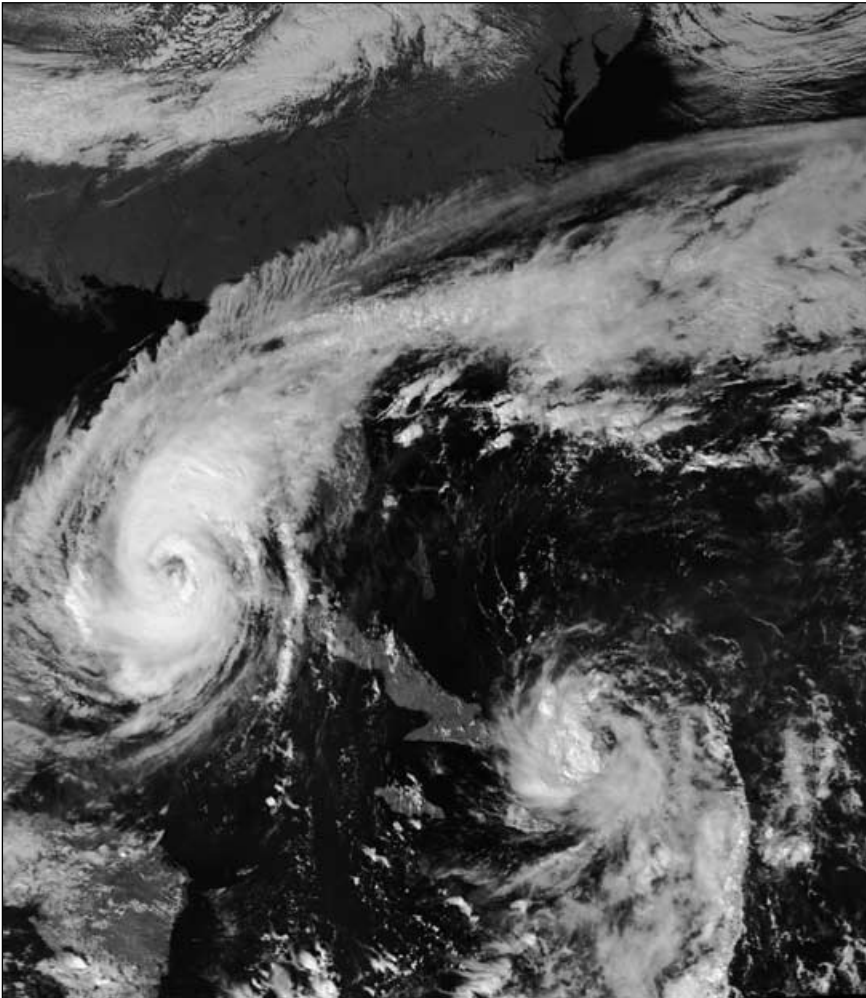
Hurricane Wilma making landfall on Mexico's Yucatan peninsula at 19:20 UT on October 20, 2005 in this NOAA-18 channel-2 HRPT image. At this point, Wilma was a category-4 hurricane.

Image: NOAA CLASS archive Processing: HRPT Reader

At that point Wilma was the most powerful hurricane ever recorded in the Atlantic basin having escalated from category-2 to category 5 in just 6 hours! This prompted the evacuation of some 100 000 people from low-lying coastal areas around Cuba and another 33,000 holidaymakers from

four-hour pounding that cost at least four lives, cut power to millions of homes and caused billions of dollars in damage.

Wilma flooded the low-lying Florida Keys, then hit the mainland south of the fast-growing retirement city of Naples before



The twin record-breakers, Hurricane Wilma (left) and Tropical Storm Alpha (lower right), pictured in this NOAA 18 channel-2 HRPT image at 18:45 UT on October 23, 2005.

Image: NOAA CLASS archive

speeding across the Everglades to the populous Miami-Fort Lauderdale area on the Atlantic Coast, blasting windows out of high-rise buildings, destroying mobile homes and flipping cars.

Tropical Storm Alpha

Amidst all the turmoil surrounding hurricane Wilma, *Tropical Storm Alpha* became the record 22nd Atlantic tropical storm of the season when it developed south of Puerto Rico, incredibly, on October 22. This exhausted the list of storm names for the first time ever and necessitated use of the Greek alphabet to continue the series. At its peak, as it approached the Caribbean island of Hispaniola, *Alpha* was producing winds of up to 90 kph which necessitated the evacuation of thousands of residents in both the Dominican Republic and Haiti.

After making landfall, winds subsided to around 55 kph, accompanied by torrential rainfall. Some places received over 35 cm of rain and hundreds of houses in Haiti were destroyed by flash floods. In a suburb of the capital, Port au Prince, 23 homes were washed away when a rain-swollen river over-

flowed its banks. The flooding and mudslides triggered by the heavy rains caused at least 26 deaths, some after individuals were overwhelmed by flash flooding. Never in danger of escalating to hurricane proportions, *Alpha* petered out after just two days.

Naming Atlantic Storms

Starting from 1953, Atlantic storms were allocated girls' names but, from 1979, male and female names were assigned alternately. Five 'awkward' letters (Q, U, X, Y and Z) are not included in the lists which operate in a six-year cycle. Hurricanes that produce major loss of life or property, such as *Charley*, *Frances*, *Ivan* and *Jeanne* from the 2004 season, and doubtless *Katrina* and *Wilma* from the current one, are 'retired' and replaced.

As a contingency, should yet more storms develop, they will be named using letters from the Greek alphabet (alpha, beta, gamma ...). The recent tropical storm *Alpha* was the first ever instance when this has occurred. The list of storm names is maintained by an international committee of the World

Meteorological Organisation, of which NOAA is an active member. You can find the lists for the next five years at:

<http://www.nhc.noaa.gov/aboutnames.shtml>

A listing of retired names can be consulted at:

<http://www.nhc.noaa.gov/retirednames.shtml>

Names are given to tropical cyclones when they reach tropical storm status (sustained winds of at least 63 kph) and are maintained should the tropical storm be upgraded to a hurricane (sustained windspeed of 117 kph or greater).

Of the 22 named storms that have formed since the June 1 start of the 2005 hurricane season, 12 have become hurricanes, six of these major. This is double the long-term average, which is 10 named storms and six hurricanes (two major) per season. The Atlantic hurricane season officially closes on November 30.

Image Credit

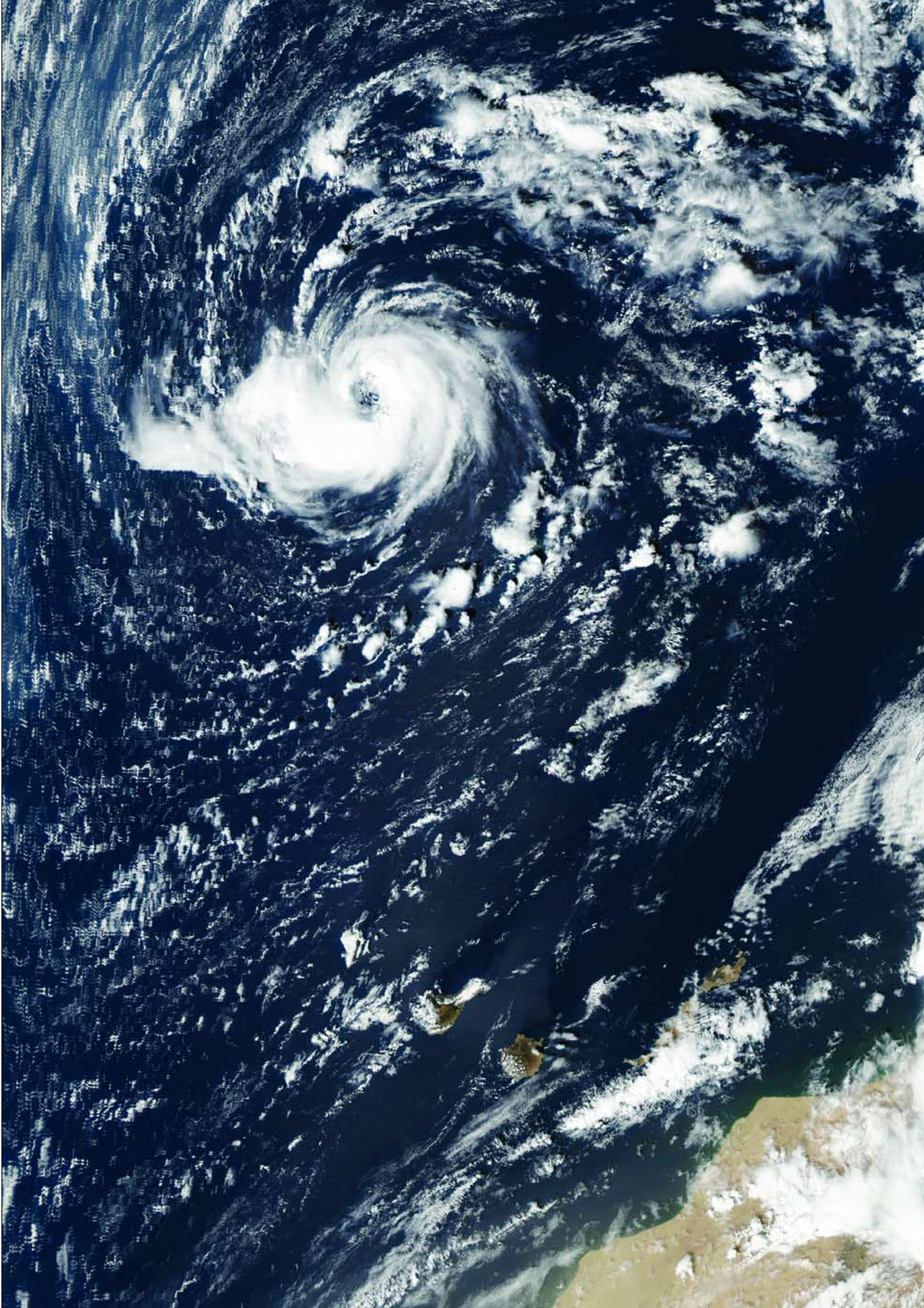
The colour image on the opposite page was acquired by the MODIS instrument aboard NASA's *Aqua* satellite. The 250-metre resolution image shows Hurricane *Vince* at its most active at 14:10 UT on October 9, 2005.

Credit: MODIS Land Rapid Response Team, NASA GSFC.



Hurricane Wilma pictured over Florida at 18:35 UT on October 24, 2005. NOAA-18 channel-2 HRPT

Image: NOAA CLASS archive



An improved DAWS Temperature Script

Les Hamilton

As explained in last quarter's article by Fred van den Bosch [1], Digital Atmosphere Workstation (DAWS) cannot handle directly negative temperature values from synoptic data files. A work-around was presented which offered a solution by adding a temperature offset to all values. Although this works, it does have the side effect of making the script hard to interpret because the actual temperatures being plotted do not in fact appear within it. Below is an alternative script which achieves precisely the same display, but at all times references the actual temperature values being displayed.

```
ERASE
# -----
# Place actual temperature value in Slot No 1
ANALYZE,STOR=1 TEMP
# -----
# Store ZERO - (TEMP/1000 is approximately ZERO) in Slot No 2
analyze,STOR=2 SDVC=1:1000
# -----
# SDIF 2:1 subtracts Temp from 0 (changes -T to +T)
# SDIF 1:2 subtracts 0 from Temp (leaves +T unchanged)
# -----
ANALYZE,OVER FILL COLOR=000:239:255 GRTN=0 SDIF=2:1
ANALYZE,OVER FILL COLOR=000:255:209 GRTN=0 SDIF=1:2
ANALYZE,OVER FILL COLOR=000:154:255 GRTN=5 SDIF=2:1
ANALYZE,OVER FILL COLOR=159:255:000 GRTN=5 SDIF=1:2
ANALYZE,OVER FILL COLOR=000:080:255 GRTN=10 SDIF=2:1
ANALYZE,OVER FILL COLOR=255:255:000 GRTN=10 SDIF=1:2
ANALYZE,OVER FILL COLOR=082:000:255 GRTN=15 SDIF=2:1
ANALYZE,OVER FILL COLOR=255:204:000 GRTN=15 SDIF=1:2
ANALYZE,OVER FILL COLOR=179:000:255 GRTN=20 SDIF=2:1
ANALYZE,OVER FILL COLOR=255:161:000 GRTN=20 SDIF=1:2
ANALYZE,OVER FILL COLOR=242:000:242 GRTN=25 SDIF=2:1
ANALYZE,OVER FILL COLOR=255:097:000 GRTN=25 SDIF=1:2
ANALYZE,OVER FILL COLOR=204:000:204 GRTN=30 SDIF=2:1
ANALYZE,OVER FILL COLOR=255:014:014 GRTN=30 SDIF=1:2
ANALYZE,OVER FILL COLOR=153:000:153 GRTN=35 SDIF=2:1
ANALYZE,OVER FILL COLOR=255:110:110 GRTN=35 SDIF=1:2
ANALYZE,OVER FILL COLOR=122:000:116 GRTN=40 SDIF=2:1
ANALYZE,OVER FILL COLOR=255:153:153 GRTN=40 SDIF=1:2
#basemap
ANALYZE,CONT CINT=5 COLOR=100:100:100 LINE=1
ANALYZE,CONT COLOR=255:255:255 EQUA=0 LINE=1
```

A north Atlantic chart produced in this way (but with 2°C contours) is shown on the inside back cover of this issue.

Each temperature is first placed in the first storage slot. As DAWS does not permit the user to place the value zero into a slot directly, the second section of the script improvises, dividing the temperature by a thousand and placing the result (which is almost zero) in Slot No 2.

When negative temperature values drawn from the synoptic datafile are subtracted from zero (i.e. 0 - Temp) a positive value is created and plotted on the chart in a 'cool' colour. When a positive temperature from the synoptic datafile has zero subtracted from itself, (i.e. Temp - 0) it is unchanged and can be plotted on the chart in a 'warm' colour.

References

- 1 Using Scripts with DAWS, GEO Quarterly No 7, page 30.
- 2 Advisory on Daws Scripting, this issue, page 41.

TURBOCHARGE

your Feng Yun 2C Downloads

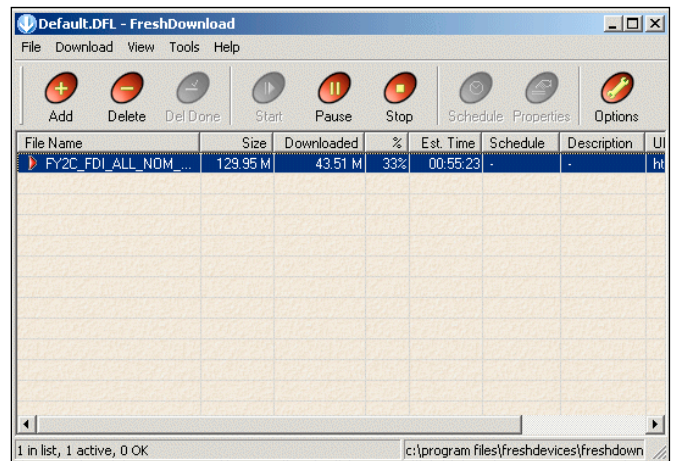
Last issue [1] we described how you can download raw Feng Yun 2C telemetry data from China's National Satellite Meteorological Centre (NSMC) and process it yourself. Unfortunately, since then, Internet data transfer rates from the Orient have plummeted to unacceptable levels. But thanks to Fred van den Bosch, who has 'discovered' a download manager called *FreshDownload*, transfer rates can now be increased up to eightfold.

FreshDownload is a download manager which can be obtained free (as a 1.5 Mb download) from

<http://www.freshdevices.com>

The program, though free, does require registration if you are to use it beyond its 11-day trial period; but the good news is that registration is also free!

The secret behind this program's speed is that it can open up to eight simultaneous HTTP connections to retrieve a file.



The main *FreshDownload* window

Setting up a Download

Your first action will probably be to increase the default number of simultaneous connections. Click **<View/Fresh options/Connection>** and change the value to 8. Next, visit the NSMC site at

<http://www.nsmc.cma.gov.cn/SCB/F2C/HDF/>

and right-click on the file you require and, on the pop-up menu, click 'Copy link address'. Next open *FreshDownload* and click the 'Add' button followed by Ctrl-V on the keyboard. The address for the HDF file will immediately appear in the 'URL' field. Finally, click 'OK' (or press the 'Enter' key) to start the download.

In practice, most HDF files (which weigh in at 133 Mb) can be downloaded in 90 minutes or less. Fred claims a 'record' of under 20 minutes!

On days when connections are particularly slow, download channels can time-out. If so, exit the program, then reload and double-click on the filename (see image above) to resume. There is also an option to increase the time-out value.

Reference

Processing Images from Feng Yun 2C, GEO Quarterly No 7, page 26

HURRICANE FORECAST FEEDS

Peter Green

This article describes a small program that can keep you up to date with hurricanes through the forecasts available from the NOAA National Weather Service Hurricane Centre as well as other weather and image related sites. The National Hurricane Centre (NHC) can be found at

<http://www.nhc.noaa.gov/>

where you can obtain the latest news regarding the forecast and development of hurricanes as well as ongoing informed discussion. The website also provides a host of images as well as details about hurricane formation, tracking and forecasting. You can have hurricane advisories delivered to your desktop via RSS newsfeeds!

What is RSS?

RSS (Really Simple Syndication) can provide lightweight summaries of the latest news in a form that can be read using news aggregator software. The idea is to provide the latest news and updates in a headline or news digest format.

What do I need to use RSS Newsfeeds?

To use our RSS newsfeeds you must have a feed reader or news aggregator installed on your computer. These programs can be set to read the newsfeeds on a recurring basis, from as little as every 5 minutes up to several hours.

What are the NHC Feed Addresses?

The NHC currently offers three basin-wide aggregate feeds plus a new innovation for the 2005 Hurricane Season, a series of feeds, each relating to a specific active storm (figure 1).

BlogExpress

To take advantage of the RSS feeds I use *BlogExpress* which is available as a free download from:

<http://www.usablelabs.com/productBlogExpress.html>

BlogExpress is a full-featured .NET application for content syndication (also called a news aggregator or blog reader) which supports all RSS versions. It can read contents from any websites that provide XML files for content syndication. *BlogExpress* is a small download (560 kb) which just runs in the background collecting the latest news items for you.

Inserting Hurricane Feeds into BlogExpress

Once you have installed BlogExpress you must add the NHC feed addresses to the list of feeds in the reader. It's a good idea to start by adding a new category for your feeds: just click **<File → New Category>** and type in 'Hurricanes'.

Next, open the NOAA NHC web page in your browser and click on the orange coloured 'XML' icon labelled 'RSS feeds' in the left-hand menu panel (this icon is used across the Internet to indicate that an RSS feed is available). This opens a page containing the various RSS feed addresses (figure 1). **Right-click** the mouse on any of the links shown and select 'copy link address' from the popup menu that appears (figure 2).

Back in *BlogExpress*, click **<File → New Subscription>**, click on the 'Subscription address' field and paste in the address (by typing Ctrl+V on the keyboard) as illustrated in figure 3. Click 'Check' then 'Finish' and the job is done. Next time you run BlogExpress you will find the hurricane news flooding in.

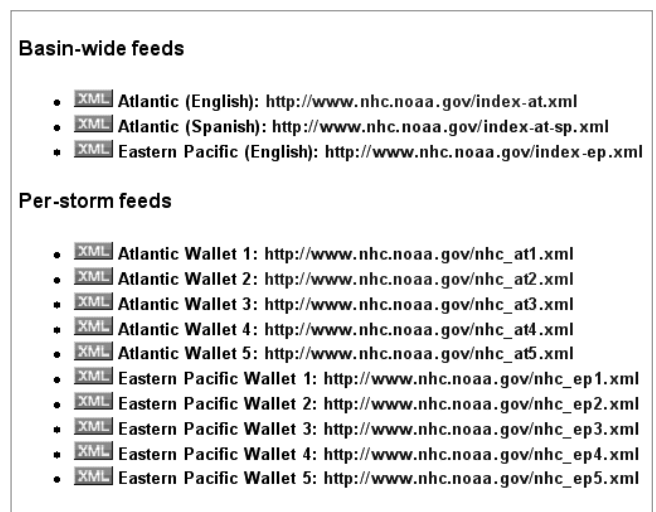


Figure 1 - Newsfeeds listed on the NOAA NHC web page

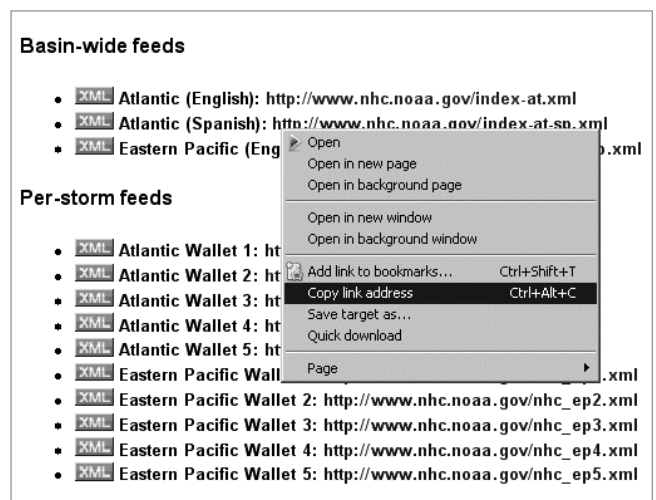


Figure 2 - Copying the newsfeed web address

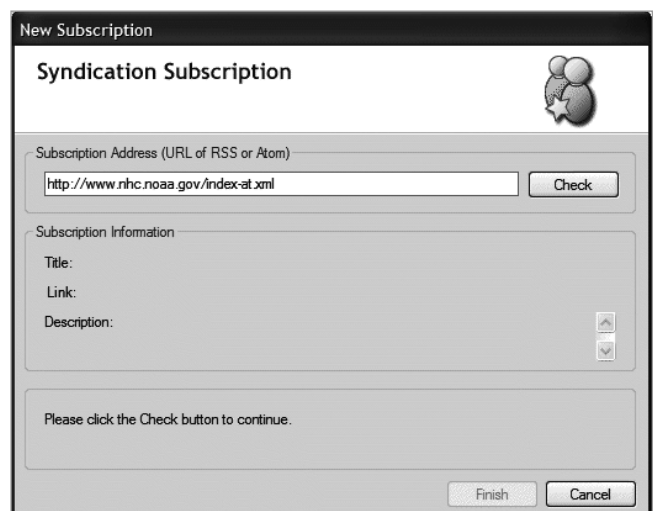


Figure 3 - Adding a new feed to BlogExpress

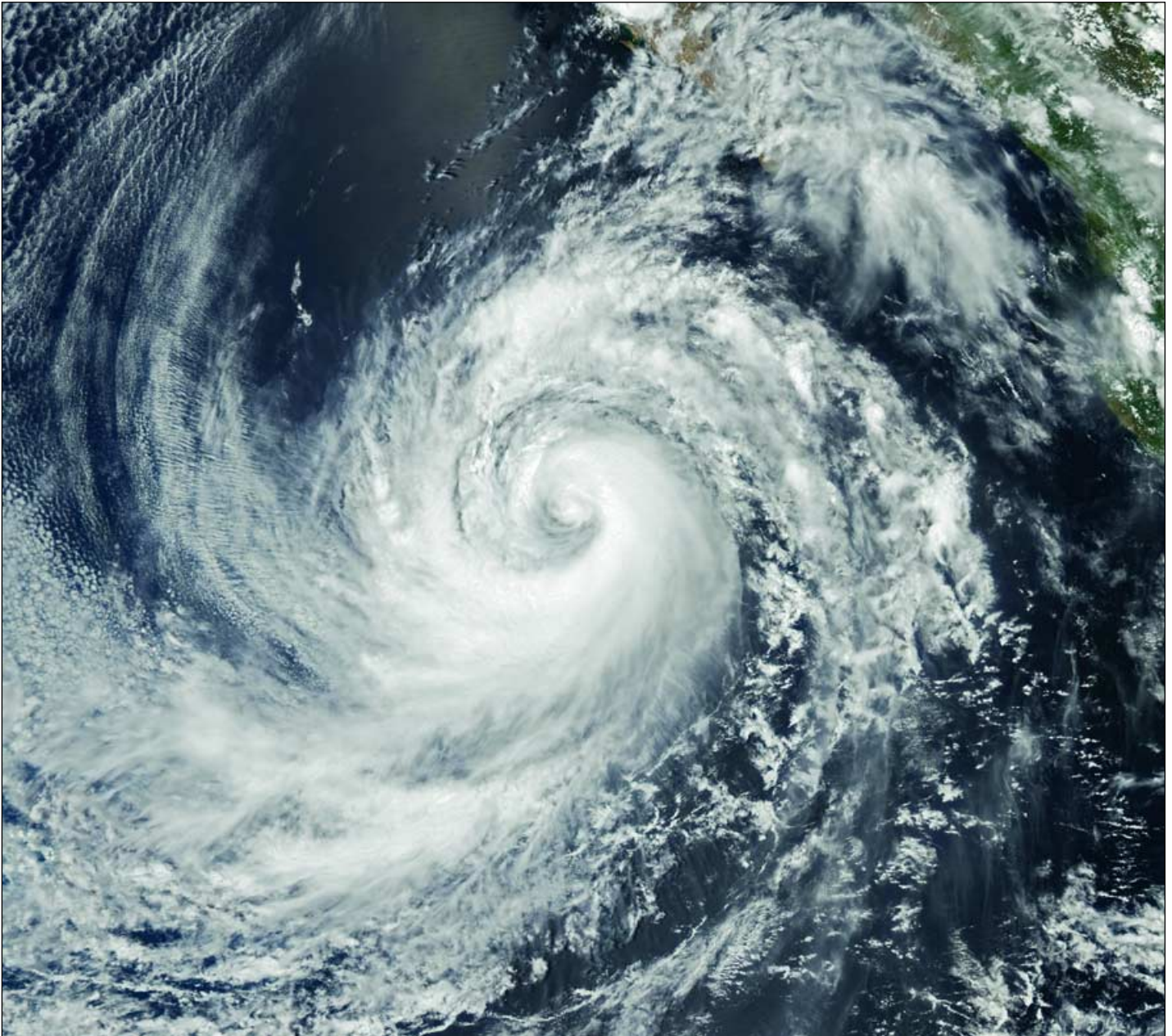


Figure 4 - Hurricane Hilary imaged in true colour by NASA's Aqua satellite on August 22, 2005

E-mail Delivery

If you prefer, the menu on the NOAA NHC web page has an option where you can receive the same advisories by e-mail.

