The GEO Quarterly

Group for Earth Observation

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

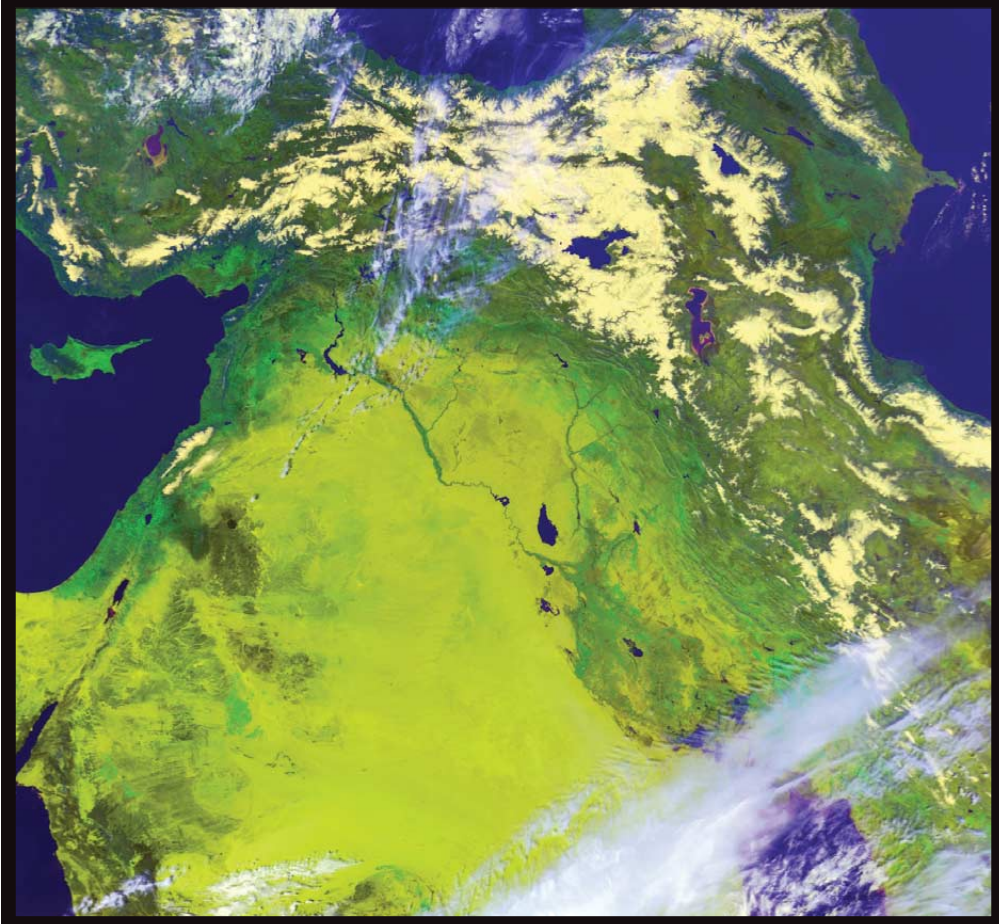
Number 30

June 2011

Inside this issue . . .