Hurricane Hilary

The August 20 advisory on Hurricane Hilary stated:

‘EXPANDING AREA OF CONVECTIVE
CLOUD TOPS COLDER THAN -80C’

This is illustrated in figure 5, a screenshot taken from David Taylor's MSG Animator program which shows Hurricane Hilary as viewed from NASA's GOES-12 geostationary satellite. One of Ton Lindemann's colour lookup table palettes has been applied to show the regions of greatest convective activity. Ton's CLUTs can be downloaded from the 'Satsignal' page at:

www.satsignal.net

Thanks to both Ton and David for making their software available.

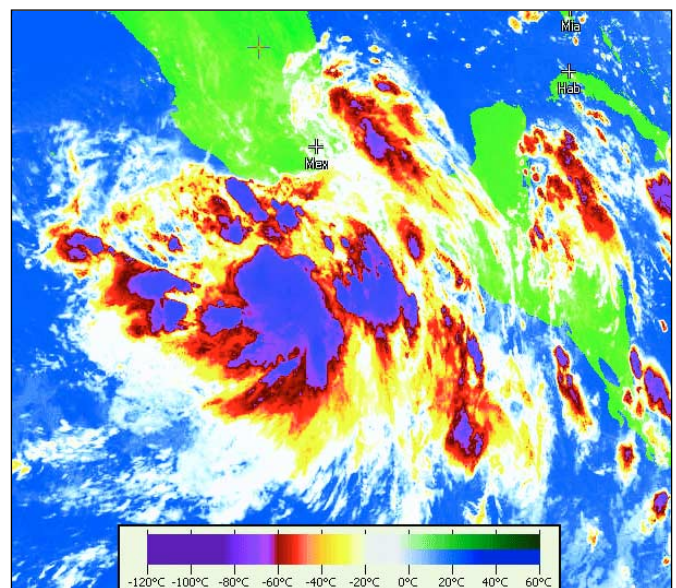


Figure 5 - Hurricane Hilary as imaged in David Taylor's MSG Animator on August 20, 2005



GEO at the 2005 AMSAT-UK Colloquium



John Tellick

GEO was once again pleased to be invited to attend this year's AMSAT-UK Colloquium, held between July 29-31 at the University of Surrey, Guildford, where we manned three stands devoted to the reception of both geostationary and polar orbiting weather satellite images, plus information about the hobby.

On the first stand there were no fewer than three MSG systems (run by Francis Bell, David Taylor and John Tellick) demonstrating live Meteosat-8 reception. Real-time animations and other imaging from these were projected on to a big screen in the exhibition area, just outside the lecture theatre.

Owing to the building's location, our Hot Bird reception dish had to be 'planted' in a garden area behind some railings but worked well nevertheless. David Simmons provided his expertise in setting up the dish for us as well as answering queries, and the signal was then divided, using a simple T-splitter, to allow us to feed two PCs from the same antenna.



David Simmons (left) and Francis Bell setting up the dish for Hot Bird/Meteosat-8

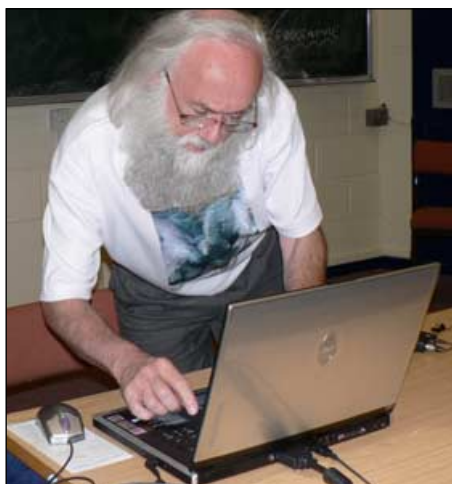
David Taylor dealt with software set-up queries and demonstrated various weather satellite programs on his laptop, and also demonstrated a quick laptop setup of the *EUMETCast* USB hardware and software with a SkyStar USB box.

On another stand devoted to APT reception, Francis Bell managed to demonstrate successful NOAA 18 reception on an RX2 receiver despite pagers being very audible on his scanner. Our comprehensive display of brochures, technical documents and satellite photos, kindly donated by *EUMETSAT* and BNSC, created great interest, as it always does. And John Tellick provided some examples of GEO Shop products as well as details and advice to those interested in setting up a *EUMETCast* system.

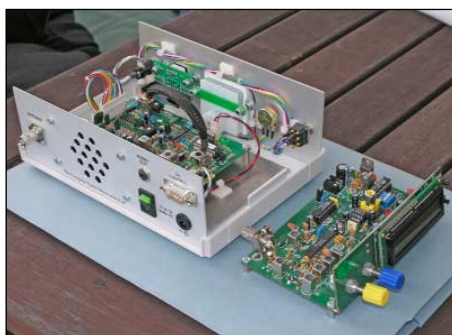
The people who visited the GEO displays and spoke with us were well-informed and many were interested in getting a live weather feed for themselves. The message that MSG reception

was not too difficult to achieve seemed to be getting across more.

At last year's Colloquium, the chairman had commented on the average age of attendees and how amateur radio was suffering from a lack of recruitment of young members? This



David Taylor installing the *EUMETCast* software on his laptop



Two of the APT satellite receivers on display on the GEO stand



Delegates browse through the literature on the GEO stand

year it was very encouraging to see so many young people—many of them involved with building micro-satellites—in attendance. Long may this continue! GEO, AMSAT and all amateur radio groups have to find ways of enthusing youngsters and interesting them in science and the many aspects of amateur radio.

There was lot of space-oriented content this year which proved very interesting. One of the main presentation was on the Cassini-Huygens mission to the Saturnian system. This included much detail about the Huygens landing on Titan and was delivered by Professor John Zarnecki of the Open University, the principal investigator for the surface science package on Huygens. Other presentations were concerned with the design and construction of spacecraft, space qualification for hardware, orbital dynamics, future and imminent amateur satellite projects and the design of electronics for space and space hardware.



The display area where live images were projected on to a big screen

There was also discussion of projects with the ISS to get schools (and thereby the younger generation) interested and involved with space. GEO clearly has a role here since the reception of *EUMETCast* data by amateurs and schools can help to achieve this on many levels.

David Taylor gave a talk on the near future of weather satellites, concentrating on the AVHRR and MetOp data that will soon be disseminated on *EUMETCast*.

There was also a presentation on satellite tracking software during part of the Colloquium which generated a lot of interest in David's *WXtrack* program.

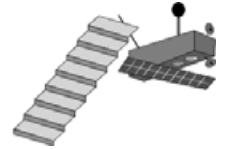
The Colloquium provided a most interesting and worthwhile three days and considerable interest was shown in the GEO live *EUMETCast* demonstrations and the space/environmental related information freely available to delegates.

Acknowledgements

Thanks to David and Cecilia Taylor for allowing us to make use of some of their photographs; also to David for his contributions to this report.



News in Brief



Coming soon ...

HRPT via EUMETCast

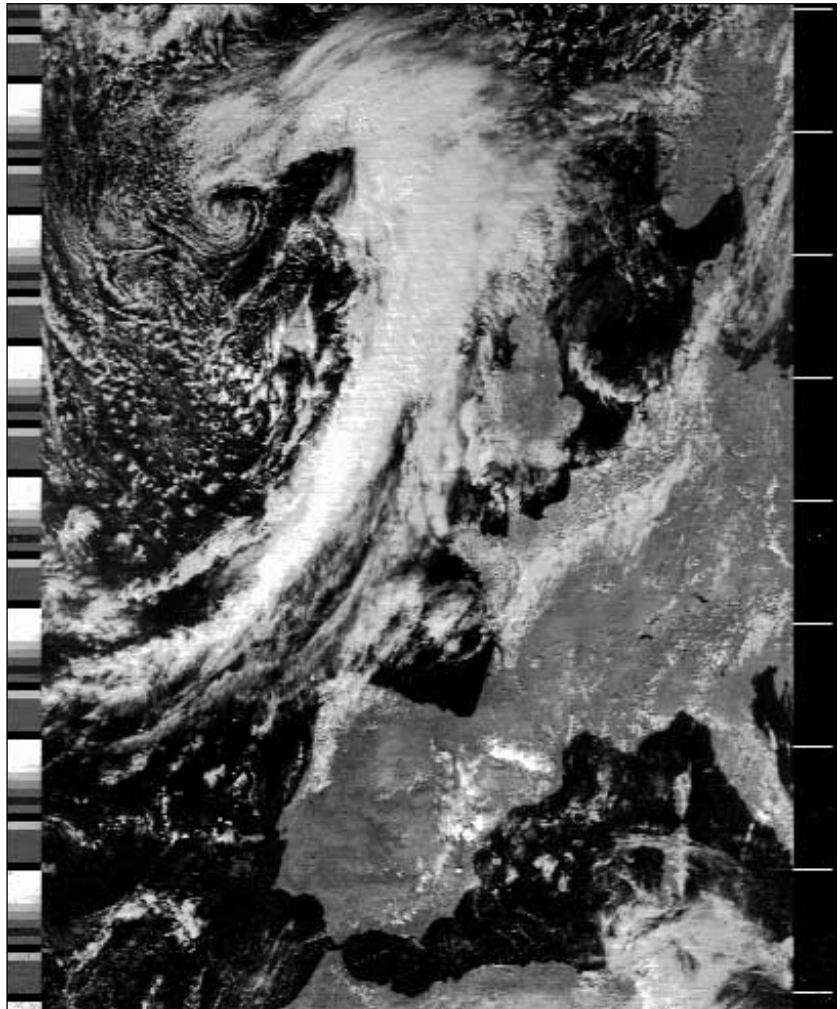
The lower image on the inside front cover of this issue is a screen-shot from a program in development by David Taylor, and shows what HRPT AVHRR data, which will soon to be available via EUMETCast, will offer users.

Data from the polar orbiting satellites such as NOAA-18 (and, in the future, from MetOp) is collected from multiple receiving stations (Maspalomas in Gran Canaria and Tromso in Norway in this example) then transmitted over the EUMETSAT *EUMETCast* service in one-minute chunks. The data thus covers a full swath stretching all the way from the Equator to slightly beyond the North Pole, a feat which would be impossible for any single ground station. In the new combiner program, all the one-minute segments are displayed on a common polar stereographic map format, making a continuous image. The segments are also combined to form a single large file which can be displayed and analysed using programs like *HRPT Reader*. The full 1.1 kilometre ground resolution of the HRPT data is maintained and the image size of this example is 9972 lines of 2048 pixels.

It is EUMETSAT's intention to make this data available to users before the end of 2005, and the same type of dissemination will be used for the new MetOp satellite next year. The great thing for users of the EUMETCast system is that no new hardware is required: just some low-cost software to decode and assemble the segments. So even people who can not erect the steerable antenna previously needed to receive HRPT data will soon be able to enjoy the higher resolution and quality provided by this format through the medium of EUMETCast. Exciting times indeed!

WEFAX/PDUS Extension

As we go to press comes news that the oft-postponed launch of the MSG-2 satellite may take place on December 20 this year. Inevitably, this has resulted in a knock-on effect on the new satellite's commissioning, and WEFAX and PDUS transmissions from Meteosat-7 have consequently now been extended until June 14, 2006.



NOAA-18 image from the 13:35 UT pass on September 24
Processed by Bill Cutler using Spacetechn/Archimedes A5000

MetOp-2 News

The latest date for the launch of EUMETSAT's first polar orbiting weather satellite in the MetOp series is currently June 20, 2006.

Imaging on Archimedes

Way back in the late '80s, when amateur weather satellite imaging was still very much in its infancy and most PC users were still firmly entrenched in DOS, a company called *Spacetechn* produced the first weather satellite decoding software with a 'windows' style interface. This innovative package, called *Weatherdesk*, ran on the Acorn 'Archimedes' micro-computer. **Bill Cutler** still uses his Spacetechn decoder podule in an Archimedes A5000 computer, and recently sent GEO some examples of his images, including this rather nice NOAA-18 one he acquired on September 24 this year.

Bill lives in Battersea, London and has no problems with pagers. He uses an RX2 receiver, first of all recording the satellite audio on a mains cassette recorder then decoding it on his Archimedes.

Bill tells us that he has in the past experienced interference from a neighbour's electronic low-voltage outdoor lighting, and has repositioned his turnstile antenna to the bottom of his garden to minimise this.

RSS Feed for GEO-Subscribers

If you plan to take up Peter Green's advice and tap into RSS newsfeeds, you might like to add the GEO-Subscribers mailing list to your portfolio.

Just add a subscription to this address:

<http://rss.groups.yahoo.com/group/GEO-Subscribers/rss>

APTDecoder

New Software for NOAA APT Processing

Les Hamilton

Some months ago, **Patrik Tast** of Västervik in Finland released *APTDecoder*, a software package that allows you to capture NOAA APT audio, convert it into weather images, then subsequently process these to add colour, remove noise, create a weblog and much more. Although still under continuous development, *APTDecoder* already offers a host of features which make it a powerful rival to established favourites in its field, like *WXsat*, *WXtoImg* and *Satsignal*.

Obtaining and Installing APTDecoder

APTDecoder is free software and is available both from the Software Library and by direct download from:

<http://www.ptast.com/apt/decoder/>

The single installation file will, by default, install *APTDecoder* in the folder 'C:\APTDecoder' although it does offer a 'browse' button that allows you to select your own preferred location. The first time you run *APTDecoder*, it is a good idea to open the **<Help → About>** menu and click where it says 'Create a desktop shortcut'.

Preparing APTDecoder for Imaging

APTDecoder offers a host of user options. Here are just a few that you are recommended to modify before starting to use the program.

- Click **<Settings → General settings>** and in the *General* tab check 'Enable auto recording and processing' so that satellite passes will be captured automatically.
- Open **<Settings → Ground station>** and type in your latitude, longitude, altitude and station name.
- Make sure you are on-line then open **<Satellite → Keplerian elements>** and click 'Download' to import the latest 2-line elements.
- Open **<Satellite → Active APT satellites>** and place a check mark against the names of those satellites from which you wish to create images. *Note:* If no satellite is checked, the program will not do anything!

Capturing your first image

Now just leave *APTDecoder* running. The legend at the top of the screen announces which satellite is approaching and continually updates its azimuth and elevation, as well as stating the maximum elevation and AOS (Acquisition Of Signal—the time when the satellite rises above your horizon). Signal capture then commences (figure 1), the image displaying in real-time as it builds up. Note the floating overlay which shows full details of the satellite pass; this overlay does not appear on the saved images. Once the pass is complete the satellite audio, the decoded image and an information file are all saved automatically

Setting Recording Volume

If you already have other software such as *WXsat* or *WXtoImg* working satisfactorily on your PC, the recording level should

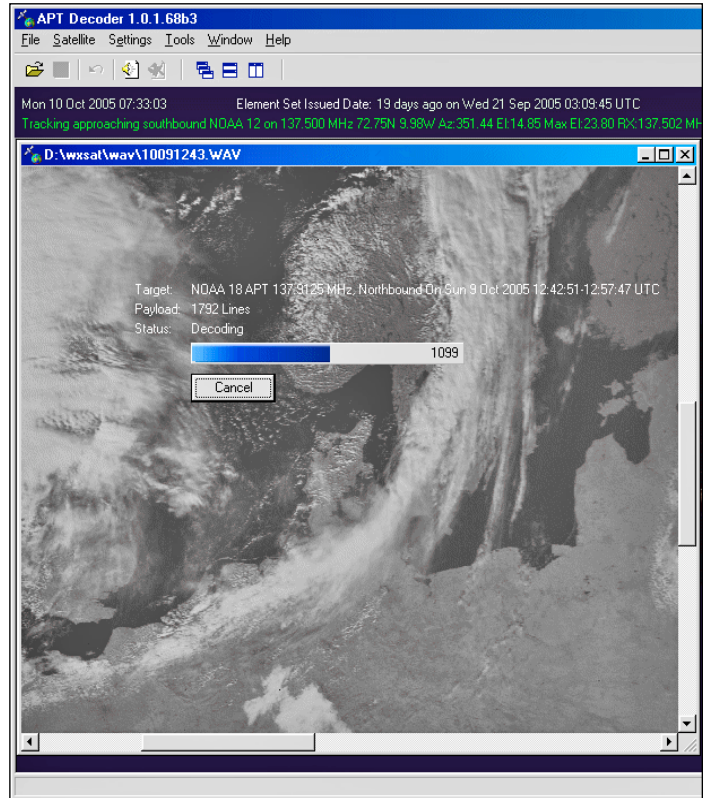


Figure 1 - The APTDecoder main screen

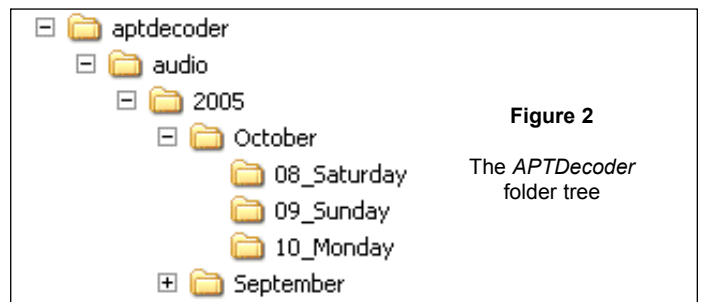


Figure 2
The APTDecoder folder tree

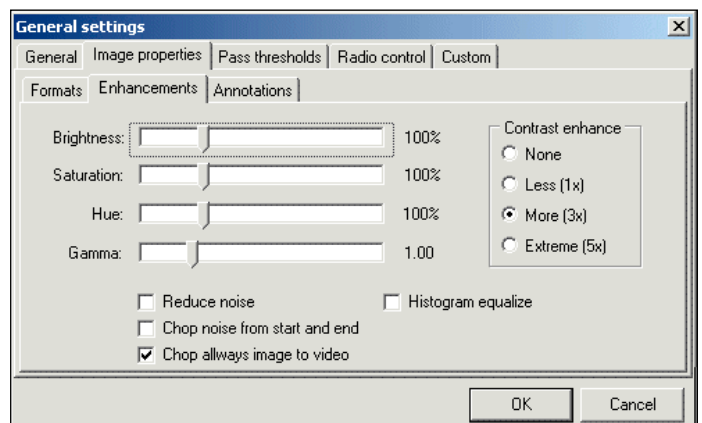


Figure 3 - The Image Enhancement Window

prove satisfactory for *APTDecoder* and your images should show a full range of tones. Otherwise, wait until a satellite image is forming and click **<Tools → Recording control>**. Check the 'Select' box for the input channel that you connected to your receiver ('line-in' or 'microphone' as appropriate) and adjust its volume slider until the decoding NOAA image shows a good range of tones without 'burning out' the cloud detail.

Filing System

APTDecoder creates a new data folder each year, containing a subfolder for each month and a further subfolder, as required, for each day of the month (figure 2). Every NOAA pass generates three files: a WAV file containing the satellite audio, a jpeg image in the standard NOAA format of two side-by-side images, and a text file which contains full details of the pass (satellite name, times of AOS and LOS, station details and the 2-line element set). All these are saved in the current 'day' folder, every file with a convenient generic stem filename based on the date and time:

`yymmdd_hhmmss_NOAA_nn`

Optimising Image Reception

Even though you take the trouble to set the recording level carefully, you may well discover that your images still lack the brightness and contrast that you desire. *APTDecoder* has built-in tools for modifying its default image parameters under the **<Settings → General settings → Image properties → Enhancements>** menu (figure 3). Any changes made here will become the defaults for all future satellite images. You can actually change these parameters during image acquisition then store the changes by clicking 'OK'.

Pass Thresholds

Unless you have a particularly clear horizon you will probably find that the beginning and end of each pass is of poor quality and not worth decoding. The **<Settings → General settings → Pass thresholds>** tab allows you to select, by either elevation or pathloss (in dB), when during a NOAA pass imaging starts and ends.

Modifying Images

Once a basic twin-channel NOAA image has been captured it can be processed in a variety of ways. The two channels, *Video-A* (daytime visible channel-2) and *Video-B* (infrared channel-4) may be displayed individually or further improved using the tools in the **<Enhance>** menu. False colour can be applied in several ways, both as a colour-composite image and as colour enhanced IR. The full range of image possibilities available in the **<Images>** menu is:

- Normal - the basic twin-channel NOAA transmission
- Video A - visible channel-2 by day, channel-3 IR overnight
- Video B - channel-2 infrared
- * False colour (A,B)
- * False colour temperature enhanced (ch 2+4)
- * False-colour low temperature enhanced (ch 2+4)
- IR brightness temperatures (ch 4)
- * IR low temperature enhanced (ch 4)

An additional useful option in the **<Images>** menu is called **<Spacecraft → Passinfo>** which displays a screen showing the contents of the logfile produced at the time of acquisition (see figure 4).

The **<Enhance>** menu provides tools to normalise and equalise the image, as well as to adjust contrast and modify the gamma setting (figure 5). The **<Effect>** menu offers additional tools, some more useful than others. The '*Magnifier*' opens a small

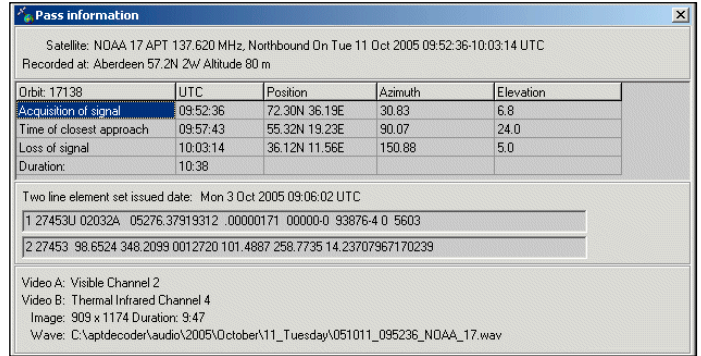


Figure 4 - The satellite pass information window

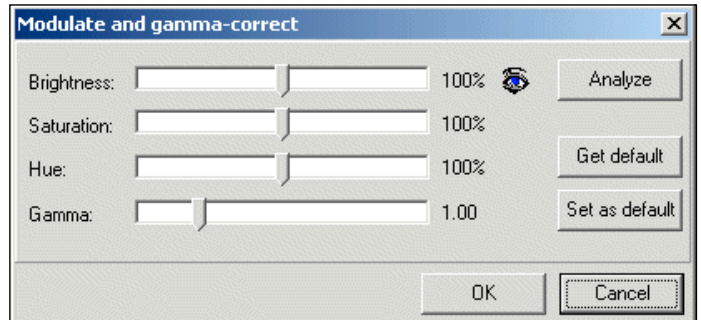


Figure 5 - Gamma correction in the **<Enhance>** menu

scalable window showing the region beneath the cursor at up to 500% enlargement; the '*Reduce noise*', '*Median filter*', '*Despeckle*' and '*Sharpen*' options all work well; others such as '*Enhance*', '*Emboss*' and '*Find edges*' are of dubious usefulness in this field.

Selecting a Colour Palette

Four of the image modes listed above (asterisked) can each be assigned its own individual colour palette through the **<Settings → Color lookup tables>** menu (figure 6). Click the yellow folder icon adjacent to the mode for which the palette is to be changed, select a new one from the pick-list that is displayed, then click 'OK'. If you wish to see the immediate effect of a new palette, load an image of the appropriate mode, select a new palette and click the appropriate 'eye' icon. This way you can check various palettes before making a final decision as to which you wish to be the default for that mode. *APTDecoder* also features an editor where you can create palettes of your own (**<Tools → Color Lookup Table Editor>**).

Imaging from Archived WAV Files

APTDecoder can be used to create images from archived WAV files. Because these will often be stored on a CD or DVD, writing the images to the same folder as the WAV file is no

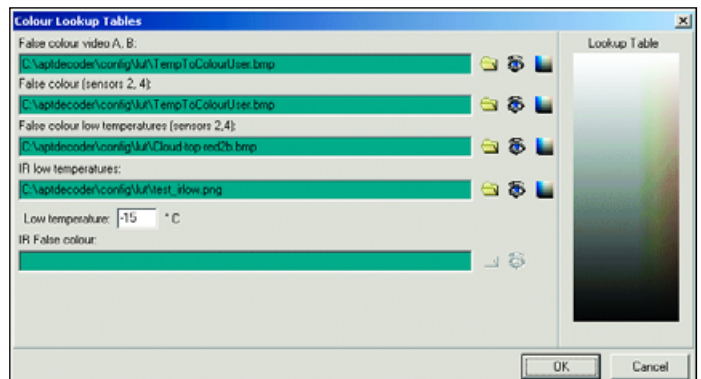


Figure 6 - The colour palette selection window

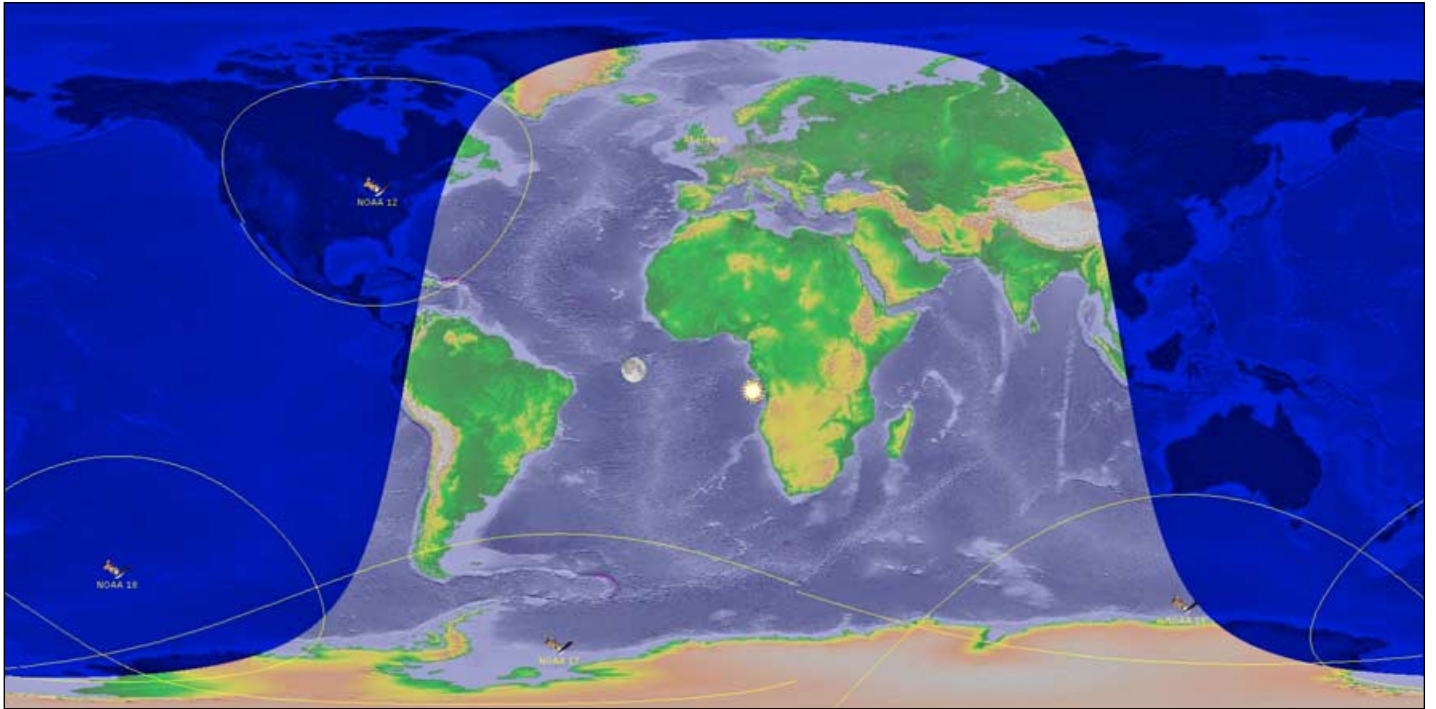


Figure 7 - APTDecoder's Flat Earth Monitor (satellite tracking screen)



Figure 8 - NOAA 17 at 11:37 UT on July 7, 2005, processed in APTDecoder using a customised palette

longer possible—but there is an ingenious solution. *APTDecoder* creates a new folder called ‘raw’ inside its ‘audio’ folder, and deposits the images there. The format in which the images are stored (JPG, BMP, GIF etc.) can be selected from **<General settings → Image properties>** by using the ‘RAW Image format’ drop-down menu. This setting also determines the format of images saved during direct reception from the satellites.

Flat Earth Monitor

A satellite tracker called the *Flat Earth Monitor* is an integral feature of *APTDecoder*. It operates continuously in the background but can be displayed from the **<Tools>** menu (figure 7). The satellites you display, and whether you choose to draw footprints and display the positions of the sun and moon, are all controlled under the **<Settings>** menu.

Daily Log

APTDecoder can prepare a web page containing any, or all, of the images that you process during the day. This is a very elegant HTML page (index.html), stored in the ‘APTdecoder\html\daily’ folder, which displays a thumbnail copy of each image along with a neat table listing full details of each satellite pass. Clicking on any thumbnail reveals the full-size image. To generate the Log just check ‘Create an html log’ on the *General* tab. If you wish, the program will also upload the Daily Log to your FTP server—an ideal way to keep your web page of satellite images up to date.

At the start of each day, *APTDecoder* erases the previous day’s Log and starts a new one so you don’t have to continually delete old images.

Radio Control

APTDecoder supports radio tuning control for the RX2, R2FX, and EMGO weather satellite receivers.

RSS Reader

Another valuable feature of *APTDecoder* is its in-built RSS Feed reader (see Peter Green’s article on page 11). Not only does this connect with updates on the *APTDecoder* Forum, you can also program in RSS feed addresses for NASA, NOAA, GEO_Subscribers and so on.

Other Features

In a program as feature-laden as *APTDecoder*, it is impossible to cover everything in a single article. Other useful attributes are a Pass List table, Footprint Overlap predictor, Orbit Data table (expanded display of the 2-line

element data), Satellite swath display plus a feature to check and update your computer clock via the Internet.

The APTDecoder Internet Forum

The *APTDecoder* software is under constant development and one of its strengths is the availability of a dedicated forum where users can ask questions, make bug reports, offer suggestions, and generally benefit from each others’ experiences. The forum can be accessed directly through the **<Help → Community>** menu, or by pointing your Internet browser to:

<http://www.ptast.com/apt/decoder/>

and clicking the *Community* button at the top of the page.

Questions and bug reports are generally dealt with promptly. Unfortunately, *APTDecoder* does not yet possess a *Help File*. No doubt this will appear in time, but meanwhile, why not join the Internet Forum and share your experiences with other members. You should find that this Forum goes a long way towards meeting all your program ‘help’ requirements.

Conclusions

Although still very much a work in progress, *APTDecoder* is already an impressive program for capturing APT weather satellite transmissions. The software is really easy to use: just enable auto-recording and sit back and await results. High-quality images are created at the time of acquisition and the program also saves the WAV file so that processing in other software can be undertaken later if desired.

Julian Moss has been an enthusiastic user of APTDecoder since it was launched, and his appraisal of the software can be read in the gray side-panel at right.

It is worth noting that *APTDecoder* is a multi-threaded application and manages the CPU demands of its own modules, and any other high-priority software running at the same time, in an intelligent manner. For example, if *Flat Earth Monitor* is open when a satellite pass becomes due it slows down as the recording thread takes priority. When the recorder is inactive, more time is devoted to *Flat Earth Monitor*. This can result in several seconds delay when closing down modules such as Flat Earth monitor and the Radio Control tuner-programmer; the module may appear to ‘hang’ for several seconds before vanishing from the screen.

Julian Moss has been involved in trialling and testing *APTDecoder* since it first appeared, and many of the CLUTs (colour palette files) distributed with the program were created by him. Here is Julian’s appraisal of *APTDecoder*.

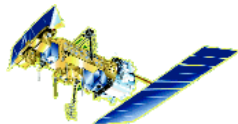
“I am extremely pleased with this software. I am now using it exclusively, instead of the full version of WXtolmg which I not so long ago paid for. I find that *APTDecoder* produces much finer and more natural looking images than WXtolmg, though as with SatSignal it is not tolerant of poor quality telemetry and cannot produce an image from a pass recorded using a narrow band receiver (at least, not in my experience.) *APTDecoder* cannot (yet) add overlays to an image, but this is currently being developed and I am very excited about what I have seen so far.

“I find that *APTDecoder* produces images that are as good as those produced by SatSignal. But it has the major advantage over SatSignal that it is a fully integrated package that automates the whole process, from recording the satellite pass to uploading decoded images to a web server.

“I suppose I should add that *APTDecoder* has the advantage of being free, but as someone in the software business I have no problem with the idea of paying for software.

!I have customised my own colour look-up tables for false colouring my images. I started this some time ago when *APTDecoder* did not provide much control over the appearance of images. I find that by increasing the contrast of the look-up bitmaps in a paint package, I can produce brighter images that are more to my liking. However, if you do this, then it is no longer possible to edit the bitmaps using *APTDecoder*’s built-in CLUT editor, and any other changes must be made manually.

“I have found Patrik Task to be extremely responsive to suggestions. Several of the features in the program, such as the ability to run minimised in the system tray, and to produce an XML RSS feed of new images, were suggestions I made. I really hope that, as a result of this article, more APT enthusiasts from around the world will begin using Patrik’s program, so that I can add their RSS feeds to my feed reader and start seeing weather images from other places as soon as they are created.”



WEATHERMAN

Everything you need for NOAA APT reception in a single package!

Les Hamilton

Vierling Communications GmbH, based in Ebermannstadt, some 50 km north of Nurnberg in Germany, have recently launched a new product called *WEATHERMAN*, a complete APT weather satellite station. *WEATHERMAN* is aimed at mobile users as well as the home and education markets and comprises a 137 MHz APT receiver with power supply unit, connecting leads and a QFH antenna kit plus recording, imaging and control software.

I have been using *WEATHERMAN* daily since early August and have found it to produce excellent images from all the NOAA satellites. In the case of NOAA-18 it is only marginally outperformed by the RX2 regarding its ability to reject UK pagers on 137.91 MHz. For readers thinking of investing in a new APT system, or even just a quality receiver or QFH, *Vierling* equipment is well worth considering.

The Package - What you get

WEATHERMAN is delivered in a package that includes the 40 x 1500 mm alloy mounting mast and the four brass filars of the quadrifilar helical antenna (QFH) kit. Three boxes contain the APT receiver, its 9-volt plug-top power supply unit and the various bits and pieces required to complete construction of the QFH. One end of the 15-metre length of antenna download comes ready fitted with tags to attach it to the filars and there is a standard bayonet connector at the other to mate it with the receiver—no soldering is required. The supplied CD installs all necessary software and PDF user guides for setting up the system.

The Receiver

The *Vierling* APT receiver is housed in an attractive plastic case 155 x 80 x 35 mm. At its lower end are a 9-volt power input socket and a 9-pin D-type serial port connector for computer control; at the upper end are the bayonet antenna connector and two 3.5 mm jack sockets. One socket connects the signal from the receiver to the 'line-in' socket of the computer soundcard while the other can accommodate headphones to monitor the satellite signal. The fascia supports a green power-on LED and an orange LED that illuminates when a satellite signal is being received. An LCD status display indicates the frequency being received.

The receiver has a 30 kHz bandwidth and includes automatic frequency correction (AFC) circuitry to compensate for the Doppler frequency offset of the satellites as they orbit. The receiver has a very high input sensitivity which renders a mast-top pre-amplifier unnecessary with an outdoor antenna. Tuning runs in 100 kHz steps from 137.10 MHz to 137.90 MHz, with additional 137.62, 137.85 and 137.91 MHz frequencies for NOAA-17, Russian

Meteor (almost certainly obsolete) and NOAA-18 (these frequencies are programmed into a PIC).

The 9V power supply has a European 'shuko' 2-pin mains fitting so you will need an appropriate adaptor to use it; because it is also fitted with a non-standard 9-volt connector, you cannot readily substitute a typical PSU designed for UK use.

The Antenna

The QFH antenna comes disassembled, as a kit, but is easily constructed in under an hour. Everything is screwed or bolted in place—you don't have to solder anything at all. The QFH is of the 'tall/narrow' design with each filar making a half-turn around the mast. Don't make the mistake that I did first time by giving the filars only a quarter-turn. The centre-left photograph at right shows a part-built QFH with two of the filars correctly located. Being of all-metal construction (alloy/brass), and with the download connections protected by a weatherproof cap, this antenna should prove ideal for outdoor use.

Setting up WEATHERMAN

Setting up *WEATHERMAN* for use took just a few minutes. For initial tests I attached the QFH to the top of a 2.5 m tall washing post in a clear situation near the foot of my garden. The antenna download, PSU and audio lead from the 'signal' jack were all connected and, within seconds, the receiver's LCD screen stated 'NOAA scan-mode' and displayed the frequency stepping through the pre-programmed settings. As soon as a NOAA satellite arrived within range the orange LED lit up, scanning ceased, and the LCD pronounced 'NOAA aktiv'. When a set of headphones (or a small speaker) was attached, the comforting NOAA 'clip-clop' tone was clearly heard.

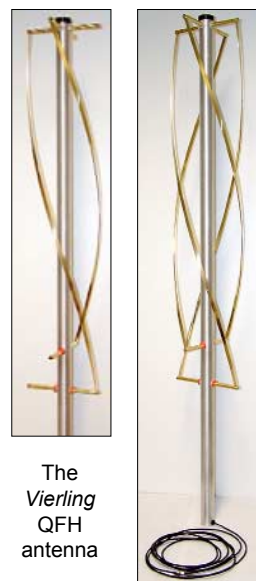
The *Vierling* receiver possesses no manual controls although a specific frequency can be selected under software control from the PC (see Appendix A). In practice I found the default scanning mode to be perfectly adequate for almost every situation; software control is only required to select between two satellites when their passes overlap.

Software

The software includes *WaveTrace*, *Vierling's* own wave-file recording program and *WetterSat*, the receiver control software. Also supplied are David Taylor's *Satsignal* for converting the saved WAV files into images and *WXtrack* for tracking the satellites and predicting their passes. These provide the novice with a fairly foolproof method of producing images (see Appendix B). However, if you already have your own recording and imaging programs installed on your PC, you can continue to use these with *WEATHERMAN*.

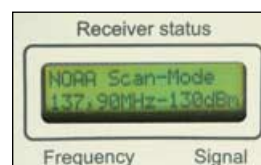


The *Vierling* APT receiver

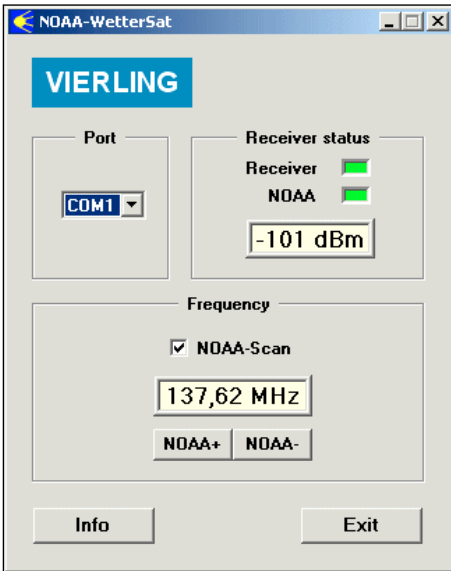


The *Vierling* QFH antenna

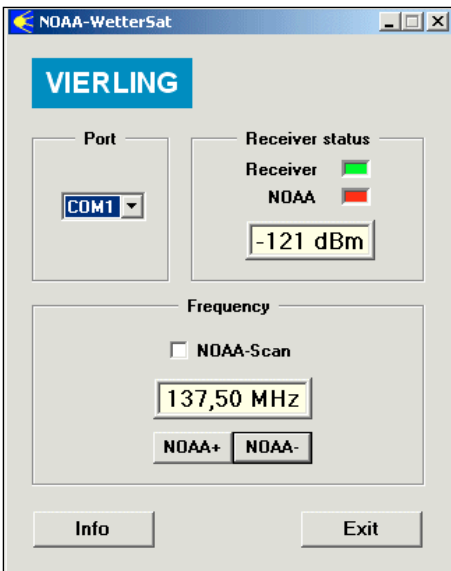
During construction (left), showing the half-turn of each filar and completed (right)



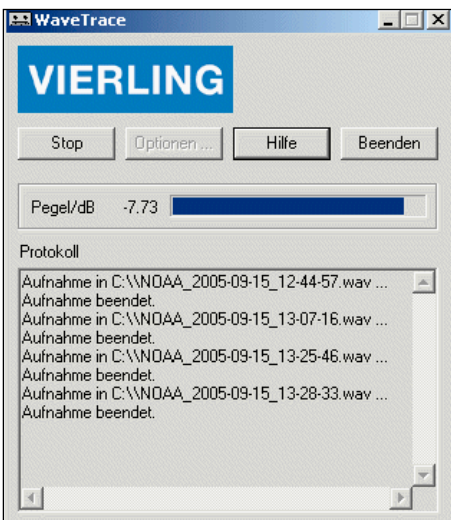
Close-up of the LCD display on the *Vierling* APT receiver



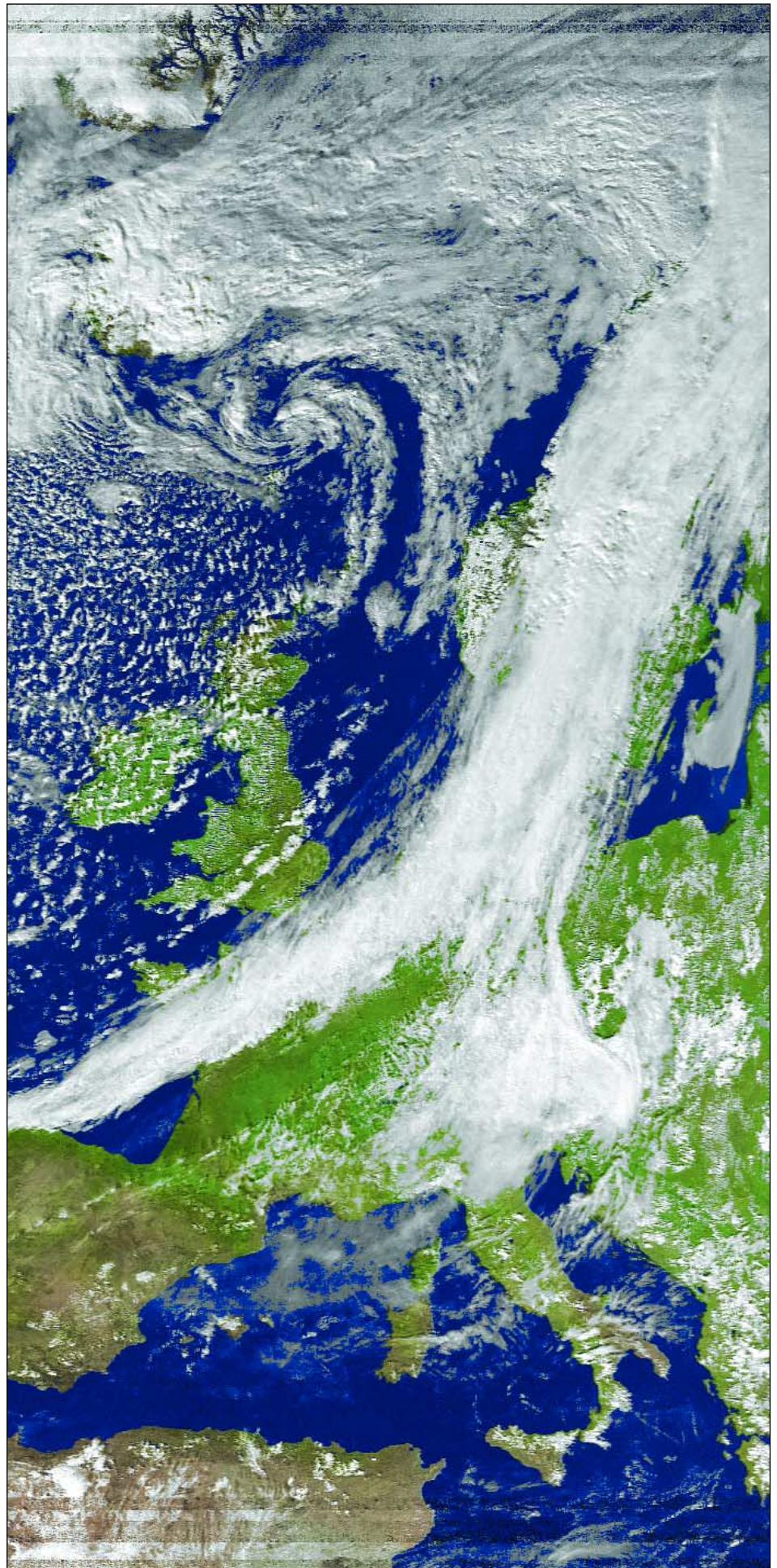
Wettersat, in scanning mode, has locked on to a 137.62 MHz NOAA-17 pass. Both 'NOAA' and 'Receiver' windows show green.