Highlighting Vegetation

John Tellick

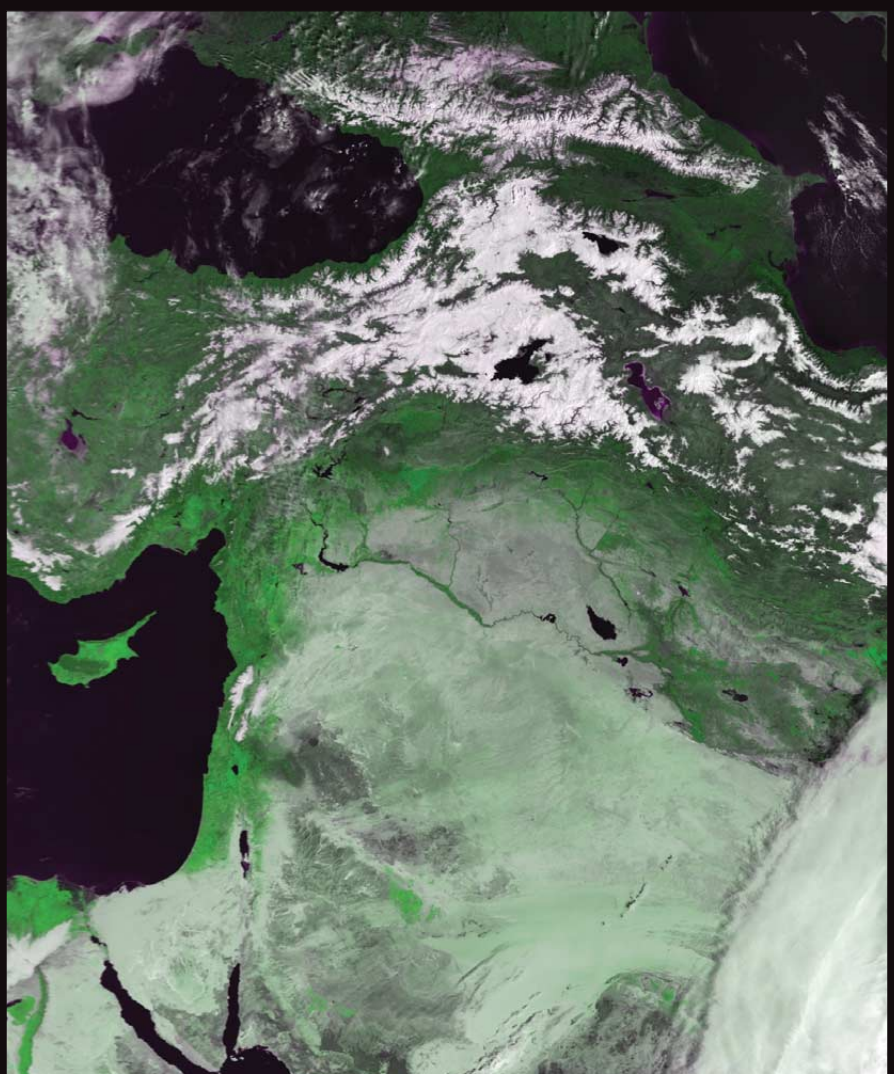


Following on from my Libya desert cultivation article, a couple of vegetation highlighted images, this time of the Middle East.

The two images show different parameters used to show up vegetation on a Metop and NOAA image disseminated on the same day – 16-03-11.

They show vegetation along the eastern Mediterranean coast, through Syria and northern Iraq, crop cultivation along the banks of the Euphrates river [like Nile cultivation] and a wide area of cultivation between the Euphrates and Tigris rivers between Baghdad and Basra in Iraq.

Snow covers the mountains of eastern Turkey, NW Iran, Armenia and Georgia.



GEO MANAGEMENT TEAM

Public Relations
Francis Bell,
Coturnix House, Rake Lane,
Milford, Godalming, Surrey GU8 5AB
England.
Tel: 01483 416 897
email: francis@geo-web.org.uk

General Information
John Tellick
email: info@geo-web.org.uk

GEO Quarterly Editor
Peter Green
'Hollowtree'
Eggesford, Devon EX18 7QX, England.
email: geoeditor@geo-web.org.uk

Assistant GEO Quarterly Editor
Les Hamilton
email: les.hamilton@tiscali.co.uk

Membership and Subscriptions
David Anderson,
35 Sycamore Road,
East Leake, Loughborough LE12 6PP
England, UK.
email: members@geo-web.org.uk
Tel: 01509 820 067
Fax: 01509 559 015

Technical Consultant (hardware)
David Simmons
email: tech@geo-web.org.uk

Webmaster and Website Matters
Ray Godden
e-mail: ray-geo@lescharriols.eu

Education Coordinator
David Painter
email: education@geo-web.org.uk
GEO Shop Manager
Clive Finnis (Assistant: David Simmons)
email: tech@geo-web.org.uk

International Liaison
Rob Denton
email: international@geo-web.org.uk

Nigel Evans
email: nigel@geo-web.org.uk

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The *GEO* Quarterly

June 2011

Editorial: Peter Green

Time seems to have flown very quickly since the launch issue of the GEO Quarterly in 2004, we are now welcoming you to Quarterly number 30. When you look back at the Quarterlies you can see not only how the layout of the magazine has changed but also the leap forward in the images that we are now able to process.