Wettersat, set to 137.50 MHz under computer control awaits NOAA 12. The green 'receiver' window shows that the receiver is active on this frequency; the red 'NOAA' window shows that the satellite signal is not yet being received.



Wavetrace in action

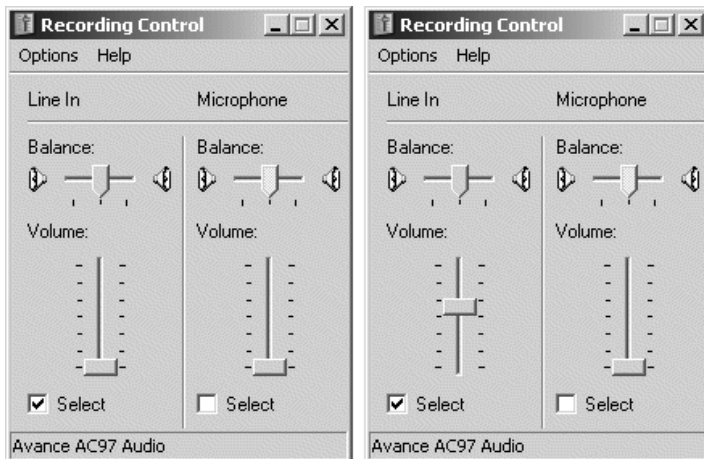


The NOAA 18 pass from 13:04 UT on September 27, 2005, captured in Aberdeen, Scotland using WEATHERMAN (Vierling APT receiver with outdoor QFH antenna) and processed with WXtoImg.

Setting the Recording Level

It is vital that the recording level of your PC soundcard is set up correctly. If it is too high the images will be too white and clouds in particular become 'bleached'; too low and images will be very dark.

Recording level is adjusted using a program called *sndvol32.exe*. Click on your computer's START button; select 'Run' and type 'sndvol32' in the 'Open:' field. Click 'OK' and the program will open with the legend 'Volume Control' in its title-bar. Click <Options> then <Properties> and check the 'Recording' radio-button; make sure that the 'line-in' and 'microphone' options are ticked then click 'OK' to reveal the Recording Control panel (below).



The soundcard recording control showing the 'line-in' input muted by the volume slider (left) and activated (right).

WEATHERMAN will normally be connected to the soundcard's 'line-in' socket, so this must be activated by checking the 'Select' box in the 'Line-in/Balance' panel and then raising the volume control slider to around mid-scale. Once a live NOAA signal is being received, observe the blue audio-level bar in *WaveTrace*; adjust the 'line-in' volume slider in *Recording Control* until this stretches approximately 80% across the *WaveTrace* window (if this bar touches the far edge of the window, your level is too high).

If you find that the signal level remains low even with *Recording Control* at maximum you can, instead, connect the 'headphone' output from *WEATHERMAN* to the soundcard 'line-in' socket. In this case the audio level can be adjusted both at the receiver (using a small screwdriver to adjust the recessed 'volume' grub-screw immediately above the 'Power' LED on the front panel) and in *Volume Control*.

With some soundcards you may find that you get better results by connecting to the 'microphone' input socket instead (be sure to click its 'Select' box to activate this audio channel).

Producing Weather Satellite Images

The most rewarding and exciting way of imaging from weather satellites, specially for newcomers to the hobby, is to use soundcard software that actually displays the images on the PC screen at the same time as the satellite is passing overhead. If you already have soundcard capture software such as *WXtoImg*, *WXsat*, or *APT Decoder* installed on your PC, I would certainly recommend that you continue using it instead of *WaveTrace*. All these programs decode both WAV files and images. This means that a particularly good pass may be reprocessed following capture using any of these programs, or *SatSignal*, to produce images of the highest quality.

The Results

As far as reception and imaging from the NOAA satellites that use the 137.50 and 137.62 MHz frequencies are concerned, there are

My Experiences with the Vierling 'Weatherman'

Clive Finnis

I have used the Vierling receiver in place of my RX2 for a few days of passes now. I have not used the QFH antenna that comes with it but stuck to the Paul Hayes QFH I have installed in my loft. Due to planning regulations around here I cannot use an external antenna.

Initial Impressions

The Vierling receiver is supplied in a small, almost hand held size case, which looks very neat and professional, and gives confidence that it will be reliable in use.

In Use

The first problem was that the Vierling does not supply d.c. at the aerial socket to power a preamplifier (the RX2, Timestep Proscan and Dartcom receivers all have this facility). I know that preamps are seen as unfashionable, but with my antenna being indoors I find that a Dartcom Preamp close to the QFH definitely gives me longer passes and better quality images. I climbed to the loft and disconnected the preamp.

Two alternatives present themselves if you really want to use a pre-amp with the Vierling receiver:

- 1 use a bias-T close to the receiver (Minicircuits do them for about \$30 to \$80 each) or
- 2 provide a separate d.c. feed to the pre-amp via a feedthrough capacitor.

I did neither and relied on a straight through connection from Antenna to receiver.

Second problem: Using the 'Line In' socket on my sound card, I could barely get enough input for *WXtoImg* despite setting the Volume Control on Windows Control Panel to maximum.

Changing to the 'Mic In' socket I reduced the Volume Control to minimum, yet still got an overload on *WXtoImg*. *Catch22*—too little on one, too much on the other (see the main article for a possible solution).

A third problem was the software bug Les discovered: the software crashes if the Vierling is connected during a re-boot. Hopefully this will prove an easy fix for Vierling.

Results

Unfortunately, mine were disappointing. When I first unpacked the Vierling I was so impressed that I was reaching for my cheque book to buy one; but I now think the good old RX2 will continue to be my mainstay for the time being. The main problems were reduced lengths of passes and serious pager interference, possibly due to the lack of a pre-amp to compensate for the indoor antenna, I suspect.

I suffer very minor NOAA18 pager interference here with my RX2, showing only at the start and end of the passes. With the Vierling it was all the way through the pass. This cannot be due to the download or the aerial as these were unchanged. It could be the lack of Dartcom Preamp, or it could be a problem with the Vierling receiver itself.

Conclusion

I would like to spend more time with the Vierling and investigate some options regarding the pre-amp and input levels to the PC. It seems such a nice piece of kit and I feel it should give better results than I achieved. Unfortunately I've had to do it on a 'five minutes here, five minutes there' basis due to various home and work commitments.

no issues. *WEATHERMAN* produces results comparable with any other receiver I have used—bar none! Even with NOAA-18 at 137.91 MHz, results are very good indeed.

The colour composite **NOAA-18** image reproduced on page 20 was captured from a pass with a maximum elevation of 70° using *WEATHERMAN* with the QFH mounted outdoors. It provides a full eleven minutes of flawless imagery. True, the extremities of the pass—where the satellite signal is at its weakest—show distinct evidence of pager breakthrough: over north Africa and to the Far North where a hillside further compromises my horizon—but I'll accept this any day! My **RX2** receiver, also fed from an outdoor QFH, imaged the same pass and showed exactly the same pager bands (though marginally less prominently).

The performance of WEATHERMAN, as with my RX2, is dependent on receiving the strongest possible signal from NOAA-18. Anything that attenuates the satellite signal seems to increase pager intrusion (here in the UK). When the QFH was mounted in my loft, beneath the eaves of the house, there was a major increase in pager interference with both receivers. I also discovered that passes with a maximum elevation below 20° suffered severe pager banding over most of their length.

Clive Finnis evaluated the *WEATHERMAN* system from his home in Dorset (see right-hand panel on page 21) and made similar observations.

Conclusions

WEATHERMAN is the only complete APT weather satellite imaging solution currently available. If you are starting out on the hobby for the first time, it comes strongly recommended, with a high-quality computer-controllable receiver and a durable all-metal QFH antenna. A CD of useful software is also provided.

Overall, I was extremely impressed with the *Vierling* APT receiver which produced images every bit as good as those from any of my other receivers under identical conditions. Even for NOAA-18, which has defeated the efforts of a number of high-quality receivers (see our review of the excellent German-built *R2FX* APT receiver in our previous issue), results were surprisingly good. Before testing it I had feared that the *Vierling* receiver might struggle on this frequency but my doubts were almost completely dispelled as it came a very close second to my **RX2**, widely considered to be the best receiver at 137.91 MHz.

Appendix A

Software control of the *Vierling* receiver can be achieved by means of the small program called *Wettersat.exe*. After installing all the *WEATHERMAN* software, you should find this in the **<Program files\Weatherman>** folder on your PC. It is a good idea to drag this on to the Desktop using the right mouse button and creating a shortcut there.

To use the program you will require a 9-pin D-type serial lead to connect the receiver to your PC. By default, *Wettersat* opens in 'scan' mode. The 'receiver' window shows green to indicate that *WEATHERMAN* has been detected; the 'NOAA' window will also change from red to green as soon as a satellite signal is received (see the upper left-hand image on page 20).

To select a particular frequency, uncheck the 'scan' box and click either the 'NOAA+' or 'NOAA-' button to cycle through the stored list to the one that you require. The receiver will remain tuned to this frequency until you alter it once more. If the receiver is powered off (by unplugging its PSU), it always starts up again in 'scan' mode. The centre image on page 20 shows the receiver awaiting a satellite on 137.50 MHz.

Warning

At the time of writing there is a 'bug' in this software. If the Vierling receiver is already powered on and connected to the PC while the latter is booted up, a 'port not available' error occurs. The simple solution is to remove either the power lead or the serial lead from the receiver while the PC boots up then reconnect once the computer is running.

Appendix B

The *Wavetrace* program can also be found in the **<Program files\Weatherman folder>** on your PC. Create a shortcut for ease of use. The *WaveTrace* screen window is illustrated in the bottom left illustration on page 20. Detailed help is available on clicking the button labelled 'Hilfe'. [This help is in English](#), and in common with all the *WEATHERMAN* documentation, is an Acrobat PDF file—so you need *Acrobat Reader* installed on your computer.

I used the program without modification and results were excellent. All you require to do is click the 'Start' button; everything else is automatic, and every time a satellite is picked up by *WEATHERMAN*, an audio wave (WAV) file is saved on the hard drive.

The *WEATHERMAN* installation includes a shareware copy of David Taylor's *SatSignal* to convert your WAV files into images. (It is located inside the **<Program files\Weatherman\WXtrack>** folder). Run *SatSignal*, load one of the saved WAV files, then watch your images unfold. (For a more detailed article on the use of *SatSignal*, see GEO Quarterly No 3, page 46).

Obtaining WEATHERMAN

At the time of writing, *WEATHERMAN* can be ordered from Vierling, through their website. The direct link appears at the foot of this page. If you follow the link '*Information material*' you will be able to download an English-language version of the *WEATHERMAN* brochure (1.5 Mb PDF file).

If you require further information, or wish to enquire about ordering from Vierling, click the link '*Prices & more information*' to e-mail your request/order to them. There is no problem with language, as the Vierling team are proficient in English.

Prices for GEO Members are as follows:

Item	Prices	
	Euro (ex VAT)	Sterling (inc VAT)
Complete WEATHERMAN (No. 70351.001)	336 euro	£280
Vierling Receiver only (No. 70351.002)	215 euro	£180
QFH Antenna only (No. 70351.6003)	150 euro	£125

To complete payment for my system I had to pay an additional £22 bank charge for the currency conversion and cash transfer. However, by the time you read this, GEO may be able to supply *WEATHERMAN* through the GEO Shop, which would allow payment by credit card or personal cheque and avoid these charges.

Do check the GEO Shop page on our website (or send the Shop an e-mail) before ordering. The URL is:

<http://www.geo-web.org.uk/shop.html>

Above prices in euros are as quoted to GEO by Vierling, and do not include VAT. Approximate prices in Sterling, including VAT are listed for comparison. All prices include P&P.

GEO Shop

Manager: Clive Finnis
e-mail: shop@geo-web.org.uk
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Telestar Ku band universal LNB	11.00	12.50	-
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Turnstile APT antenna	36.00	-	-
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TechniSat SkyStar 2 PCI Card

A 'free to air' DVB satellite TV and data receiver card as recommended by EUMETSAT. This card requires installing inside the computer and comes with comprehensive installation instructions and CD-ROM of driver software.



TechniSat SkyStar USB Box

If you do not feel confident about installing cards inside your computer you can use the external USB version.



Telestar 80 cm dish (or similar model) and Ku-band LNB



GEO PIC 1.0 for RX2

This PIC comes programmed with the two new frequencies to be utilised by the forthcoming NOAA-18 and NOAA-19 satellites.

Note: Check your RX2 synthesiser chip before ordering (see GEO Quarterly No 5, page 16)



GEO/Dartcom EPROM v 1.3

Recent tests have shown the **Dartcom APT receiver** to be one of the best regards pager immunity in the UK. This NEW EPROM for the Dartcom APT receiver adds the two new NOAA frequencies to the scan list in memory page 0.



TechniSat SatFinder Alignment Meter

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



Turnstile APT antenna



Dartcom QFH antenna



GEO 2004 CD
Back issues in PDF format - so that new members can catch up on last year.

All credit cards are authorised before goods are despatched.

Please include your e-mail address or telephone number in case we need to contact you about your order. In the event of problems with items purchased from GEO-Shop, please contact Clive Finnis (contact details at top of page).

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We will ship by post, so please allow 28 days for delivery although we hope UK and EU orders will take just a few days; orders to the Rest of the World may take a few weeks.

Items from the GEO shop are available only to paid up GEO members

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: douglas@dsdeans.freeserve.co.uk

John Tellick, Surbiton, Surrey, ENGLAND

Information about the hardware required to receive Meteosat-8 and advice about registering for the various MSG services. John will also 'field' any queries of a more general nature about any aspect of receiving weather satellite transmissions.

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

Keith Holland, London, ENGLAND

Specifically, help for APT users (137 MHz band) and Meteosat-7 wefax.

- e-mail: geo@koholland.plus.com

David Strickland, Truro, Cornwall, ENGLAND

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

- e-mail: David@Strickland.uk.com

Geoff Morris GW3ATZ, Shotton, Flintshire, NE WALES

Geoff has lots of experience aerial, coax,connectors, mounting hardware etc. Also done a lot of work with the orbiting satellites. Geoff is know his way with most of David Taylor's software. He has recently started with MSG, so should be able to share his experiences with other newcomers to this branch of the hobby.

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

Guy Martin G8NFU, Biggin Hill NW Kent, ENGLAND

Guy is prepared to advise anyone who wishes to receive MSG under Windows 2000. He also runs Meteosat-7 SDUS.

- agm@tonbridge-school.org

Hector Cintron, San Juan, Puerto Rico, USA

Hector is prepared to field enquiries on HRPT, APT, WEFAX, EMWIN and NOAAPORT

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

E-mail contact can of course be made at any time, but we would ask you to restrict telephone contact to the period 7.00-9.00 pm in the evenings.

Useful Internet Discussion Groups

There are a number of 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.

GEO-Subscribers

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

e-mail:GEO-Subscribers-subscribe@yahoogroups.com

Satsignal

An end-user self help group for users of David Taylor's Satellite Software Tools including the orbit predictor WXtrack, the file decoders GeoSatSignal and SatSignal, the ATOVS and HRPT Reader programs, the remapper GroundMap, and the MSG Data Manager

e-mail: SatSignal-subscribe@yahoogroups.com

MSG-1

A forum dedicated to Meteosat-8 (formerly MSG-1), where members can share information about the reception hardware and software.

e-mail: MSG-1-subscribe@yahoogroups.com

Weather Satellite Reports

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

e-mail: weather-satellite-reports-subscribe@yahoogroups.com

WXtolmg

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

e-mail: wxtoimg-subscribe@yahoogroups.com

Copy Deadline for GEO Quarterly No 9 Tuesday, January 31, 2006

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
- Construction projects
- Weather satellite images
- Reports on weather phenomena
- Description of readers' satellite imaging stations
- Activities from overseas
- 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 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 well before this date 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.

If your article submission contains embedded images and diagrams, please note that we do also require, in addition, individual copies of each image or drawing which is not embedded within the article, for 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:

editor@geo-web.org.uk

Large attachments (1 Mb to 10 Mb) are best sent to:

lesw.hamilton@gmail.com



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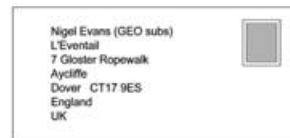
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Construct a Portable PSU



for your RX2 Wxsat Receiver

Richard Osborne

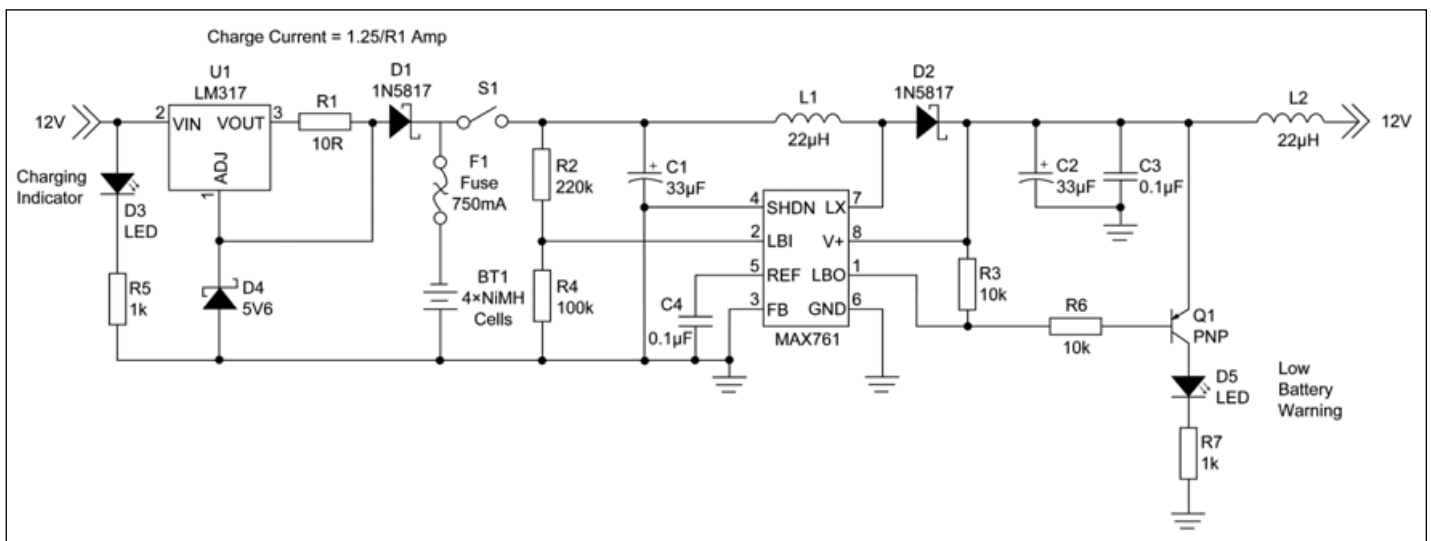


Figure 1

The RX2 receiver is designed for a 12 V supply at about 100 mA. In the house, a regulated plug-top power supply can be used but this is not possible for portable operation. My answer to the problem is to power the RX2 from a step-up DC to DC convertor powered by four nickel metal hydride (NiMH) rechargeable batteries.

I built a DC-DC convertor on *Veroboard* together with a simple charger circuit for the batteries and packaged the lot inside a small plastic instrument case. The circuit diagram of the supply is shown in Figure 1.

The core of this circuit is the *Maxim* MAX761 DC-DC convertor, which boosts the 5 V supplied by the batteries to the 12 V required to operate the receiver. The circuit can deliver a current up to 150 mA.

The design also contains a comparator that can be used to monitor the voltage

of the battery pack and drive an LED when the voltage falls below a pre-set value to indicate that the batteries need charging. The comparator is set to trip at about 4.8 V.

When a charging supply is connected the batteries are constantly charged in trickle mode using an LM317 as a simple constant-current source. ZD1 prevents the output from the LM317 rising too far if, for any reason, the battery pack circuit goes open circuit. I recommend the use of a resettable fuse in series with the batteries as they can deliver a large quantity of current under short-circuit conditions.

With the simple charger circuit described, the batteries could become overcharged if left on charge for too long. Some mains powered plug-in timers incorporate a timer feature that could be used to good effect. For more comprehensive charging functions, the Maxim MAX712 could be used as a

basis. Alternatively, use a box with a battery compartment and charge the batteries externally.

When designing DC-DC convertors, a useful tip is to obtain two identical inductors and fit the second in series with the output. This gives a substantial reduction in switching noise at the output resulting in a very smooth output supply.

The components are all readily available from suppliers such as Farnell. The inductor needs to have a minimum current rating of 1.25 A.

Another use for the convertor is to power an LNB in conjunction with a satellite finder meter, useful for locating Hot Bird to receive MSG-1 transmissions.

Acknowledgement

Thanks to Norbert Puetz of Erding, Germany, for the photograph of his customised RX2 receiver.

create your own 3D weather Images

Fred van den Bosch

In this article I describe how you can make 3D anaglyphs from your weather satellite images. An anaglyph is a special kind of image which produces a 3-dimensional appearance when viewed through coloured glasses. A freeware program called *Bas Relief* is used to generate these anaglyphs.

Introduction

The registered version of WXtolmg, the program which I use for APT-images, contains options for the creation of 3D anaglyphs. These must be viewed through coloured spectacles with a red filter to the left and a blue-green one to the right. Because MSG images are flat, just like those from NOAA APT, it should be possible to make anaglyphs from them too.

Initially I was disappointed. Searching the Internet turned up a large quantity of procedures using photosoftware such as Photoshop and Paint Shop Pro, but the implementation of these methods was generally extremely laborious and the results inconsistent.

In order to learn more I summarised my experiences on the Satsignal Internet forum under 'How to make anaglyphs.' Following these depressing experiences I searched for software that could create an anaglyph directly from an image.

Theory

First of all a little theory. A traditional way of presenting two different stereo images of an object is convert them into a coloured

anaglyph. Such an anaglyph contains the information from the left-hand image in the red channel and that from the right-hand image in the green and blue channels of the colour image (figure 1). The image is then viewed through coloured glasses. The red filter over the left eye contains only information from the left image; the green or blue filter over the right eye contains only information from the right-hand image. Now you see a 3D image!

Bas Relief

Bas Relief is a program for making all kinds of manipulations to 3D images. The free demo version is fully functional in one specific area—creating anaglyphs.

Bas Relief can be downloaded from :

[http://www.3dphotopro.com/
software.html](http://www.3dphotopro.com/software.html).

You have to register for the free newsletter to gain your download password, but you can unsubscribe later at any time.

Operation

The operation of the Bas Relief software is as follows. The program works on the assumption that all light coloured parts of the image are relatively close to the observer while all dark parts are more distant. This information is used to make a 'depthmap'. The anaglyph is then created by combining the original image with this depthmap.

Procedure

Making a 3D-image is in fact very simple indeed. Just work through the following

steps, in order.

- Run Bas Relief to reveal the screen shown in figure 2.
- Load the same satellite image into **both** the <Image> and <Depthmap> windows.
- Now click the <Smooth> button. This reveals the 'Segmentation smoothing' pop-up window (figure 3).
- First, click the <Create outline image> button. As soon as the outline appears (figure 4), click <Close>.
- Next, click the <Smooth depth map> button to create a rather hazy greyscale image (figure 5) then click <Close>.
- Finally click <Open depth map> to place this image in the 'Depthmap' window of the main Bas Relief window. Click <Close> to clear the pop-up screen.

On the main screen (figure 2) try a value of '20' for <Parallax between views>, select <Colour Red-Cyan> and then click on the <Anaglyph image> button. Once you supply a suitable filename in the <Save image> input box your anaglyph is created.

Disadvantages

Although creating an anaglyph image as explained above is a very simple process, it is nevertheless quite a lot of work using Bas Relief. Does anyone see any possibility of automating the process?

A second disadvantage is connected with the premise that the light parts of the image are the nearest to the observer. This means that light-coloured areas such as the Sahara will appear closer (in MSG images). However as long as Europe is selected as the region of interest, this disadvantage is not as bad as I expected.

Alternatives

Anyone who would like yet more programs to experiment with can download '2D to 3D RedBlue converter' [1]. This program creates, from a single image, both left-hand and right-hand stereo images by manipulation of pixels.

These can be used to make a black-and-white anaglyph, or using a program such as *Anaglyph Maker* [2], a coloured one.

Because these programs require even more work than Bas Relief, they are not discussed further here.

References

1 2D to 3D RedBlue Converter

[http://www.programurl.com/
2dto3d-redblue-converter.htm](http://www.programurl.com/2dto3d-redblue-converter.htm)

2 Anaglyph Maker

http://www.stereoeye.jp/index_e.html

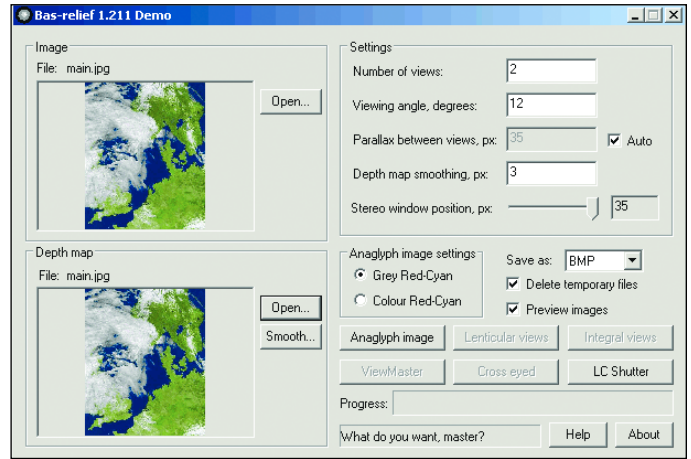
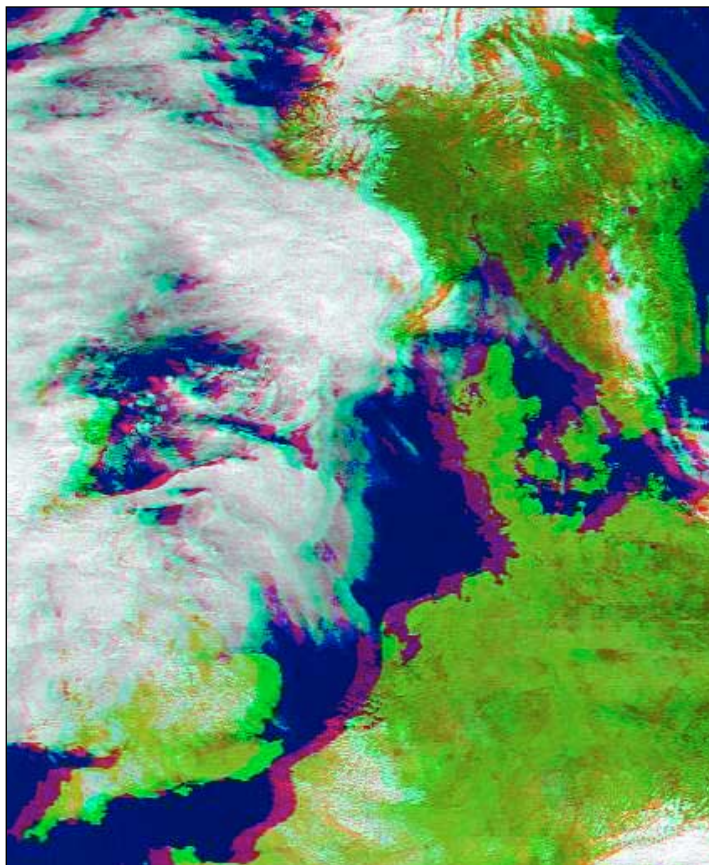
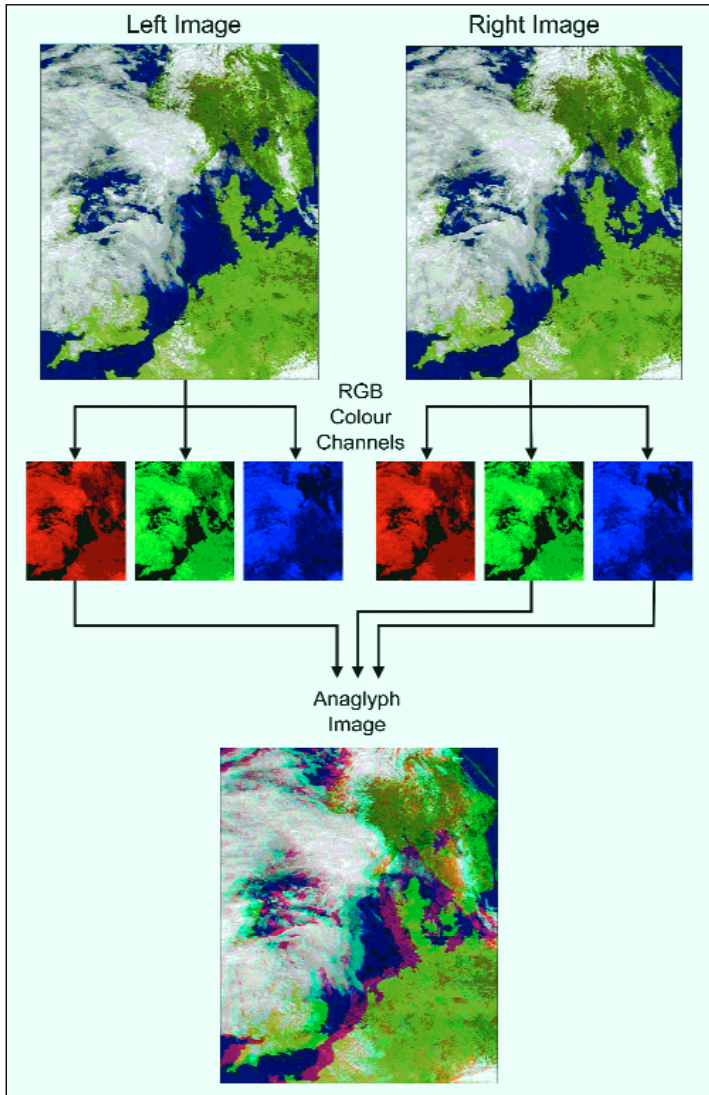


Figure 2 - the main Bas Relief screen

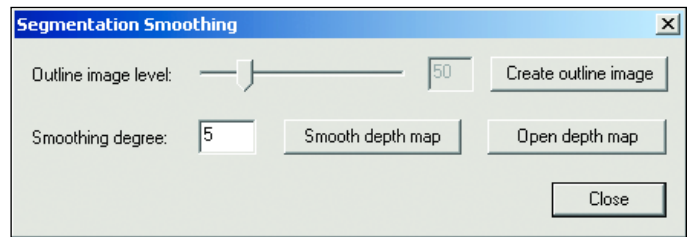


Figure 3 - the smoothing pop-up window

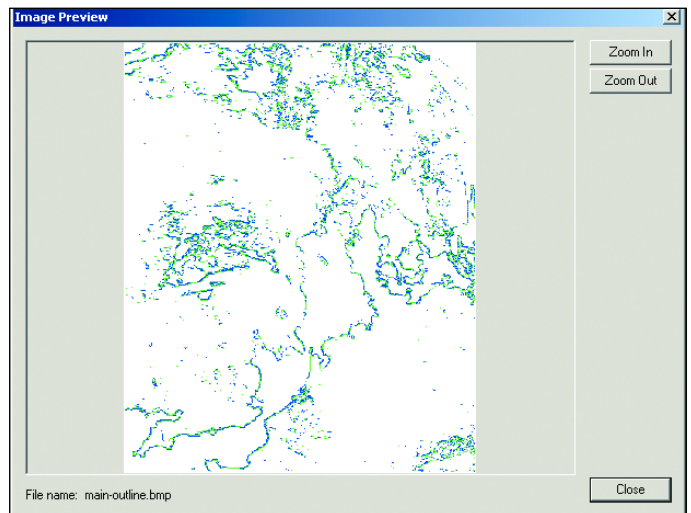


Figure 4 - the outline image

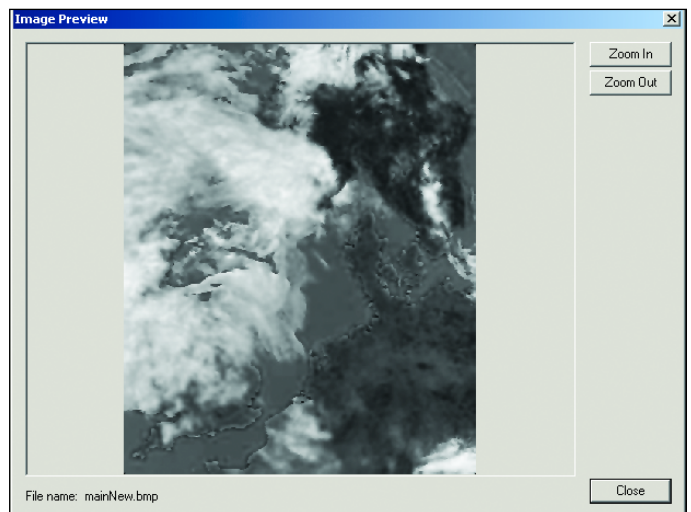
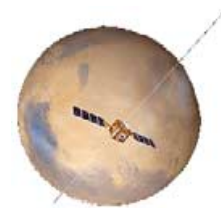


Figure 5 - the greyscale depth map

Figure 1 (upper left) - the main Bas Relief window
Figure 6 (lower left) - the final colour anaglyph

Amazing Revelations from Mars Express



The European Space Agency's *Mars Express* has now been orbiting the Red Planet for a year and a half, during which time it has taken some of the most spectacular and detailed images ever of the planet. The mission will image the entire surface of the planet at a resolution of 10 metres per pixel, and can also image selected areas at 2 metres per pixel. The satellite occupies a highly elliptical, 7 hour 42 minute orbit which ranges from 298 km to slightly beyond 10000 km. Here are presented just a few of the spectacular images that have so far been returned from the High Resolution Stereo Camera (HRSC) aboard Mars Express.

Coprates Chasma

Coprates Chasma (figure 1) is a major trough located roughly in the centre of the Valles Marineris canyon system which appears at the north (right-hand side) of the image; it ranges between 60 and 100 km wide and extends 8 to 9 km below the surrounding plains. Coprates Catena lies parallel to Coprates Chasma and can be seen in the south (left) of the image as three troughs; these range from just a few kilometres up to 22 km wide and are up to 5 kilometres deep. Ground resolution is approximately 48 metres per pixel.



Figure 1 - Coprates Chasma

Nicholson Crater

Nicholson Crater (figure 2), which measures approximately 100 kilometres in diameter, is located at the southern edge of Amazonis Planitia, north-west of a region called Medusae Fossae. This image shows the central part of Nicholson Crater with a ground resolution of approximately 15 m/pixel (north is to the right).



Figure 2 - Nicholson Crater

Ice and Dust at the Martian North Pole

Figure 3 shows layers of water ice and dust for the first time in a perspective view of part of the Martian north polar icecap. The cliffs are almost two kilometres high and the dark material in the caldera-like structures and dune fields could be volcanic ash.

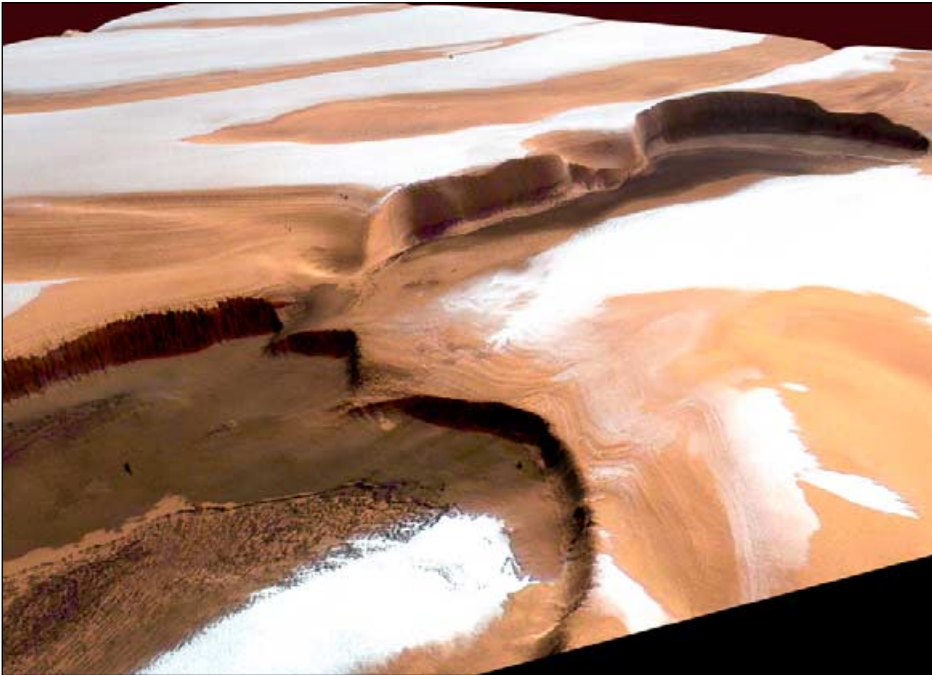
Phobos

Every so often, Mars Express passes close to Phobos, one of the planet's two tiny moons, about one hour before the orbiter attains the lowest point in its orbit. For several minutes the orbiter can be commanded to turn its camera away from Mars and towards the moon. Images obtained of Phobos, which has a maximum diameter of just 28 kilometres, have surpassed any obtained from previous Mars missions, and

show a global network of regularly spaced grooves which extends from near the equator as far as the north pole of the satellite's Mars-facing surface (figure 4). The image shows the Mars-facing side of the moon and has a resolution of approximately 7 metres/pixel. It was taken from a distance of slightly less than 200 kilometres on August 22, 2004.

The Future for Mars Express

It was announced on September 22 that the Mars Express mission will be extended by one Martian year from the beginning of December 2005 (about 23 months). This decision, taken by ESA's Science Programme Committee, will allow the spacecraft to continue building on its many scientific successes to date



Water ice near the Martian north pole

Since the start of science operations in early 2004, *Mars Express* has revealed an increasingly complex picture of Mars. New aspects of the Red Planet are emerging almost every day, including its present-day climate system and its geological diversity. *Mars Express* has also started mapping water in its various states.

Among its discoveries so far, *Mars Express* has established that volcanic and glacial processes are much more recent than had been expected, confirmed the presence of glacial processes in the equatorial regions and mapped water and carbon dioxide ice in the polar regions.

Mars Express has also detected methane in the planet's atmosphere, which suggests either current volcanic activity on Mars, or, more excitingly, the possibility that there are currently active 'biological' processes. This hypothesis may be reinforced by the fact that *Mars Express* has established that the distribution of water vapour and methane, both ingredients for life, substantially overlap in some regions of the planet.

All images: ESA, © ESA/DLR/FU Berlin (G. Neukum).



Figure 4 - The Mars-facing surface of Phobos

Netherland's Dykes

Along the southwest coast of the Netherlands, sediment-carrying rivers have created a massive delta of islands and waterways between the coastal dunes. Following a devastating storm which flooded the region on January 31, 1953, the Dutch built an elaborate system of dykes, canals, dams bridges and locks to hold back the North Sea. This simulated natural color image was produced from the *Aster* instrument aboard NASA's *Terra* satellite on September 24, 2002.

*Image: NASA/GSFC/METI/ERSDAC/JAROS,
and U.S./Japan ASTER Science Team*



Evaluation of Location

Peter J Edwards MW5ARR - e-mail: marion@trevland.freemove.co.uk

It is often desirable to assess equipment, set up and location to satisfy oneself that everything operates as best as possible within the limitations of location and receiver alignment. This article describes my own experiences evaluating home-built equipment using readily available weather satellite reception software.

Building the Hardware

My satellite receiver was assembled quickly and easily using a kit from Emgo [1]. After much investigation of available literature inferring ease of construction and lack of nulls in elevation acceptance I decided to construct a QFH antenna.

The QFH was built from readily available 8 mm copper central-heating tubing with solder-type elbow connectors at the corners, using dimensions available on several websites. The use of 8 mm tubing made the construction easy due to the softness of the copper, allowing bending of the elements without creasing. The tubing used for support was 32 mm plastic waste pipe. Initially the antenna was installed in the attic of my bungalow approximately 5 metres above ground.

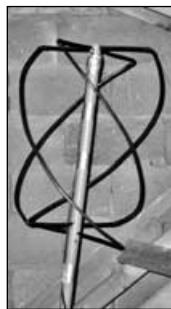


Figure 1
The QFH in the attic

Software

Satellite reception was made using *WXSat* software and results were reasonable, but it became clear following analysis using David Taylor's *WxTrack* [2] prediction program that many passes were not being recorded to their full length.

I assessed the problem using David Taylor's *NOAA Plot* [2] program, which can produce polar plots of signal-to-noise ratio (SNR) along a satellite's path across the heavens. Figure 2 shows the output obtained from *NOAA Plot* with the system described above. I included passes from NOAA-12, -15 and -17 over a one-week period. The white lines indicate where the SNR is 30 dB or greater. It was clear that the receiver was only recording the end of

each pass; therefore it was assumed, correctly as it later turned out, that it was tuned on the low side of the signal and that the approaching satellite was outside the capture range of its passband and/or discriminator.

After the receiver had been realigned and the front-end amplifier peaked by use of a signal generator, a second series of recordings showed an enormous improvement though results were still far from optimum. *NOAA Plot* showed that the SNR was still only just above an acceptable value for low noise images and azimuth plots showed deep nulls in coverage. This was not unexpected considering the indoor location of the QFH in my attic.

Pre-amplifier

The next stage was to attempt to improve the overall SNR by installing a masthead pre-amplifier. I found a 144 MHz pre-amp of the type fitted inside 2-metre radios many years ago. The design utilised a 'cheap and nasty' transistor: although not a state-of-the-art low-noise device this proved more than adequate for satellite reception. High-tech, state-of-the-art devices are expensive and not required as signal levels are generally high once the satellite is above the radio horizon. I consider that low noise devices become an unnecessary overkill at 137 MHz. The pre-amp was installed in a plastic box and peaked using the faithful signal generator.

The addition of the pre-amp resulted in a considerable improvement (figure 3) and this set-up was used for over a year without problems. When the day came to service my existing outdoor antennas it was an obvious time to relocate the satellite antenna to the outside mast. Positioning the QFH at the top of the mast added approximately 3 m of additional elevation and ensured that it was clear of any obstructions. *NOAA Plot* indicated a further 10 dB improvement in SNR (figure 4). Figure 5 shows plots of average SNR as a function of satellite elevation at each stage in the improvement sequence.

How do you use NOAA Plot?

NOAA Plot requires data files generated by *SatSignal* and *Wxtrack*, two more of

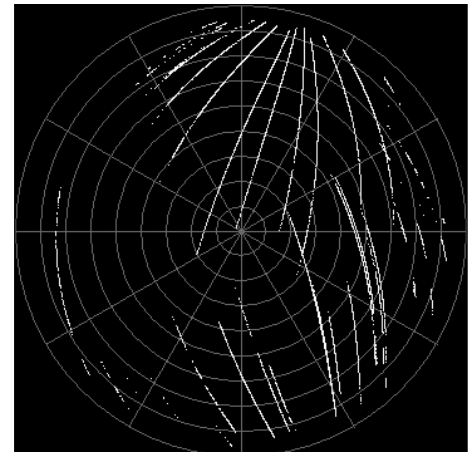


Figure 2 - Polar plot for the attic mounted QFH

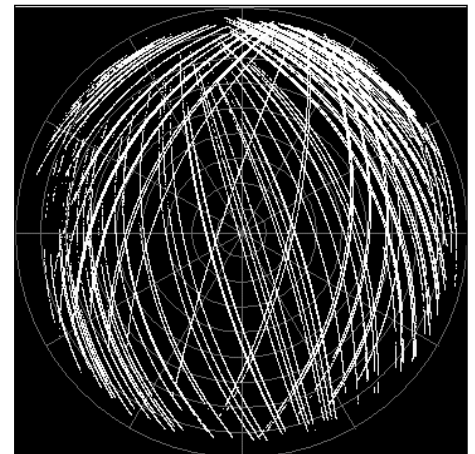


Figure 3 - Polar plot with added pre-amplifier



Figure 4 - Polar plot with outdoor QFH

David Taylor's programs, before it can operate. These files have the form *xxx telem.dat* (created by *SatSignal*) and *xxx pass.dat* (generated by *Wxtrack*), where 'xxx' is the standard 'mmddhhmm' time-code filename stem relating to a

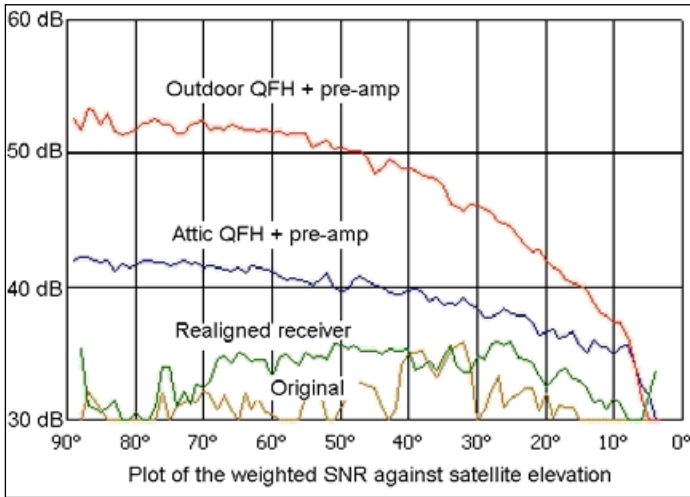


Figure 5 - Average SNR as a function of satellite elevation, showing sequential improvements

particular satellite pass recording. The 'telem' file from *Satsignal* contains the noise-level information for the image; the 'pass' file from *WXtrack* provides spatial details of the actual pass.

Creating mmdhmmtelem.dat

Open *SatSignal* and make certain that <Options→Save NOAA noise stats> is ticked: then process a WAV file recorded using *WXSat* and save the images. Next, load the saved image (the 'main image' containing the two NOAA channels side by side) back into *Satsignal* and the telemetry datafile will automatically be saved into your *WXtrack* folder.

Note: you require a registered version of *Satsignal* for this, and must, of course, have *WXtrack* installed on your PC.

Creating mmdhmmmpass.dat

Open *WXtrack* and make sure that the 'Save track listing as' field is checked in <Options → What to save>. On the 'Setup' tab, double-click the pass relevant to the WAV file you just processed; this takes you to the 'Ground Path' tab where you must click the 'Make Picture' button. *WXtrack* now saves the pass datafile inside its own folder.

You must now copy both these datafiles into the *NOAA Plot* folder before running *NOAA Plot* to produce the analysis.

At first sight there might appear to be much work involved in creating a week's worth of 'telem' and 'pass' files and copying them all into *NOAA Plot*. But yet another of David Taylor's programs, *SatBatch* [2] comes to the rescue, as it can be used to fully automate the process.

The Effect of Local Topography

The diagrams produced by *NOAA Plot* (figures 2-4) show nulls in various directions. Some of these are due to the topography around my QTH but the charts also show that reception is possible well below my *visible* horizon. Reception at elevations as

low as 4° is normal in most directions yet, with rising ground on all sides, the minimum elevation would appear to be 8-10°, especially to the south. Therefore, the reception must arise from reflection and diffraction of the satellite signal: living in a rural 'hole in the ground' is not as bad as it might first appear.