We as a group don't really rely on the data we receive to make mission critical decisions in our everyday lives but with the software that decodes the data our lives are enriched. We enjoy viewing ground features or the cloud formations and then sometimes animating them. Francis Breame has made available to our members his Enviham Viewer, he was inspired to write this program to make viewing the data from this satellite easier and made it available for others to enjoy it free of charge, read about it on page 24. Likewise Rob AlBlas introduces us to his new HRPT Decoder as previewed at the Symposium on page 13.

The GEO Symposium has just successfully finished and you will see on page 20 a collage of photographs (thanks to Clive Finnis,David Taylor and Arne van Belle) to give you a flavour of the event and a taster for the report in Quarterly 31.

It's good to see some new names appearing in the Quarterly, this helps to give the magazine a variety of subjects that we are sure you will find interesting and hopefully inspiring. However we still need more authors to submit articles for your magazine. As you can see it need only be one page, it does not need to be highly technical. Take a look at page 38, John Heath has submitted an article ' Now You See it Now You Don't' which clearly displays the effect of the sun's angle on the appearance of ground features.

With more of us using mobile devices, Storm Dunlop has sent us a review of an app he uses on his iPod Touch, I know that David Painter recently used an app on his phone to help align his dish so that he could receive Envisat, please let me know if you are using any of these products and apps so that we can build a database for other GEO members to access. To make the alignment of his Envisat dish easier Francis Greaves succumbed to a digital satellite meter, read about it on page 26.

We are looking forward to bringing you, our members the next 30 issues but we can't do it without your support, through articles,images but also your membership and spreading of the word for GEO.

Contents

The GEO Report

Francis Bell

Symposium

This report has been written just a few days after our 2011 symposium meeting at the National Space Centre, Leicester. From my perspective and the feedback I have received from those who attended the day's events were successful and enjoyed.

The day was split between presentations relating to earth observation and workshops / demonstrations of direct reception of satellite images. Very entertainingly in the background there were the activities in the NSC's exhibition areas where for the day they were running a theme based on the film(s) Star Wars. Some of our GEO members took photographs which give some flavour to the relaxed nature of this event.

GEO company secretary Nadine Bell (left) and GEO shop manageress Carol Finnis at the NSC being escorted by storm troopers to keep them out of trouble'. Photograph Clive Finnis

In my opening remarks to our meeting I expressed my thanks to those members who had come from abroad to be at our meeting: four from Holland, two from France plus GEO Members from all parts of the UK.

I hope that a fuller report will be in our next Quarterly which will also include a report of the AGM together with financial reports. I will be progressing the themes which seemed to emerge from our meeting relating to cooperating with other groups and organisations who have an overlapping interest with GEO. We have contacts with TORRO (The TORnado and Storm Research Organisation) and RMetS (Royal Meteorological Society. Importantly the meeting recognised the decline in GEO membership numbers and action plans were agreed to address this issue. In the meantime please don't forget to renew your own membership when it falls due. It was also noted that our website was in need of restructuring and again plans are in hand for this important job.

There is an audio recording of all the day's events and I will make these available in due course.

Having experienced a successful weekend in Leicester the next major event within a few weeks time is GEO's visit to Darmstadt.

GEO's visit to Darmstadt 7th and 8th July 2011

A notice relating to GEO's visit to Darmstadt appeared on page 24 of our last Quarterly 29 and also details are published on our website; these notes will bring members up to date with the arrangements for our visit.

The visits to EUMETSAT HQ in Darmstadt, their ground station at Usingen and the tour of the European Space Operations Centre (ESOC) in Darmstadt have all been confirmed and only fine details still have to be arranged. If you wish to register for this visit please do so as soon as possible because there may have to be a cap on numbers if the demand is excessive. Use the website to register but if all else fails email ***international@geo-web.rog.uk*** with your details.. It is essential that a definitive list of delegates is available to our hosts at EUMETSAT and ESOC because they are both high security establishments. It is also essential that you bring with you some form of photo identity to exchange for a security pass when entering these establishments.

Our visit to ESOC may be extended beyond a routine visit because we have a contact who works at ESOC perhaps giving us access to view facilities not on the normal tour route. The fine detail of this arrangement still has to be confirmed.

As indicated on previous notices there is no charge for these visits except something to cover the shared coach hire to Usingen and the tour guides for ESOC. These costs will depend on numbers but is likely to be about 15 or 20 Euros payable when we are together in Darmstadt.