As an experiment to confirm my poor location I used an Ordnance Survey map to help me to draw some 2 kilometre elevation profiles around my home. Profiles were plotted using *EXCEL* and drawn to scale. The northeast-to-southwest profile (figure 6) shows clearly that, although my house lies 270 m above sea level, it is located in a depression where the surrounding terrain rises to more than 400 m, especially to the south and west (my location is marked on the chart as 'QTH').

Creating a Radio Horizon in WXtrack

In order to make a more precise assessment of my situation I now needed to determine the actual elevation angles of my horizon in every direction. I did this by analysing the *EXCEL* charts produced from Ordnance Survey map data. Details of the method and calculation appear in the sidebar on page 31.

The outcome was a table of results like this:

Direction	N	NE	E	SE	S	SW	W	NW
Elevation	4.0°	5.4°	1.6°	2.9°	13.1°	7.9°	6.9°	5.2°

WxTrack contains a feature which allows the user to define his own horizon profile by entering specific elevation angles for azimuth value. This information is held in the file *horizon.dat*.

Azimuth v elevation figures obtained as described were edited into the existing *horizon.dat* file which was then saved. Now, when *WXtrack* is run, and provided that <options → Show → Radio horizon> has been checked, the expected radio horizon based on the optical horizon measurements from Ordnance Survey mapping is shown around your QTH.

After examination of the *NOAA Plot* polar diagrams it became clear that reception from well below the optical horizon had indeed been obtained, as previously mentioned.

Comparing the Actual and Optical Horizons

My next step was to compare my optical horizon with the horizon indicated in the *NOAA Plot* diagrams. Figures obtained from both Ordnance Survey plotting and *NOAA Plot* polar diagrams were inserted into an *EXCEL* spreadsheet and plotted in 'radar' form to produce figure 7.

As can be seen from the radar plot, reception at elevation angles below the optical horizon occurs at most azimuths but the most interesting are those between 140° and 260°. In these directions, a large hill less than a kilometre distant rises more than 150 m higher than my QTH. Under normal consideration it would be presumed that no reception would occur from that direction, yet the figures computed by *NOAA Plot* indicate that reception has

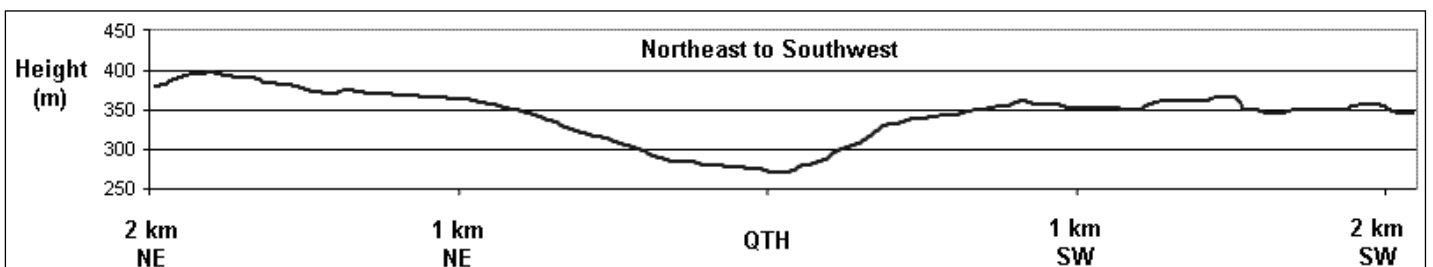


Figure 6 - The 2 kilometre elevation profile around the QTH

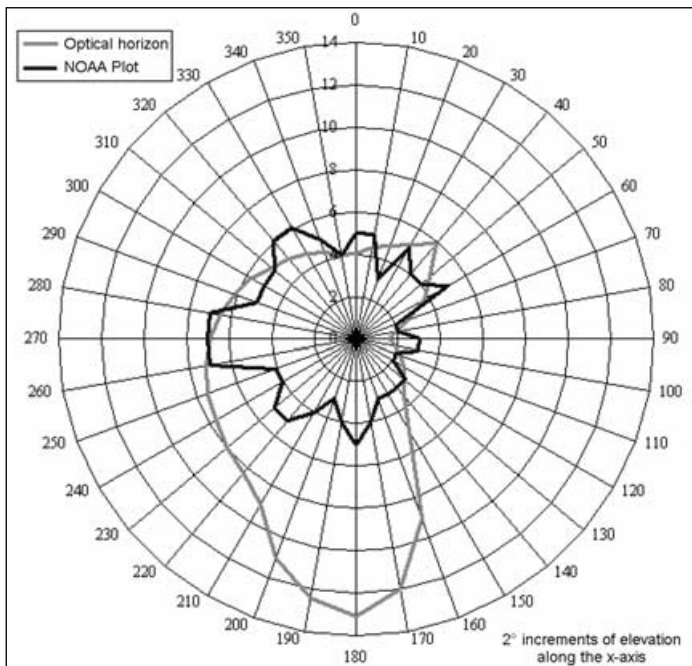


Figure 7 - 'Radar' Plot

indeed occurred. At the time of writing this is assumed to result from diffraction and not reflection, as there are no buildings or other structures in the neighbourhood.

Data from *NOAA Plot* representing the 'real' reception horizon were edited into *horizon.dat* and a map showing the real or obtained horizon was produced. Reproduced inside the front cover of this issue, the map was created in *Paint Shop Pro* by overlaying *WXtrack* screen grabs resulting from use of the two different versions of the *horizon.dat* file. Using the new horizon file has allowed more accurate predictions to be obtained than would have occurred without the necessary investigation.

In Conclusion

The moral to this is that good satellite reception is easily achieved with minimal outlay. Receivers can be bought or assembled, antennas such as the QFH are not difficult to fabricate at home, software is available, and when registered has outstanding facilities. I had for a long time suspected that reception at my location was far better than could be predicted and it was satisfying to be able to optimise my station using readily available software, and to be able to confirm the improvements.

Reception is azimuth dependant but images as distant as the Crimea to the east, Algeria in the south, Svalbard to the north and to the west of Greenland are all normal from my location.

The theoretical maximum SNR being 58.9 dB, it is assumed that little if any further improvement could be made—other than to move location!

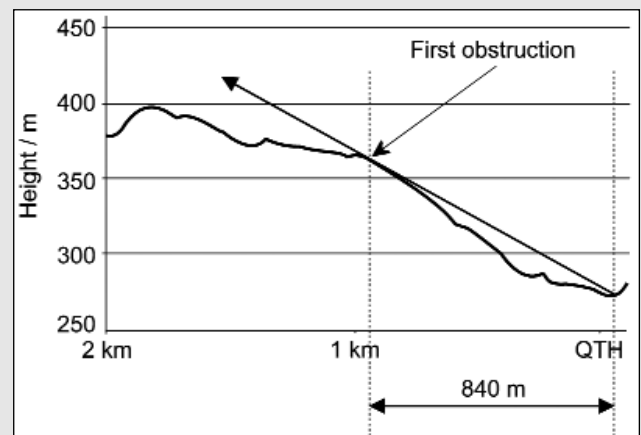
Few problems are insurmountable and even living in what would at first sight appear to be a poor location, surprisingly good results can be obtained. My present system includes recording and processing using *WXtolmg* [3], reviewing the day's images followed by reprocessing using *SatBatch* and *SatSignal* if required.

References:

- 1 Emgola APT receiver kit - www.emgola.cz
- 2 David Taylor's software - www.satsignal.net
- 3 *WXtolmg* APT software - www.wxtoimg.com

Determination of Elevation Angles

Elevation angles for creating a radio horizon were obtained by analysing a number of elevation profiles created in EXCEL. The method is explained using part of the elevation profile from figure 6. The vertical scale has been exaggerated for clarity.



I drew a line from my QTH to the first location where the high ground would intercept a satellite signal and noted the horizontal displacement. In the example illustrated above it is 840 metres.

The actual height of this obstruction is easily calculated by subtracting the altitude of my QTH (270 m) from the altitude of the obstruction (350 m). This gives a vertical obstruction height of 80 m.

The theoretical minimum elevation angle for reception is now defined by the gradient of this line. Mathematically, this is the **tangent** of the required angle.

To work out this angle

Calculate the gradient, which in this case is

$$\frac{\text{height of obstruction}}{\text{displacement of obstruction}} = \frac{80}{840} = 0.095$$

All that is now required is to identify the angle whose tangent has a value of 0.095.

There are two ways to do this

- Look it up in a book of mathematical tables
- Use a scientific calculator

The former should require no further explanation.

With a scientific calculator, you have to evaluate the term $\tan^{-1}(0.095)$, the inverse tangent of the gradient.

Calculators do differ in their operation, but generally:

- Press the '2nd function' key
- Press the 'tan' key
- Enter 0.095
- Press the 'ANS' key

In this case, the angle is calculated to be 5.4°

Radiation Pattern and Polarisation of a self-phasing RQHA when both loops are axially displaced

by Rob Hollander

Every now and then constructors of a Resonant Quadrafilair Helical Antenna (RQHA) ask me what the effect is of an axial displacement of the two loops of such an antenna. The construction of a self-phasing RQHA, with two loops of different size, can be made simpler by shifting the centres of both loops in the axial direction in order to get the loop terminals at the top in one plane. The actual shift of the loop centres depends on the design parameters: like centre frequency, number of turns, pipe diameter and the ratio of the diameter of the cylinder of the helical part and the axial length of the RQHA.

For an antenna for APT at 137.5 MHz, with a half-turn helix, a pipe diameter of 12 mm and a ratio of helix diameter over length of 0.444 (the design parameters that I use), the displacement of the centres will be 18 mm. In terms of wavelength (218 cm at 137.5 MHz), this 18 mm is less than 1%. This means an overall small shift in phase of the fields of the two loops in the axial direction. In the radial direction there is almost no phase shift due to an axial displacement. If there is any effect at all, then we expect to see it in the axial direction.

To explain the effects it is often easier to consider the RQHA to operate as a transmitting antenna. Instead of the sensitivity pattern we have a radiation pattern of the same shape. The radiation pattern and polarisation of an RQHA are the result of a delicate balance of the fields of the two loops with currents 90 degrees out of phase. The field at a certain place *r* and time *t* is the result of the addition of the fields generated by the currents in the different parts of the RQHA.

For the purpose of calculations, the antenna is divided into very small current elements. We have to take into account not only the strength and the phase of the current in each element but also the phase due to the fact that the speed of light is not infinite and the different path-length from each current

element to the point *r* where the field is considered. Therefore, if the RCP fields of an RQHA where both loops have the same centre cancel in the downward axial direction, then we expect that this is no longer the case for the same RQHA when the centres of the two loops are axially displaced. However, the radiation pattern is not the only thing that will change; the circular polarisation will change too!

The 100% RCP in the axial direction upwards will become less than 100%. The question is: 'How much less?'

For a small displacement of 1% of a wavelength you may guess that these changes in pattern and degree of RCP will be small. Nevertheless, I decided to calculate the effects to see how far we can go with an axial displacement of the two loops.

Figure 1 shows how the polarisation pattern changes as the axial displacement increases from zero to 1, 2, 5 and 10% (from top to bottom).

The degree of circular polarisation is expressed as *Axial Ratio* (AR), defined as the ratio of field strengths.

$$\frac{(RCP - LCP)}{(RCP + LCP)}$$

The AR is +1 for pure RCP, -1 for pure LCP and zero for linear polarisation (where RCP=LCP.) The absolute value of AR is shown in Figure 1. From the horizon there is little effect. The *Axial Ratio* from above (at zenith) drops, but remains better than at the horizon, where the *Axial Ratio* should be as close to +1 as possible to avoid noise bands in the APT pictures.

Figure 2 illustrates the corresponding radiation patterns. The radiation patterns are shown as RCP sensitivity (in blue) and LCP sensitivity (in red), relative to the maximal RCP sensitivity as 30 dB. It is clear that a 1% shift has virtually no effect but that a 10% shift

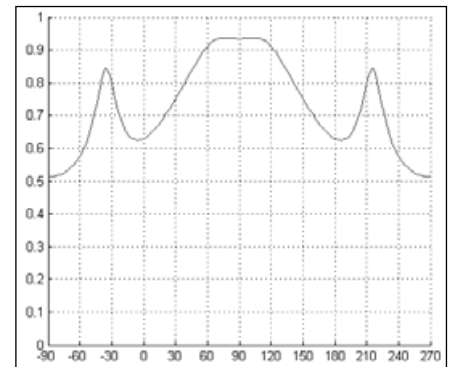
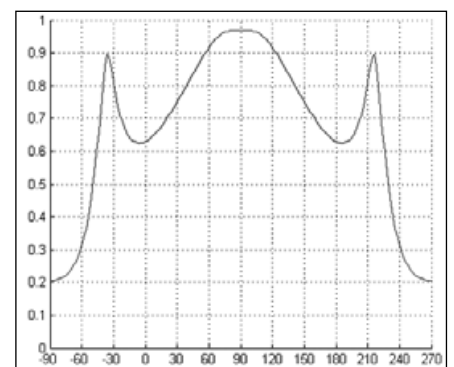
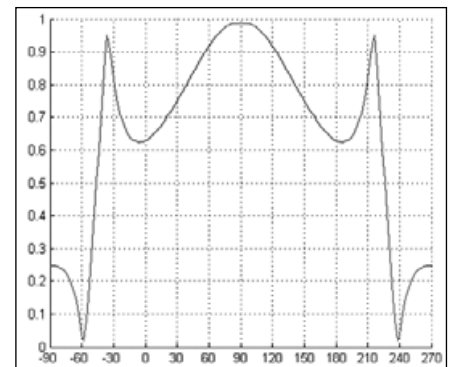
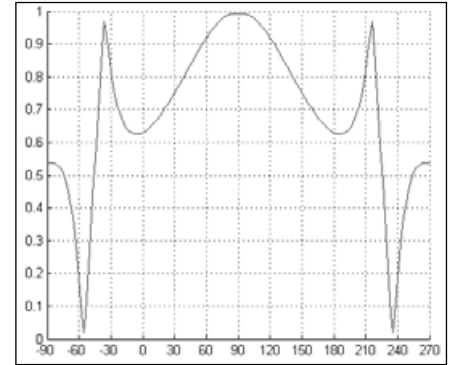
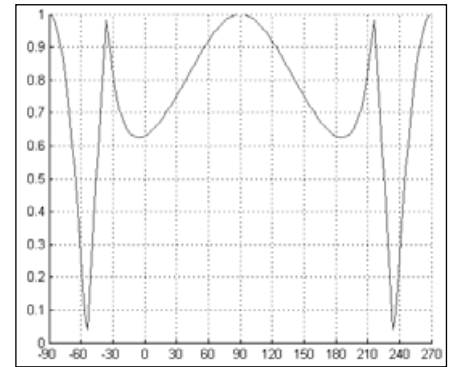


Figure 1
Axial Ratio graphs for (top to bottom)
0, 1, 2, 5, 10% axial shift

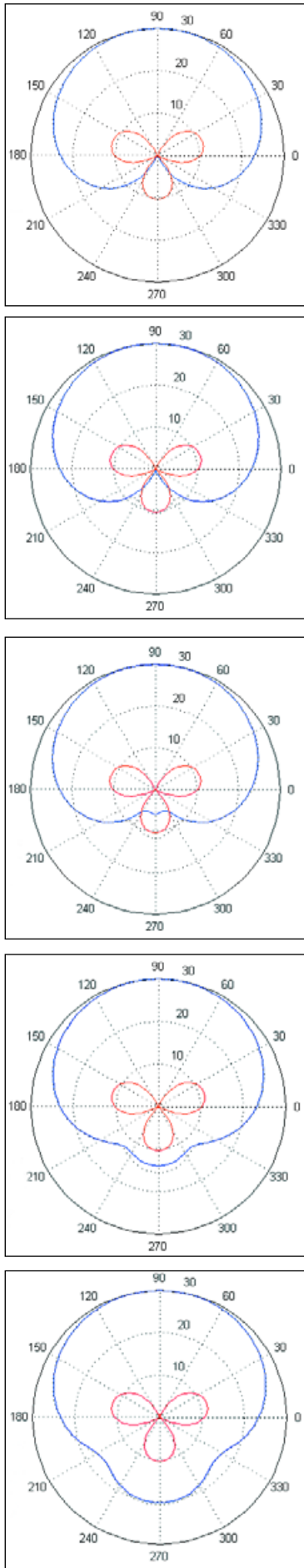


Figure 2
Radiation patterns for (top to bottom)
0, 1, 2, 5, 10% axial shift

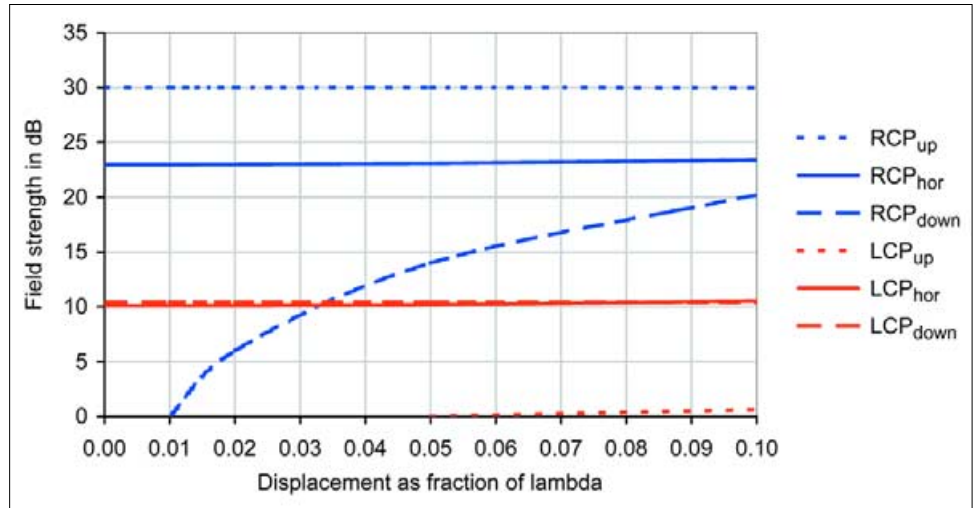


Figure 3a
Sensitivity for RCP and LCP as a function of the axial displacement
in three directions: from the horizon, from above and from below.

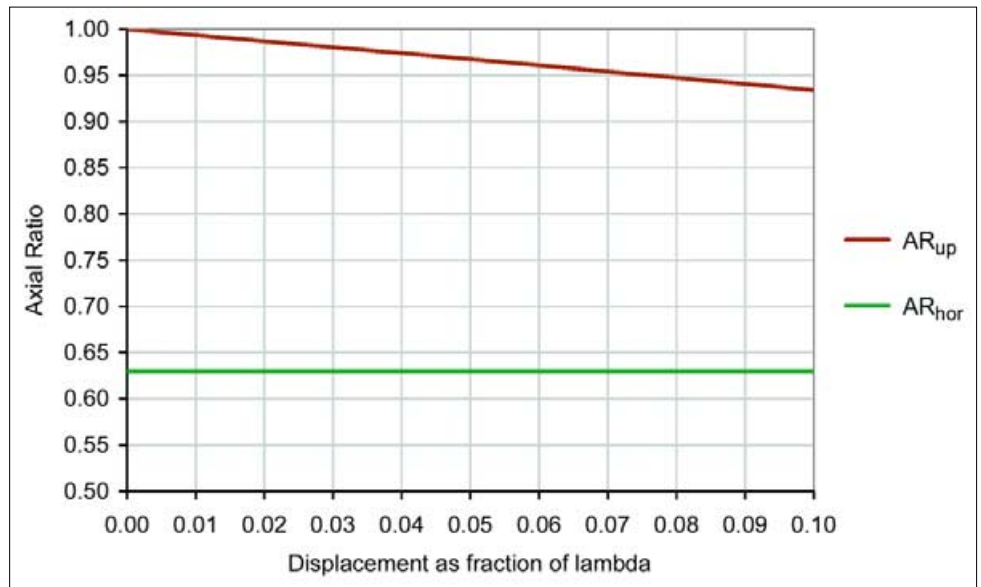


Figure 3b
Polarisation shown as AR at zenith and at the horizon as a function of the axial displacement.

has a distinct effect. Especially, the RCP pattern changes. The RQHA becomes a little bit sensitive for RCP from below!

Figure 3 shows the same results in a different way. Figure 3a (top) shows how the sensitivity for RCP and LCP changes with axial displacement in three directions: from the horizon, from above and from below.

The sensitivity from the horizon increases slightly with the axial displacement. The sensitivity from above is constant and the sensitivity from below rises with axial displacement. Figure 3b (bottom) shows how AR at zenith and at the horizon depend on the displacement. The conclusion is that the ~1% axial displacement, needed to get the terminals of a self-phasing RQHA in one plane, does

not change the radiation pattern and the polarisation noticeably.

Addendum

Another constructional problem

Some people would like to have the antenna terminals at the bottom of their RQHA. This is possible. Just put your RQHA upside down and your RQHA remains a RCP sensitive antenna.

However, to bring the radiation pattern back to the upper hemisphere you have to change the phase of one loop by 180 degrees. I already mentioned this in my article GEO-Q3 page 28, where you can find more details. This upside-down version would be useful if you wish to use your own favourite balun construction, without the need for the co-ax to run down from the top of the antenna.

Earth Imaging News

Peter Wakelin

AIRS Data Improves Weather Forecasts

Although the majority of GEO members probably look upon the visible and infrared imagery as the most important data to come from weather satellites, it is the huge amount of data from other instruments that has made the biggest contribution to improved forecasting accuracy over the last few decades.

40 years ago, balloon-borne radio sondes released from a few thousand land stations and a handful of ships were the primary source of upper air measurements of wind, temperature, and humidity. Sounding the atmosphere from satellites has improved steadily both in spatial resolution around the world and in the accuracy of vertical profiling. AIRS has taken this one stage further.

The Advanced Infrared Sounder (AIRS) is an experimental instrument on board the *Aqua* satellite, which uses 2,378 distinct spectral channels to collect data about the Earth. AIRS uses microwave data from other instruments on *Aqua* to take into account the effects of clouds, which results in much improved vertical temperature measurements through the atmosphere.

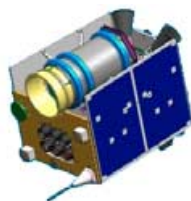
Two years ago, the European Centre for Medium Range Weather Forecasts in Reading, UK, started to incorporate AIRS data into their numerical global forecast model and noticed a marked improvement, especially in the southern hemisphere. Now, NASA and NOAA scientists at the Joint Center for Satellite Data Assimilation in Camp Springs, MD, USA, have reported similar improvements in forecasts up to six days ahead.

For more information on AIRS see:

<http://airs.jpl.nasa.gov>

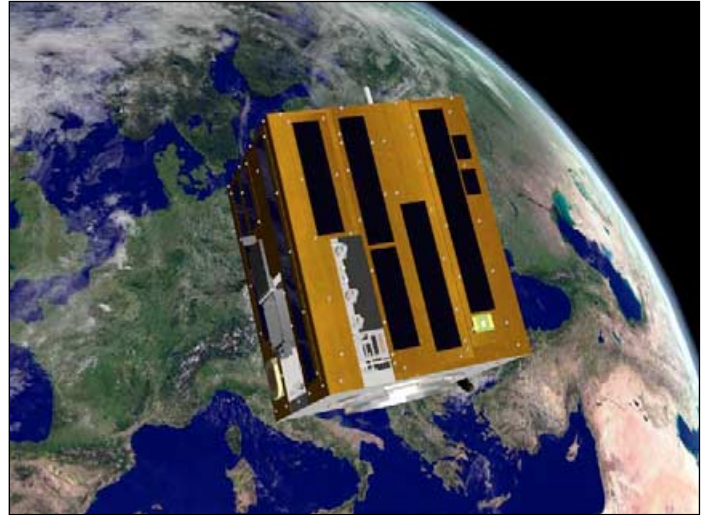
Two British-Built Imaging Satellites Launched

The Russian company *Polyot* launched several small satellites on a single Kosmos-3M rocket from Plesetsk, northern Russia, on October 27. The payloads included *Beijing-1* and *Topsat*, two satellites built by Surrey Satellite Technology Ltd, Guildford, UK. *Beijing-1* is part of the Disaster Monitoring Constellation and will be operated by Tsinghua University for a Chinese company, Beijing Landview Mapping Information Technology Ltd. Its 31 cm aperture telescope has a resolution of four metres. *Topsat* is an imaging spacecraft for UK military research.