The programme as it stands is:

Thursday 7th July 2011

09.00 Assemble outside the EUMETSAT HQ building.

09.30 Arrival and Registration at EUMETSAT

09.45 Welcome address by Head of Operations

09.50 UNS

10.10 NPP

10.45 Coffee break

11.00 MSG METEOSAT

11.15 METOP / EPS

11.45 EUMETSAT Evolution

12.30 Lunch

13.30 Tour of Data Centre

14.00 Tour of Control Centre

14.30 Future / 3rd. Party (?)

15.15 Coffee Break

15.30 MTG

16.00 Final Questions and Group Photo

Friday 8th July 2011

09.00 Assemble outside EUMETSAT HQ building for the coach to Usingen

10.00 to 12.00 noon Tour of Usingen ground station

13.00 Back in Darmstadt

13.30 Tour of ESOC. Our group will be split into two parallel groups for this tour.

3.00 pm End of visits and dispersal.

There are many hotels in Darmstadt but delegates may wish to stay at the low cost ETAP Hotel Kasinostrasse 4 - 6 64293 Darmstadt Telephone ++ 49 6151 393720

www.geo-web.org.uk

www.rmets.org

www.torro.org.uk

Quarterly Question 29

My thanks to those who took an interest in Quarterly Question 29 and submitted a correct answer. They were:-

Elmar Bogels Brunssum, Ruud Jansen The Netherlands

Mike Bragg Timaru New Zealand

Ken Barker UK

Frank Skillington UK

The question related to the name of the river shown on an Envisat high resolution single channel image I had received at home on my Envi-Ham system. The name of the river is Ogooue and it flows through the country of Gabon in west Africa. The mouth of the river as it discharge into the Atlantic is very close to the equator. As an aside I did ask how many words you knew which contained five vowels and one consonant. I did receive several replies but they are now buried in my archives.

Douglas Deans, Cecilia Taylor, Les Hamilton
One of the occasional lunch-time meetings of GEO members "North of the border". This one held on 2011 April 12, celebrating 50 years of manned space flight (the date by pure chance) Photo by David Taylor

EUMETSAT

Earth Observation Portal

John Tellick

EUMETSAT changed the process for registration and applying for data services in January 2011 by creating a 'one stop shop' the EO Portal.

This can be accessed by clicking the data access tab on EUMETSAT's website home page and then clicking the EO Portal registration link from the list of services displayed.

Every new application for access to EUMETSAT's data will first have to open a personal account.

Having done this you can then apply for data services, make changes and add additional services later.

Those of us who registered for EUMETCast many years ago have automatically been given a user account and sent an email requesting activation of this account.

I was unsure about my account status so Debbie of User Services kindly forwarded me this information which I hope you will find useful.

Well – when you registered (all those years ago), you did not have an 'account' with EUMETSAT.

When we created your EKU, this is what we call an EKU account – We assign you with a username and password and we wrote your EKU to the account and activated the data on the account.

When we created the EO Portal, we created an EO Portal account for all existing EKU holders and sent them information on how to activate the account.

Quite a few still have not activated their EO Portal account, they need to do this because this is how they should request extra data, extra EKU and license renewals. If any user cannot find the email or cannot remember their username and password for the EO Portal, they should contact us for help.

In January we integrated the Data Centre into the EO Portal, there were some users who already had an EKU so the Data Centre service was added to their subscription. Most users did not already have an account so we did the same again, we created accounts for them and sent them information on how to activate the account – along with tutorials and such.

The next phase is to add the UNS to the EO Portal – so making the portal a one stop shop for all of our services.

The product Navigator can also be accessed via the tool.

One of the things I like is that if you find the product that you want in the Product Navigator, then go to distribution and hit the blue EUMETSAT Data Centre link it takes you to the data centre with the product preselected – you can either go to the tool as guest or log in and there you are.

The aim of the EO Portal is that the user is in charge of what they receive, how they receive it, their user details and their UNS subscriptions. It does not take us out of the loop as we have to follow the change requests in our systems.

The biggest advantage of the EO Portal is that it is dynamic, when you registered, all you could tick was HRIT, IODC and probably FSD, this form was set in stone so to speak so when new products came online the users didn't know they could have access to them too. Whereas now, when a new product comes along it isw in the EO Portal the day of release.

Give it a go - Login in to your EO Portal, go to Service Subscriptions, EUMETCast, View/Edit and then in the data section hit modify, you will then see tick boxes, the ones already ticked are activated on your EKU the others are free for you to request.

If you would like to order some archived data, all you do is hit the data centre tab in the blue bar and the tool opens with you already logged in.

The main point really is that all existing users already have an EO Portal account, if they cannot access it, they should contact us for help, rather than create a second account.

The EO Portal page has useful wtutorials regarding how to create a new user account, updating your account/forgotten passwords etc and applying for various data services here:

http://www.eumetsat.int/Home/Main/DataAccess/EOPortal/SP_2010031894425 39?l=enen

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The Challenge: At what altitude are the aircraft flying? From Q29

An answer?

Hello David,

I did three separate calculations for A, B and C and the altitudes came out at 28892, 26625 and 26782 respectively. It would be interesting to know where the aircraft took off from.

Regards Frank Skillington

Frank,

I've now had chance to look at over 200MB of data for the day in question, and I find it impossible to resolve which these aircraft are, and therefore what height they were flying at, at the time of interest, and what their departure airport was. I am very frustrated by this! However, I see aircraft today flying on a not dissimilar route, at flight levels of FL32, FL34 and FL36 (32,000 34,000 and 36,000 feet), so your values are at least reasonable.

Note that the true altitude will not be exactly 32,000 feet (etc.), as that's a nominal height referred to an atmospheric pressure of 1013.25 hPa. As the actual atmospheric pressure varies, so the true height varies, for a constant Flight Level. As it varies for all aircraft in the same way, the intended vertical separation is maintained!

Cheers, David Taylor

More Accurate Time for your PC

David Taylor

Whether it be for the accurate tracking of weather satellites, accurate triangulation, or comparing the timing of events on your PC versus other PCs in your LAN or across the world, accurate timekeeping on your computer can be important for its correct operation.

I have previously described in *GEO Quarterly* how you can use the freely available *NTP* software and multiple Internet time sources to make your PC accurate to within better than one second [1]. Now, how you can make it *really* accurate at very little extra cost?

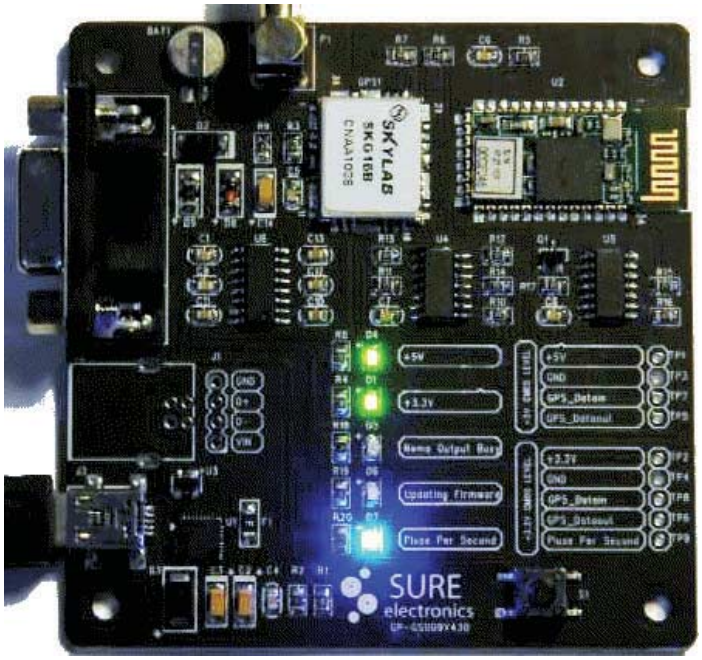


Figure 1 - The Sure GPS Evaluation Board

High Accuracy at Low Cost

What if you need (or want) greater accuracy—say better than 10 milliseconds, or even down to the millisecond level or better? To do this, you will need a local time reference, and today the best and most easily obtainable reference is the GPS constellation—flying atomic clocks which are easily readable to the microsecond level from the ground.

In the past, extracting accurate time from GPS might have required a large, heavy and expensive box of electronics. But today, devices such as the *Garmin GPS 18x LVC* are available relatively cheaply (US $100, £70) although they still require you to build a small interface to connect with your PC.

What about a £25 (US $35) package from China, which performs very well, and which includes not only the precise GPS time receiver but also the magnetic puck antenna, USB and RS-232 interfaces, and even the USB lead? Such is the *Sure GPS* evaluation board [2] , illustrated in figure 1.