Beijing-1
Drawing: SSTL

Also on board was the first Iranian satellite, *Sinah-1*, built by Polyot, Omsk, Russia. The 160 kg experimental payload carries remote sensing equipment. The other payloads were *SSETI-Express*, a student-built satellite sponsored by the European Space Agency, *Mozhaets-5*, carrying a laser



An artist's conception of the SSETI Express satellite flying over Europe in Earth orbit. Credit: Morten Bisgaard, Aalborg University

communications experiment and *Rubin-5* which is a technology/communications payload.

More on this and other recent launches can be found on Jonathan McDowell's informative website at:

<http://www.planet4589.org.jsr.html>

ESA's Cryosat Fails to Reach Orbit

The European Space Agency's *Cryosat* spacecraft fell into the Arctic Ocean shortly after launch on October 8 when the second stage of the *Rokot* launch vehicle failed to shut down as planned and did not separate from the upper stage. The *Rokot* is based on a converted SS-19 missile from the Soviet era with a modern *Breeze* upper stage added. The failure has been provisionally attributed to a flight guidance software problem but ESA, the Russians and Eurockot, the joint Russian and German developers of the *Rokot* vehicle, are each carrying out separate investigations into the failure. All six previous launches of similar *Rokots* since 2000 were successful.



The Rokot launcher

Cryosat was intended to carry out long-term measurements of polar ice and sea-ice thicknesses to look for the effects of global warming. A replacement craft may be built but a launch before 2009 is unlikely.

Meteosat-7 to Move East

Provided that the launch of *MSG-2* (now expected in December) and subsequent commissioning are successful, it is anticipated that in mid-2006 *Meteosat-7's* orbit will be lowered slightly so that it drifts eastwards at about one degree a day to its new location over the Indian Ocean. *Meteosat-5* currently operates the Indian Ocean Data Coverage service at 63 degrees east longitude but its fuel is almost depleted and its orbit inclination continues to increase (it is now almost eight degrees). Following the manoeuvre, *Meteosat-5* will be boosted upwards out of the geostationary orbit to eliminate the possibility of a collision.

DMSP-17 Launch Expected in December

The next spacecraft in the Defense Meteorological Satellite Program's polar-orbiting series is scheduled for launch from Vandenberg Air Force Base in California on December 1st. Like the civilian equivalents in the NOAA series, the DMSP craft have undergone significant developments in the last 30 years. *DMSP-17* is similar to *DMSP-16* launched in October 2003, which was the first in the latest Block 5D-3 series of spacecraft. *DMSP-17* will be lifted into orbit by a Delta 4M rocket whereas the remaining three craft are to be launched on Atlas 5 vehicles. Although the instrumentation is quite different to that on board the civilian NOAA satellites, the accompanying US Air Force picture clearly shows that the same spacecraft bus is used for the two classes of satellite.



Artist's impression of DMSP-17 in orbit

Meteosat Third Generation Progresses

Meteosat Third Generation (MTG) activities started five years ago following the decision by EUMETSAT's Council to proceed with a Post-MSG User Consultation Process. Following the consolidation of user requirements and the assessment of observing techniques, five observation missions for MTG were proposed:

High-Resolution Fast Imaging (HRFI) mission

This mission expands MSG's High Resolution Visible mission to five channels with 500-1000 m resolution and a five minute repeat cycle. The coverage is limited to selectable fractions of the full Earth disk with a coverage equivalent to one-third of the full disk.

Full-Disk High-Spectral-Resolution Imagery (FDHSI) mission

This mission is an evolution of MSG's SEVIRI imager with more spectral channels, spatial resolution improved to 1-km (visible) and 2-km (infrared) with a 10 minute repeat cycle.

Lightning Imagery (LI) mission

The observation technique selected is based on the detection of

the strongest lightning emission feature within the cloud-top optical spectra produced by the neutral oxygen line at 777.4 nm.

Infrared Sounding (IRS) mission

The primary objective of this mission is to support numerical weather prediction by providing more frequent information on vertical temperature and water-vapour profiles, and to derive improved wind data from the tracking of three-dimensional water-vapour patterns.

UV/Visible Sounding (UVS) mission

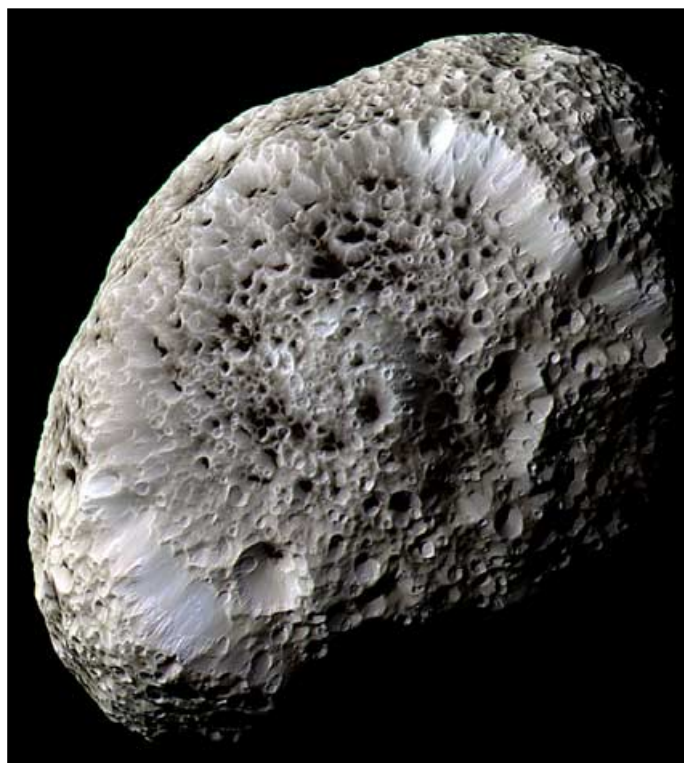
This mission is designed to detect and measure changes in the composition of the Earth's atmosphere, and applications would include air quality monitoring and forecasting, the detection and surveillance of pollution clouds and ultraviolet radiation monitoring and forecasting.

Further studies and approval processes will last until 2009 when development and testing of the MTG system will begin. The first launch is planned for 2015.

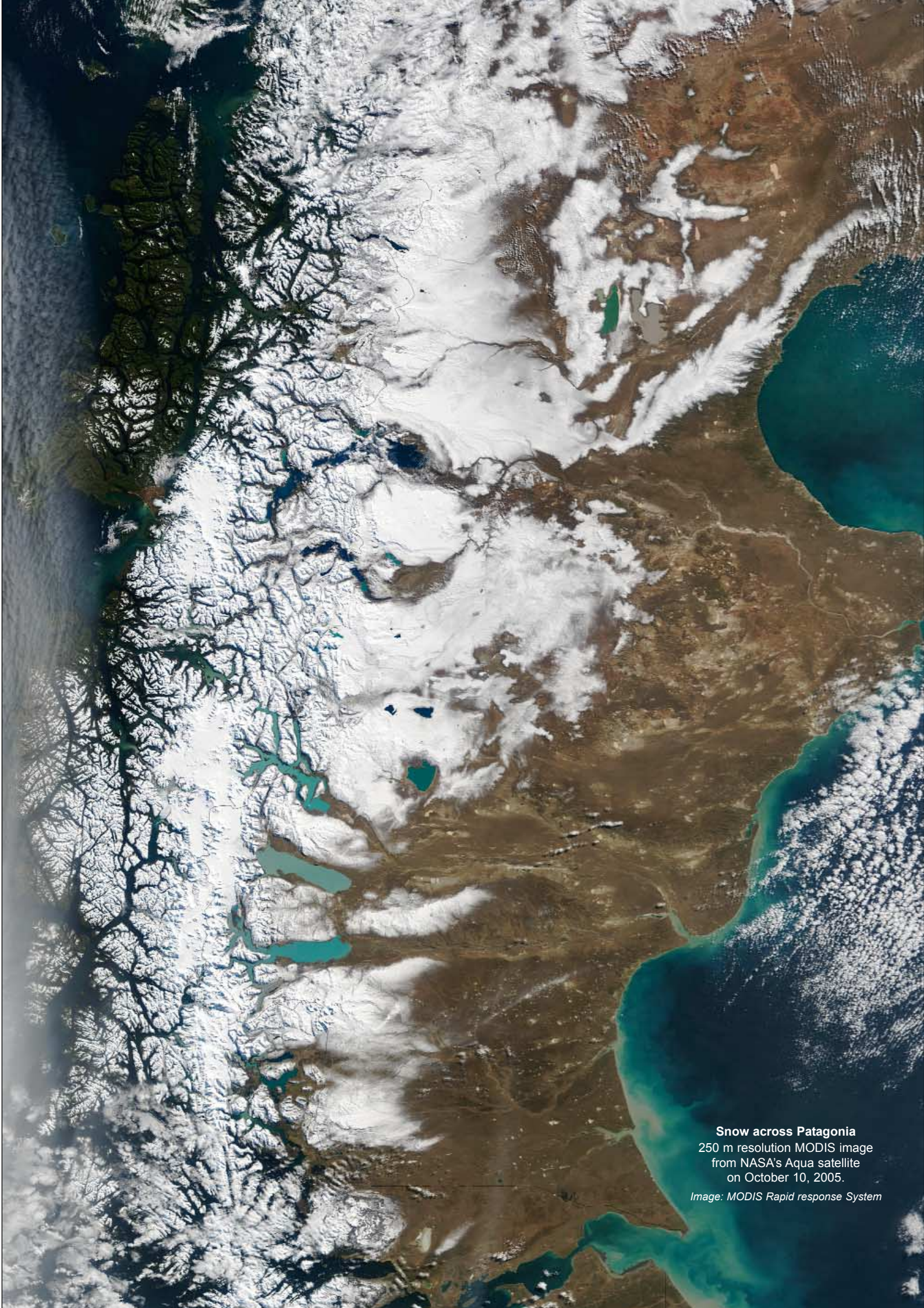
This is a brief extract from '*Meteosat Third Generation- The Future European Geostationary Meteorological Satellite*', which appears in the August 2005 issue of 'ESA Bulletin'. The authors are Jean-Loup Bézy, Donny Aminou & Paulo Bensi (ESA Directorate of Earth Observation) and Rolf Stuhlman, Stephen Tjemkes & Antonio Rodriguez (Eumetsat). For more information on ESA publications see:

<http://www.esa.int/publications>

Cassini Snapshot

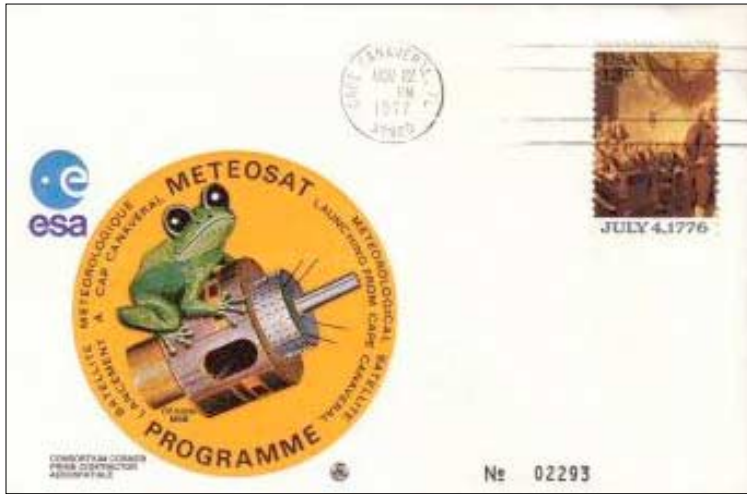


NASA's *Cassini* mission to the planet Saturn has been returning stunning images of its moons for well over a year now. The spectacular image above shows the 360 km diameter, crater-riven features of *Hyperion*, imaged by *Cassini's* narrow-angle camera from a distance of 62 000 km on September 26, 2005.



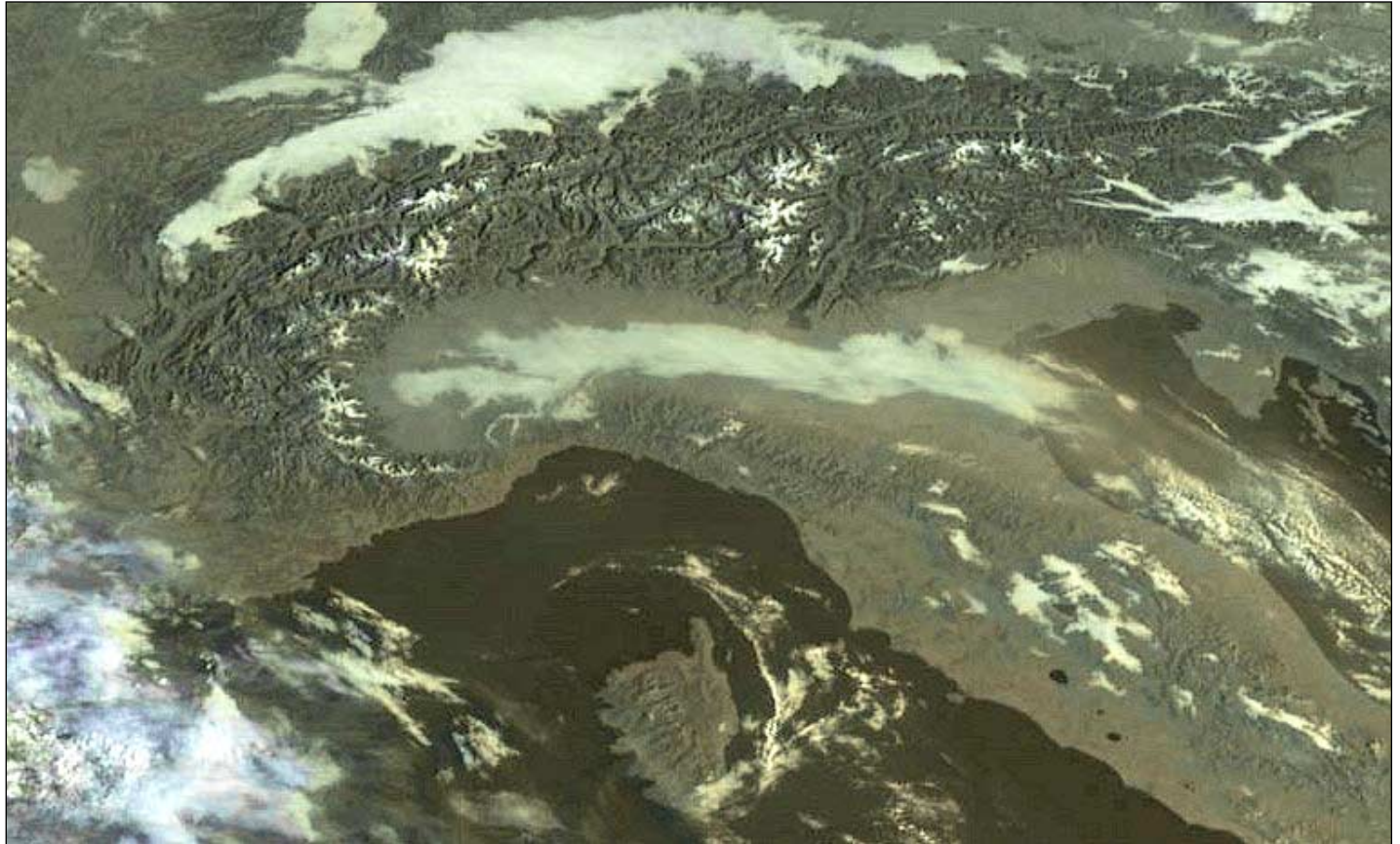
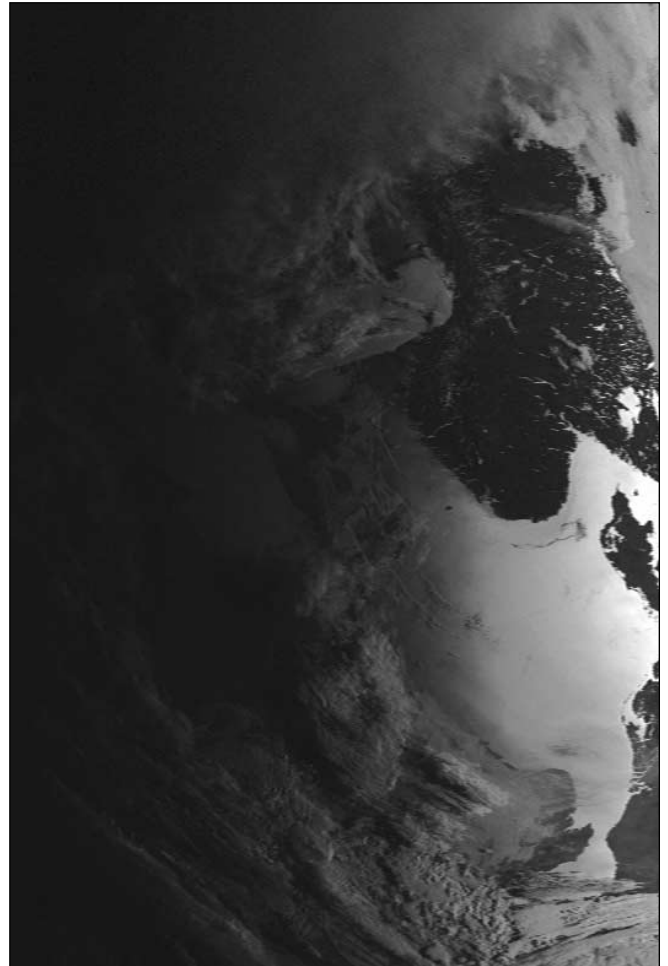
Snow across Patagonia
250 m resolution MODIS image
from NASA's Aqua satellite
on October 10, 2005.
Image: MODIS Rapid response System

Members' Images



Rob Denton has a passion for collecting postal memorabilia relating to weather satellites. The First Day Cover illustrated above was mailed from Cape Canaveral on November 12, 1977 to commemorate the impending launch of Meteosat-1 (which took place on November 23).

At right is one of the final NOAA-15 images of the autumn, obtained at 07:40 UT on October 16. Northern hemisphere early-morning sunlight is at a premium but enough remains to highlight the North Sea and lakes in Sweden with glint. (Image: Les Hamilton, Vierling receiver, Satsignal).



Laurent Deblangy from Juilles, near Toulouse in France, captured this HVR Meteosat-8 image at 08:30 UT on October 16, 2005. The image segment shows the French Alps with low stratus cloud over the valley of the River Po in Italy.

Image © EUMETSAT 2004 Processing: GeoSatsignal-5, using channels 9 and 12

POVIN



A framework for Product Oriented Video, Images and Maps

Fred van den Bosch

Background

I made a presentation at the GEO 2005 Symposium under the above title and in this article I will develop one of its components more fully. POVIM is a framework for Product Oriented Video, Images and Maps. It provides the functional design for:

- the automation of computer programs
- a separate reception PC
- a master folder containing a hierarchy of sub-folders
- a convention of systematic filenames throughout
- everything in a logical and consistent structure.

A number of hints are provided for implementation as well as a number of ideas for the future.

Introduction

The primary reason for development of the above measures is simple: my system was starting to get into a bit of a mess. I continually had to search out where specific files had been stored. So I decided to tackle the matter in a structured way using SDM (System Development Methodology), a system I had learned previously. SDM has been around for a while now and is not so useful for the majority of modern systems but it works well for POVIM.

In turn, I carried out the following steps:

- problem inventory
- problem analysis
- functional design
- implementation and testing.

Problem Inventory and Analysis

After an inventory of all problem points I was able to sum up the most important matters as follows:

- I am lazy
- everything is stored on a single system
- satellite images and Digital Atmosphere maps were stored in several different folders ...
- ... and under a variety of non-systematic names
- no form of documentation had been maintained.

The next step is the analysis of these problems:

I am lazy

Because there is no available therapy to put into practice I have decided to automate as much as possible. For David Taylor's programs [1] this is easily achieved by creating batch files. Digital Atmosphere Work station (DAWS) offers the possibility of scripts and its own scheduler.

Everything is stored on one system

This has a number of consequences:

- VPN and the *Tellique* software do not work at the same time.
VPN (Virtual Private network) is a program which I use to connect my home computer with the one at my work. As soon as VPN is started up it automatically blocks all other network traffic: this is to guarantee a safe connection to my company computer. Consequently, the *Tellique* software is prevented from working.
- Poor response times
On my 2.67 GHz system these are very similar to those of my 300 MHz laptop. Not really ideal therefore.

In the foreseeable future a separate reception PC will be required. But at the time of writing I am thinking over my needs. Broadly, there are two possibilities:

- A simple PC which is exclusively used for reception. All other work would take place on the main (large) system.
- A higher specification system where, in addition to reception, it is used to create images of several areas using *GeoSatSignal* in batch mode etc.

I am now at the testing stage with my large system to find out which programs can be run together. The results are not entirely reliable because I have only 512 Mb of internal memory and there are still other items to be installed

Images and Maps in several Folders

The cause of the problem here is of course clear. Most programs, except David Taylor's, have absolutely no consistency with each other. Files are therefore generally installed in the folder which the software designer considered the best, and using default filenames. To improve this a logical and consistent folder structure must be devised.

Storage with Non-homogeneous Filenames

The solution is simple: to design conventions for naming and use filenames.

Documentation

Well! Even in professional circles this tends to become 'forgotten'. It is therefore a good idea to document the entire system. Think about tackling:

- where the program has been installed
- input/output
- registration codes
- everything else that is important

In short, there is considerable work to be done.

Design

Using the above information, a framework can be devised (figure 1). The basis of this is a central folder called 'PRODUCTS'. Within this folder, each type of product (image,

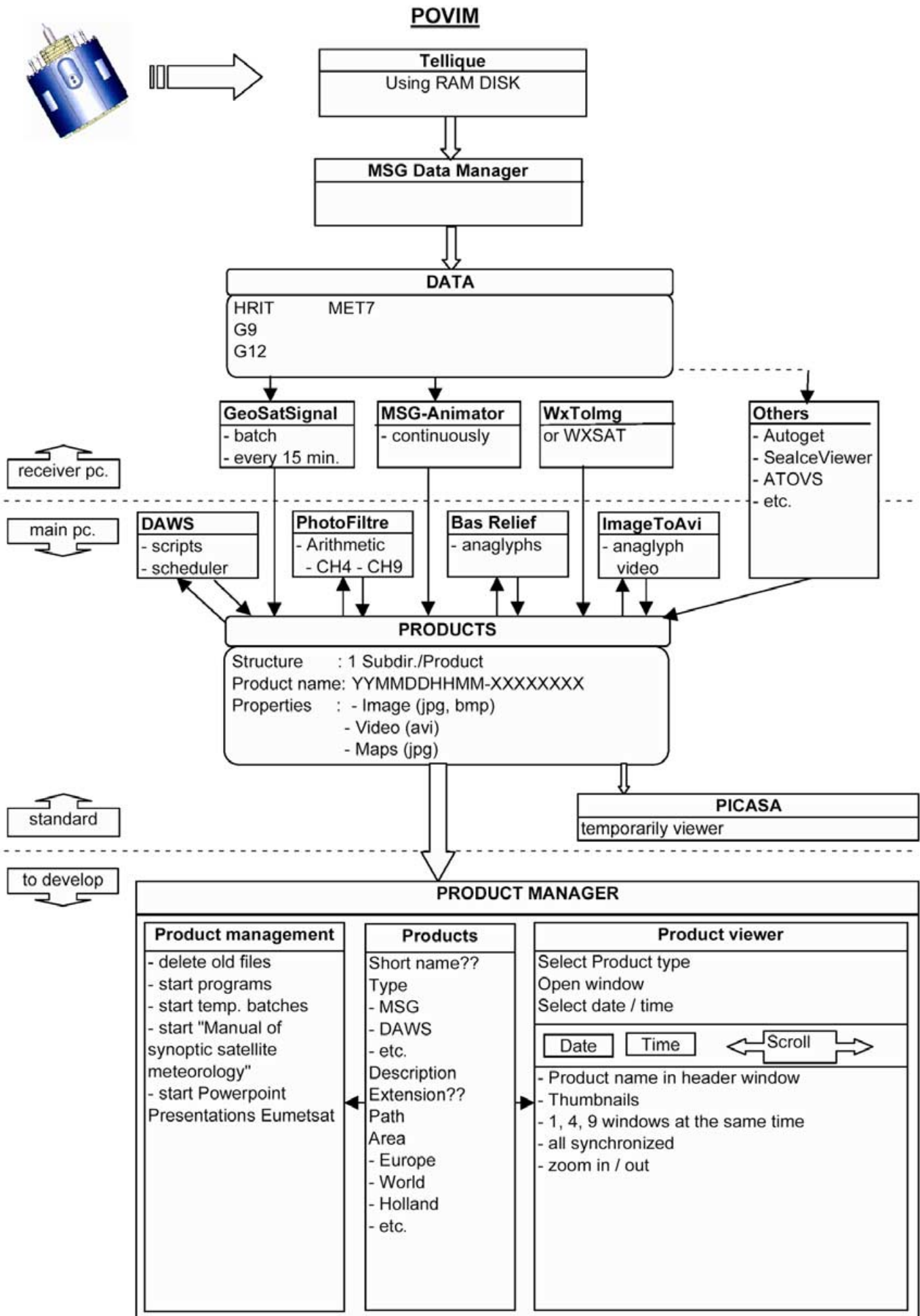


Figure 1
www.geo-web.org.uk

map, animation) is gathered into its own sub-folder. For example, the channel 1-11 Meteosat-8 images are 11 products; DAWS maps with isobars are another, etc. If desired, you can create a hierarchy of sub-folders within 'PRODUCTS': e.g. 'DATA', 'MSG', 'DAWS' and so on. Additional sub-folders for each product are then added. Figure 2 shows the main principles of my own classification. Naturally everyone can use their own ideas. The most important thing is that the structure is logical and consistent. Every product has a fixed name of type:

YYMMDDHHMM-XXXXX

where

- YY = year
- MM = month
- DD = day
- HH = hour
- MM = minute
- XXXXX = an optional extra

The only deviation from this convention occurs for animations, which often cover several entire days. Again, everyone can make their own rule here.

Now follow a few observations concerning some of the component parts of the framework.

Software Running on my Reception PC

The software descriptions described below are based on my own experiences. I do not exclude future modifications based on experiences gained in using the reception PC.

Telique Software

The *Telique* program makes use of a RamDisk [2]. This limits writing to the hard disk and offers very many advantages.

MSG Data Manager

The output of image files from this program can be collected in a sub-folder within 'PRODUCTS' (e.g. 'DATA').

GeoSatSignal

A separate *GeoSatSignal* job is defined for each type of file exported. At the same time a batch file is written for each job to export its output to 'PRODUCTS'. I myself have created a separate sub-folder called 'MSG' which contains further sub-folders for each job.

MSG-Animator

The animations are stored in their own folder.

WXtoImg or WXSat

Programs to decode APT signals, each with their own (sub)-folders.

Software run on my Large System

DAWS (Digital Atmosphere Work Station [3]) uses images from the MSG folder as backgrounds and then stores the products in 'DAWS', its own sub-folder within 'PRODUCTS'. The 'DAWS' sub-folder contains further divisions by region: Netherlands, Europe, World, Vietnam etc., each containing its own series of sub-folders for products. You can see how this works for the region 'Wereld' in figure 2.

PhotoFiltre [4] is a program with which you can perform arithmetical operations on images; for example, images from two MSG channels can be subtracted from each other. You can

find out the theory of this from the Internet [5]. Input consists of two different products and the output is saved as a separate product.

Bas Relief [6] is a program to make 3D anaglyph images. How to do this is described in a separate article [7].

ImageToAvi [8] is a program which I use to create a video from a series of anaglyphs.

Other Software

Autoget and SeaIceViewer [1] come to mind, amongst others.

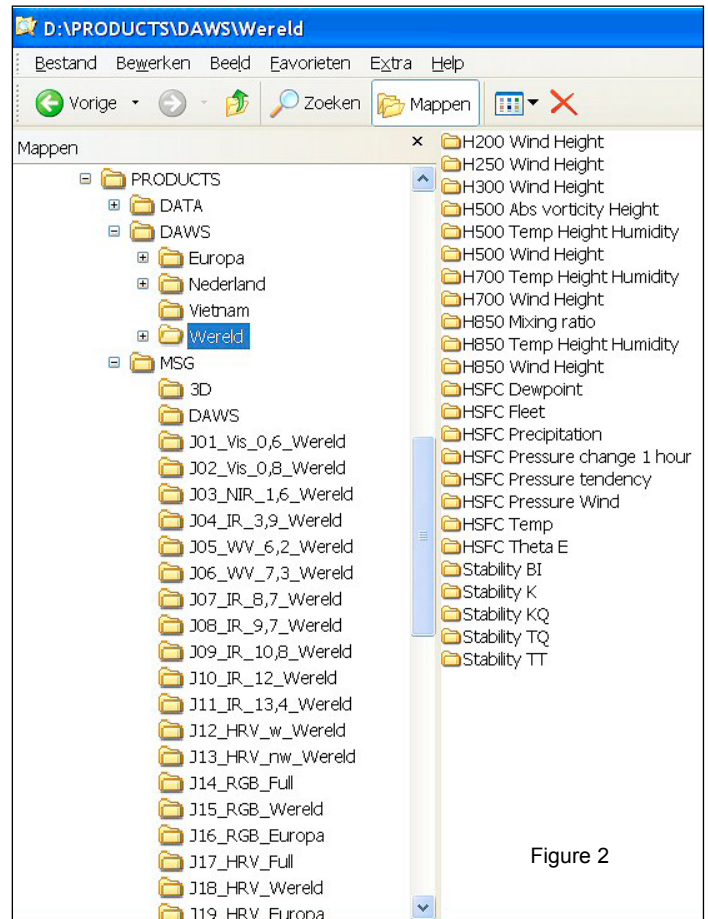


Figure 2

Implementation

How can you switch over to this structure? For those who have still to begin setting up their MSG system it is simple: use the structure described above on each installation. However, for those who have already installed a lot it will require more time and effort. Here's a step-by-step plan.

- Create the desired structure: a folder 'PRODUCTS' and the desired sub-folders.
- Give every folder a meaningful name! Consider the structure you want and keep following it. Think well about this in advance: modifying it later is a considerable task.
- For 'MSG' you can think of the region or the channels you are going to make use of; for 'DAWS' the displayed meteorological phenomena (e.g. wind and temperature).
- Make the necessary adjustments to each software program.

MSG Data Manager

- Make sure that you create a folder called 'DATA' inside 'PRODUCTS'.

- Open *MSG Data Manager* or click on the 'Stop' button and go to the Setup tab. Enter the location of this 'DATA' folder as your 'Processed image files location'.
- Click the 'Start' button to run *MSG DataManager* and all the necessary additional sub-folders will automatically be created by the program itself (within 'DATA').
- Check that the sub-folders have been created and files are written to it.
- Copy all files from the existing structure to the DATA folder.

GeoSatSignal.

- Try out the first *GeoSatsignal* job and test it interactively.
- If everything goes well, then test the associated batch file.

DAWS

Check every script carefully.

Testing in general

- Test every program separately.
- Test every program step separately, e.g. with *DAWS* each script and with *GeoSatSignal* each batch file. Record, on paper or in a spreadsheet, which programs, batch files, scripts etc. have been adapted and tested.

Product Manager

At the present time I use *Picasa* [9] as a temporary viewer. The advantage of this program is its ability to display thumbnails of all the folders—in which the modifications are continually being updated—on the screen. Next you can choose which image to zoom in to.

In the long run a program, lets call it '*Product Manager*', will be required which will be able to present everything in a more meaningful manner. As this program does not yet exist, I am going to have to build it myself. Learning a suitable programming language is therefore high on my list of priorities. Here is what I require this program to do.

Products

Product Manager will have to be able to cope with all the various products held in the 'PRODUCTS' folder. Its record for each product should include

- a short name to characterise each product
- a type which describes the nature of the product (e.g. MSG image, DAWS map/chart, etc.)
- the path leading to the folder containing each file
- the relevant geographical area for the product (e.g. Netherlands, Europe etc.)

Product Manager will also have to possess facilities to select and display the various data products. First, it must be able to select one or more products plus a start date and time; then all the products for the selected time would be presented, each in its own window. These windows would be designed to remain synchronised whenever any one of them was scrolled. And it goes without saying that you would be able to zoom in and out of the various images.

Product Manager would also have to contain certain 'housekeeping' features such as:

- Removal of Old Files
Old files in the 'PRODUCT' folder would have to be regularly removed. David Taylor's website [1] contains the program *TrimTree*. This program can run from a batch file. If you provide this program with the folder where the

files to be deleted are stored and the number of days that you wish to retain, all older files are removed.

- Starting Programs
This would allow a simple one-click option to run any of the software packages used on the system.
- Starting up Temporary Batch Files
All batch files could be started up by means of a task manager (e.g. the Windows Task Manager). It can be useful to be able to start a batch file, in a simple way, at any time.
- Refer to the 'Manual of Synoptic Satellite Meteorology'
This manual [10] exists of three CDs. Within the CDs you are regularly referred to other CDs and you feel a bit like a DJ! For this reason I have copied all three CDs into a folder in such a manner that all the references work.
- Start 'PowerPoint Presentations Eumetsat'
Eumetsat [11] have a whole series of PowerPoint presentations concerning everything you can do with MSG images. I have placed a number of the most important of these on my hard disc so that I can consult them rapidly.
- Documentation
Above I have indicated what can be stored. If there is enough interest, I will publish a more detailed checklist of my own public documentation.

Summary

This article describes the functional specifications for a system to automate the whole process. Of course everybody is free to use parts of it and how to fill in the technical details. In a following article I will explain how to build and start batch-jobs.

References

- | | |
|--|---|
| 1 David Taylor | http://www.satsignal.net |
| 2 EUMETCast Reception using a RAM Disc | Arne van Belle, GEO Quarterly No 6, page 14 |
| 3 DAWS | http://www.weathergraphics.com/ |
| 4 Photofiltre | http://www.photofiltre.com/ |
| 5 Theory arithmetic | http://wolves.dreamhost.com/web/arith/ |
| 6 BasRelief | http://www.3dphotopro.com/software.html |
| 7 BasRelief article | GEO Quarterly No 8, page 24 (this issue) |
| 8 ImagoAVI | http://www.aswsoftware.com/products/ |
| 9 Picasa | http://picasa.google.com/ |
| 10 Observing the weather with MSG-1 | Robert Moore, GEO Quarterly No 3, page 44 |
| 11 EUMETSAT | http://www.eumetsat.int |

Advisory on DAWS Scripting

Peter Edwards

I have come across a minor error, that could cause confusion or concern, in Fred van den Bosch's GEO Q7 article '*Using Scripts in Digital Atmosphere Workstation*'. The article itself is excellent and Fred should be congratulated in explaining scripting so well. But, should anyone copy the scripts as shown, they will not work correctly. The reason is that the DAWS commands must be spelt using American English. The example in question is the 'COLOR' command, which **must** be spelt 'color' and not 'colour' as published. If you use the English spelling 'colour', the command will not work properly in DAWS.

Editor's Note

I must point out that Fred is in no way responsible for this unfortunate error. His submitted scripts were correct, and were tested prior to publication. Unfortunately the British English spell-checker used on the text of GEO Q7 recommended the change in spelling and I was not observant enough to realise that this was a 'special case' which should remain unmodified.

SOFTWARE SHOWCASE



Douglas Deans - douglas@dsdeans.freemove.co.uk

As I have stated before, I will take the opportunity from time to time, when new or upgraded software is in short supply, to remind readers, some of whom may be new to the hobby, of the contents of the showcase CDs. This is one such time. This quarter we will take a look at GS4 and also review an image processing program with an interesting optional extra.

GS4 was primarily produced to help those with either a slow or pay-as-you-go Internet connection or, indeed, no Internet connection at all. The outcome was a CD full of remarkable images taken from Landsat 7, the Space Shuttle, MODIS, weather satellites and a collection from NASA's Earth Observatory. Of course, readers who use the Internet regularly will realise there is an endless package of such wonderful images produced on a

daily basis and covering every conceivable topic. I have tried to choose ones that are both interesting and timeless, and where possible, I have chosen large images that would be more difficult for some to download. For each image in the group there is a corresponding text file with a full description of the image and its source. In addition I have provided a folder with a number of incredible weather satellite animations from MSG-1. Even for those with a broadband connection this could be a handy composite CD with over 700 Mb of images and descriptions ready to use.

PhotoFiltre v 6.1.5

You might consider this to be yet another image processing program but there are certain features of this software which are very attractive to those dealing with weather satellite imagery where multiple

channels/wavelengths are available. Of course Meteosat 8 with its twelve channels is the prime example.

PhotoFiltre is a freeware program or, as it says, is 'free for private, non-commercial or educational use'; otherwise registration is required. The program has all the usual features associated with image processing software but its forte does seem to be the retouching of photographic images. I must confess that photography has never been a hobby of mine so my use of such software is inevitably associated with satellite imagery and this is where the program has a very useful optional extra.

For readers who receive the multiple channels from Meteosat-8 there are many wavelength combinations along with RGB colour options that can help to accentuate

GS1	All David Taylor's weather satellite programs and libraries, including the current releases of WXtrack, Satsignal, HRPT Reader, GeoSatsignal, GroundMap, RX2 PassControl and many other program extras. This disc also contains a large quantity of sample files, many of high-resolution data, for use with these programs.	
	WXtrack	Satellite Tracking Program v 3.5.0
	SatSignal	Creates images from wave files v 4.2.0
	HRPT Reader	Converts raw HRPT data files into images v 2.6.2
	GroundMap	Rescales satellite images v 1.3.8
	RX2 PassControl	Computer control program for the RX2 receiver v 3.0.6
GS2	A wide range of software for all aspects of weather satellite reception, including tracking, receiving, monitoring and image manipulation. Content is detailed below but many other extras are provided. Titles correspond with folder names. * implies a DOS program.	
	Collection D02	Recall (wave file recorder), Palette (modifies Wxsat colour palettes).
	Collection D03	Scanner recorder v 1.8 (wave file recorder), *NOAA95/*FENG99 (software for the NOAA 95 HRPT project)
	Collection D04	Wxsat (wave file recorder/decoder), Satmon (wave file recorder). v 2.59
	AGSatTrack	Satellite tracking program v 1.33
	APTDecoder	Program for capturing APT audio and processing images v 1.0.2.68
	Cirkit	Documents for the Cirkit Wxsat receiver and the UOSat receiver (PDF format)
	Element Manager	2-line element manager v 1.59
	Footprint	Satellite tracking program v 2.10
	Irfan View	Image/slideshow viewer v 3.80
	JVcomm32	Evaluation version (APT/FAX/SSTV decoder)
	Macintosh kepler editor	Edits verbose AMSAT format elements. Mac OS X and OS9 only.
	NeoPaint	Image processing program (30 day evaluation)
	Orbitron	Satellite Tracking Program v 3.60
	Paintshop Pro	Image processing program (30-day evaluation)
	PhotoFiltre	Image retouching program with many extras v 6.1.5
	Satscape	Satellite tracker and wave file recorder v 2.02
	Space-Track TLE Retriever	Generates TLE files in 'Celestrak' style from data sets recovered from Space Track
	Splitter	Utility program for splitting and reuniting large files
	World Wind (NASA)	View anywhere on Earth from satellites v 1.3
	WXtolmg	WAV file recording and decoding program with many options. v 2.5.11
GS3	3DEM Package for 3D Terrain Visualisation This CD includes the full set of GLOBE Tiles to allow you to produce excellent images and flybys from HRPT images. Also included is a selection of Mars MOLA files, sample images and helpful guides by Ed Murashie.	
GS4	Image CD A wide selection of high-resolution remote images from a range of satellites, including stunning imagery from the Space Shuttle missions. A full description and source is provided for each image.	
GS5	Mars Rover Panoramics A chronological account, in panoramic images, of the NASA Mars Rovers' progress across the Martian Terrain	

certain meteorological conditions. David Taylor's program *GeoSatSignal 5* (which I hope to review in GEOQ 9 and 10) has all the facilities to enable you to combine arbitrary channels of Meteosat-8 data by mapping the channel to either the red, green or blue component of the output image. The combinations are endless.

However, there are times when it may also be necessary to **subtract** channel images to help differentiate a feature such as snow or night-time fog. This is now possible with *PhotoFiltre* as an *arithmetic plug-in* can be downloaded and added to the program. This plug-in is also freeware. I know David has plans to add channel subtraction to GSS5 and so, along with the already fully working RGB option this will make GSS5 the complete package for such work.

One of the best guides for this kind of work is EUMETSAT's *MSG Interpretation Guide* which is full of wonderful information on the use of RGB techniques and channel subtractions for a large range of applications related to weather analysis and forecasting, ocean and land surface, and many other topics. The Guide can be downloaded in sections from the Internet and hundreds of megabytes of material is available.

http://oiswww.eumetsat.org/WEBOPS/msg_interpretation/

and I believe it can also be ordered from EUMETSAT on DVD.

Use of the plug-in is straightforward and is as simple as unzipping the file's content into *PhotoFiltre's* 'plugins' folder. Thereafter, when using the program, select *tools > plug-in* and then '*Arithmetic*'. There are many other plug-ins freely available for other operations and if installed they will also appear in *tools > plug-in*.

PhotoFiltre and the *Arithmetic* plug-in is available on GEO software CD GS2 or for more information and to download the program go to :-

<http://www.photofiltre.com/>

APTDecoder v 1.0.2.68

I do not intend to review this program as an excellent one has been provided by Les Hamilton on page 15 of this quarterly issue.

The program is available on GEO software CD GS2 or, for more information and to download go to :-

<http://www.ptast.com/apt/decoder/>

How to Purchase CDs

Write to the address below requesting GS1, GS2, GS3, GS4 or GS5. Prices are £5 for any single CD, 2 for £8, 3 for £11, 4 for £14 or all 5 for £17. Please enclose cash or cheque (made payable to Douglas Deans - not GEO) for the appropriate amount. Nothing else is required.

The cost includes the CD, packaging, posting and a small donation towards the cost of overheads. No fee is asked from overseas members although an exchange of software or interesting satellite images is always welcome.

Orders are normally dispatched on the day of receipt.

Order your CDs from:

Douglas Deans, 17 Montrose Way,
Dunblane, Perthshire FK15 9JL, Scotland.

Publications ... a Reminder

Francis Bell

Members who received our launch issue in February 2004 may recall a few paragraphs I wrote about some other publications which relate to weather satellites. I indicated some of these publication which I receive without any cost to myself.

This reminder has been prompted because, a few days ago, I received my latest copy the European Space Agency's August 2005 *ESA Bulletin*. It is a comprehensive publication containing about 100 pages covering ESA's science, technology, engineering and space missions. The latest issue, number 123, I found particularly interesting because of its coverage of the Meteosat programme. I don't always read

the *ESA Bulletin* from cover to cover; I usually read the abstracts and then the items relating to weather satellites. The latest edition was very informative.

ESA also produce the publication *Earth Observation Quarterly*. Its title is descriptive. It generally consists of between 8 and 16 pages and covers topics relating to Earth imaging—not just weather satellites.

Both of the above two publication are available free of charge. Write to the address below, giving your name and address, and ask to be put on the mailing list for these two particular publications.

ESA Publications Division
PO Box 299
2200 AG Noordwijk
The Netherlands



Flight models of MSG-2 and MSG-3 in the clean room at Alcatel Space in Cannes

Image: ESA - reprinted from *ESA Bulletin*, August 2005

The other publication I receive, which is 8 pages long, is *Image*, which comes from EUMETSAT, and describes a range of their activities plus brief reports. It also gives a global summary of operational weather satellites. I find it a useful document. Again it's available free of charge. Write to the address below and ask to be put on their mailing list.

EUMETSAT Information
Division
Am Kavalleriesand 31
D-64295 Darmstadt
Germany

Some of the above information is available via the Internet although in many cases I prefer the printed copy.

References

[ESA Bulletin](http://www.esa.int/)

<http://www.esa.int/>

[SPECIAL/ESA_Publications/](http://www.esa.int/)

[Image](http://www.eumetsat.int/)

<http://www.eumetsat.int/>

Follow the link to 'Publications' then click 'Image'.

To Kill A Mockingbird

Francis Bell



Duties dispatched me to Tobago, which is a small island close to South America. As usual, in a spare moment, I had an eye on telecommunications and thought that GEO readers might be interested in a photograph I took of a satellite receiving dish. It looked totally out of place against a background of coral seas, sand and palm trees.

While walking along the beach, Nadine and I crossed between a rather old hotel and a strip of shacks of mixed residential, shops and beach services. None of these looked as if it could withstand a storm. However, between the hotel and its adjacent house was a 6-metre diameter satellite dish. I was astonished to see it there; it did look totally out of place. Closer inspection revealed the age of the dish and it had probably been out of service for many years. The hint about the 'out of service' was the almond tree growing through the perforated dish mesh.

The dish's antecedents looked only just post Harper Lee's Pulitzer Prize winning novel *'To Kill a Mocking Bird'* which was about the racially charged southern USA.

I was seen taking photographs of the dish and invited into the garden of the adjacent 'house'. The friendly residents were ambiguous and coy about the ownership of the large dish but they did tell me about its current use. They told me that the dish supports the almond

tree and that the tree provides nesting sites for mocking birds and sugar birds. I smiled and thanked them for their time.

Two thoughts passed through my mind. Is this the biggest birds' nest I have ever seen? And could the focussed RF provide enough energy to incubate the birds eggs—or would the birds be better off just sitting on the eggs? There may be some natural balance here; could the RF incubate a bird's egg or be enough to 'Kill a Mocking Bird'?

Birds

A Competition

For most of us, Earth Observation is a hobby with a technical challenge but this is a light-hearted digression from our usual perspective.

I was enchanted by David Taylor's photographs of starlings on his 137 MHz turnstile aerial which was published in GEO Quarterly 6. I live on the edge of a village and have many birds living or visiting the area. Some of these birds also use my 137 MHz antenna on which to perch.

The photograph shows a family of swallows on my aerial. I know they were a family because the parents nested in our stable and produced four fledglings.

We cared for them by trying not to disturb them and ensuring the stable door was always open.

It was delightful to hear them on a summer evening when they were on my aerial. There was more audio output from the aerial than any RF which went down its coax. To twitter is the most descriptive verb I can think of to describe the sound. We hope they will be back next year.

This experience and David's photograph gave me an idea for a competition. There is no time limit just send your entry to GEO's editor—a brief description and a photograph—when you consider you have an entry.



The categories for entries I have thought of are:-

- The greatest number of birds (fifteen or more to beat David).
- The largest number of species (my modest entry here could be two from two different sites)
- The largest bird (I have a crow for an entry in this category).
- The rarest, most exotic, most colourful or any other category you decide appropriate.

Any aerial will count - HF to microwave.

Entries to the editor please - time-scale open ended. There is no prize as such: just the satisfaction of seeing your photo published in *GEO Quarterly*.