Below you can learn how to connect it to your PC, and how to configure *NTP* to use this board and turn your PC into a very mean time machine, for use by itself or as the reference clock for your network.

For more details about setting up, configuring, and testing NTP on Windows PCs, please see my Web page at

http://www.satsignal.eu/ntp/setup.html

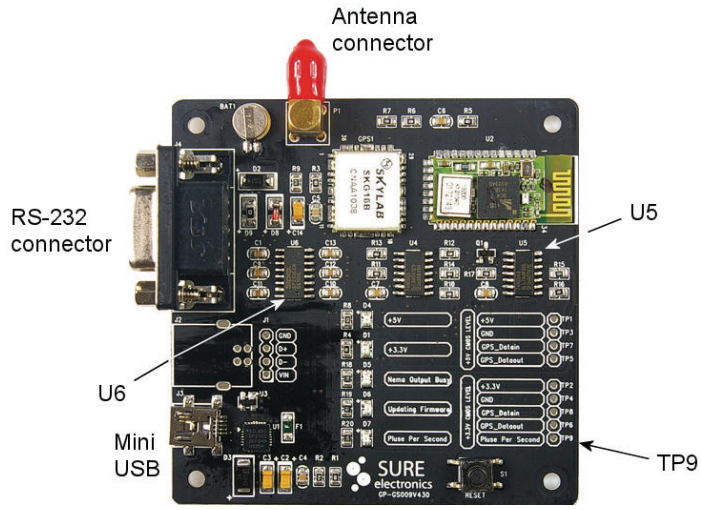


Figure 2 - The Sure GPS Evaluation Board showing Test Points

Patching the Board

In order to meet the PPS (pulse per second) over RS-232 requirement, additional connections (patches) must be added to the board. The purpose of these patches is to provide an RS-232 level PPS signal on pin 1 (DCD line) of the connector.

Whilst the PPS signal on test point TP9 could be used (figure 2), it is at CMOS level and not RS-232 level, and may not be recognised correctly by the RS-232 receiver chip in your PC. You *can* try it if you like, of course. I have provided a *Serial Port LEDs* program [3] to show the status of the RS-232 control lines. Fortunately, there is an unused CMOS-to-RS-232 level converter gate available in U6, with its input on pin 11 and its output on pin 14. However, as this is an inverting gate, and we want a positive going PPS signal, it should be driven with a negative going PPS signal. That available at TP9 is positive going however, and it is also used to drive the ridiculously bright blue LED through a CMOS inverter gate in U5; so by taking the output from that inverter on pin 8 of U5 we have the required negative-going PPS signal to drive U6.

The patches on the upper surface of the board are shown (in red) on figure 3. All that's needed on the lower surface is the addition of a lead from pin 14 of U6, through the board, to pin 1 of the RS-232 connector.

Using the Sure Evaluation Board

My initial tests were with a *Windows 2000* system running *ntpd 4.2.7p97-o*, where the board worked perfectly once the *NTP* serial rate had been changed from the *NTP* default of 4800 baud to the board default of 9600 baud. To ensure that *NTP* did not select the wrong second (by interpreting one of the trailing NMEA sentences as near the second marker), it was also necessary to set bit 1 (decimal 2) of the 'mode' parameter. The settings I used are shown in figure 4.

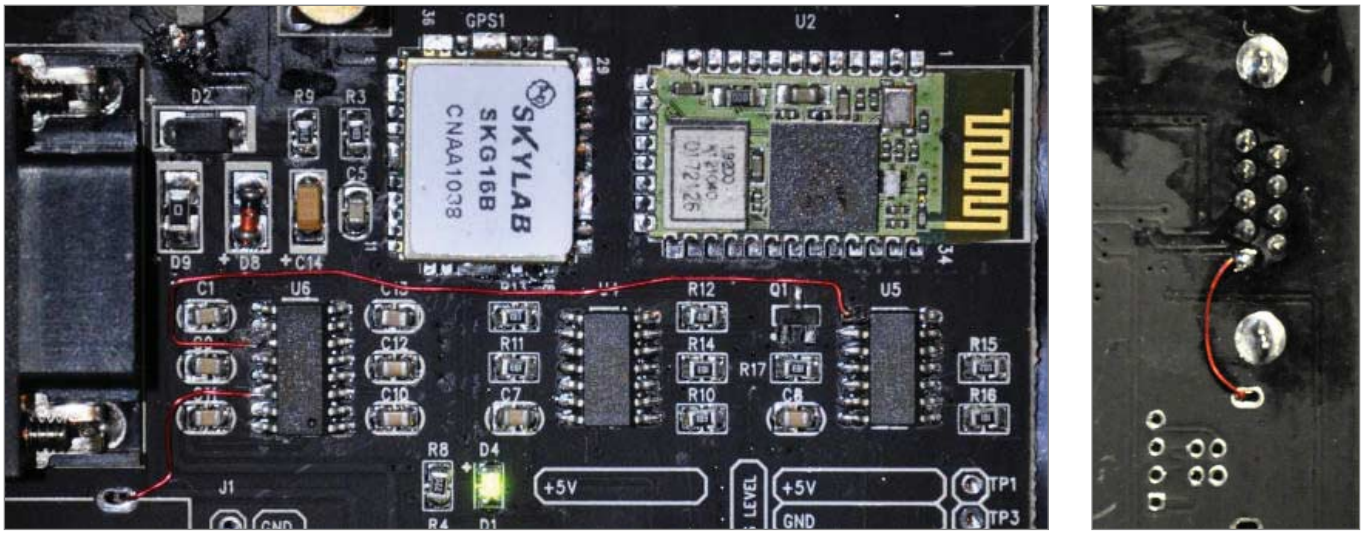


Figure 3 - The red patch wires, added by the author, to provide an RS-232 level PPS output: top of the board (left) and bottom of the board (right).

```
# ref-clock drivers
server 127.127.22.1 minpoll 4                  # PPS - serialpps.sys - on COM1:
server 127.127.20.1 minpoll 4 mode 18 prefer   # NMEA serial port, 16 = 9600 baud, 2 = $GPGGA
```

Figure 4 - NTP Settings

Previous testing with the same *NTP* version had demonstrated the importance of selecting the *$GPGGA* sentence where, on a *Dell* PC running *Windows XP*, it seemed as if the NMEA was sometimes picking up on the wrong second—or at least showing a substantial offset.

In an early test, using a higher baud rate and *$GPGGA* selection, the *NTP* jitter seen on the *Windows-7* PC was the same whether the *Garmin GPS 18* puck or the *Sure-GPS* board were used. The same was true on the *Windows 2000* PC, even with the default 9600 baud rate and default *NTP* configuration. No tests have been made to compare the PPS signal on a more precise level but, on the basis of present tests, I believe it to be within 10-20 microseconds, and likely within a microsecond or better. I'd love to hear of any more exact measurements.

I'm currently testing two of these *Sure Electronics* boards, with the magnetic antenna puck indoors (on the top floor of a two storey building), and both a *Windows XP* and a *Windows-7 64-bit* system. The *Windows-7 64-bit* system shows an averaged jitter of about 40 microseconds, and the *Windows XP* system 2.5 to 3.5 microseconds. Both are using Dave Hart's kernel-mode serial driver replacement [4], and have the NTP interpolation enabled (it has to be forced 'on' with the *Windows-7* system). I've written up the *Windows-7* system [5], which is of particular interest, as normally you are not allowed to use unsigned drivers on such a system.

The *Windows XP* system has a similar *NTP* configuration. Figures 5 and 6 show data from these two PCs, where the offset reported by *NTP* is plotted against the time of day. The difference between the *XP* system with its smoother, slower-changing trace but greater offset, and the *Windows-7* system with its smaller but more rapidly changing offset, is typical. This may simply be due to the difference between the software clock rates. I would expect a system using *FreeBSD* to perform even better, and I have had a report of success on this platform, also using 9600 baud.

Testing the Board

Before making any changes to the board, you may want to test its function. You will need to download some software from this web page

http://www.sure-electronics.net/download/index.php?name=GP-GS010&type=0

The Items to get are:

- MStar MiniCDU.zip - a tester utility for Windows
  http://www.sure-electronics.net/download/down.php?name=MStar%20MiniCDU.zip
- GPS.zip, which allows baud rate setting
  http://www.sure-electronics.net/download/down.php?name=GPS.zip

Start by setting up the board with USB power (no need for a data connection) and the antenna, then leave it for several minutes until the blue LED starts flashing. The LED sequence is blue (short flash), yellow (longer flash) then the green LEDs only (for about the same duration as the yellow). This might take as long as 15 minutes on the first run, when the whole satellite almanac may need to be downloaded.

Now find a free serial port on your PC (mine was a USB to serial adapter on COM4), and connect the device to that port with a standard 9-pin, male to female serial cable.

Checking that the Board is Working

Unzip *MStar MiniCDU.zip*, to a convenient location (such as C:\Tools\Sure\) then double-click on *MiniCDU_V1.0.5a.exe* to run the utility. From the menu bar, select **<Mode, Setup COM port menu>** to match your PC's COM port and ensure that the baud rate is set to 9600, as that is what the unit uses out-of-the-box (figure 7).

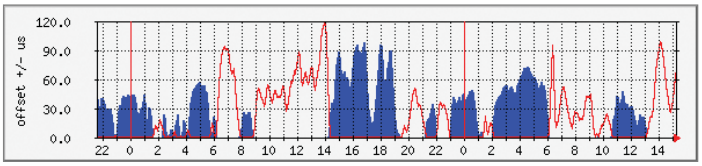


Figure 5 - Intel Pentium 4: 1.9 GHz, 1 GB, Windows XP SP3
offset µs (-) offset µs (+)

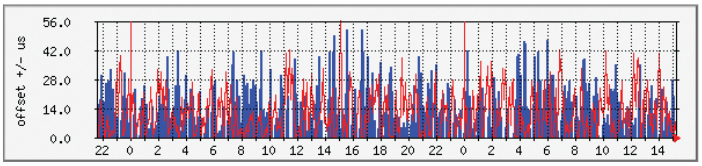


Figure 6 - Intel i5-760: 8 GB, Windows-7 64-bit
offset µs (-) offset µs (+)

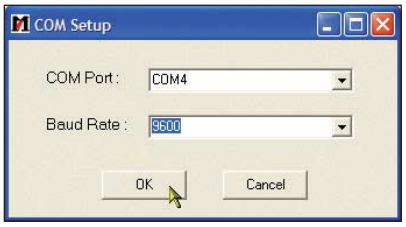


Figure 7 - Matching the PC COM Port

Click on 'OK' to save the COM port settings. You should now be able to click on the connect icon, the first in the toolbar at the top (figure 8).

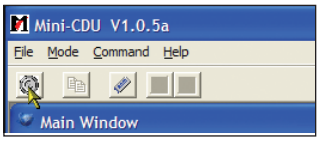


Figure 8 - The *Connect* Icon

The terminal window should now start to fill with groups of NMEA sentences in one-second batches, starting with *$GPGGA* and finishing with *$GPRMC*. You should get location details and satellite signal levels recorded as well (figure 9).

Setting the Board Baud Rate (not needed for NTP)

While not required for *NTP* use, where the default 9600 baud works correctly provided you tell *NTP* to use the first sentence (*$GPGGA*), here is how you could set the baud rate for some other application.

Extract the contents of the zip file *GPS.zip*, perhaps into the same directory you used before. You will find several files present, including *GPS.exe* and *help.html*, as well as three sub-directories. Double-click on *help.html* if you want to read how to change the baud rate.

Double-click *GPS.exe* to run the utility and obtain the dialogue screen illustrated in figure 10. Here you can set the initial port and baud rate. On my PC the port is COM4, and the initial baud rate is the default of 9600, so I have two settings to alter. Once the settings are changed, press the 'Open' button, and you should see the program searching through the various baud rates and COM ports. My PC settled on 9600 bps after just a couple of seconds.

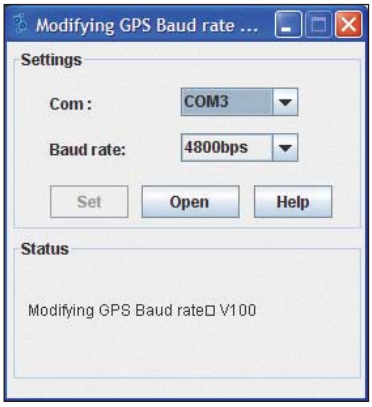


Figure 10 - The GPS.exe Dialog Screen

Should you have problems whereby this software fails to recognise your GPS, it may be that you need to update your *Java* to a more recent version. Now you should be able to set the baud rate to a new value. As an example, set the baud rate to 115,200 and press the 'Set' button

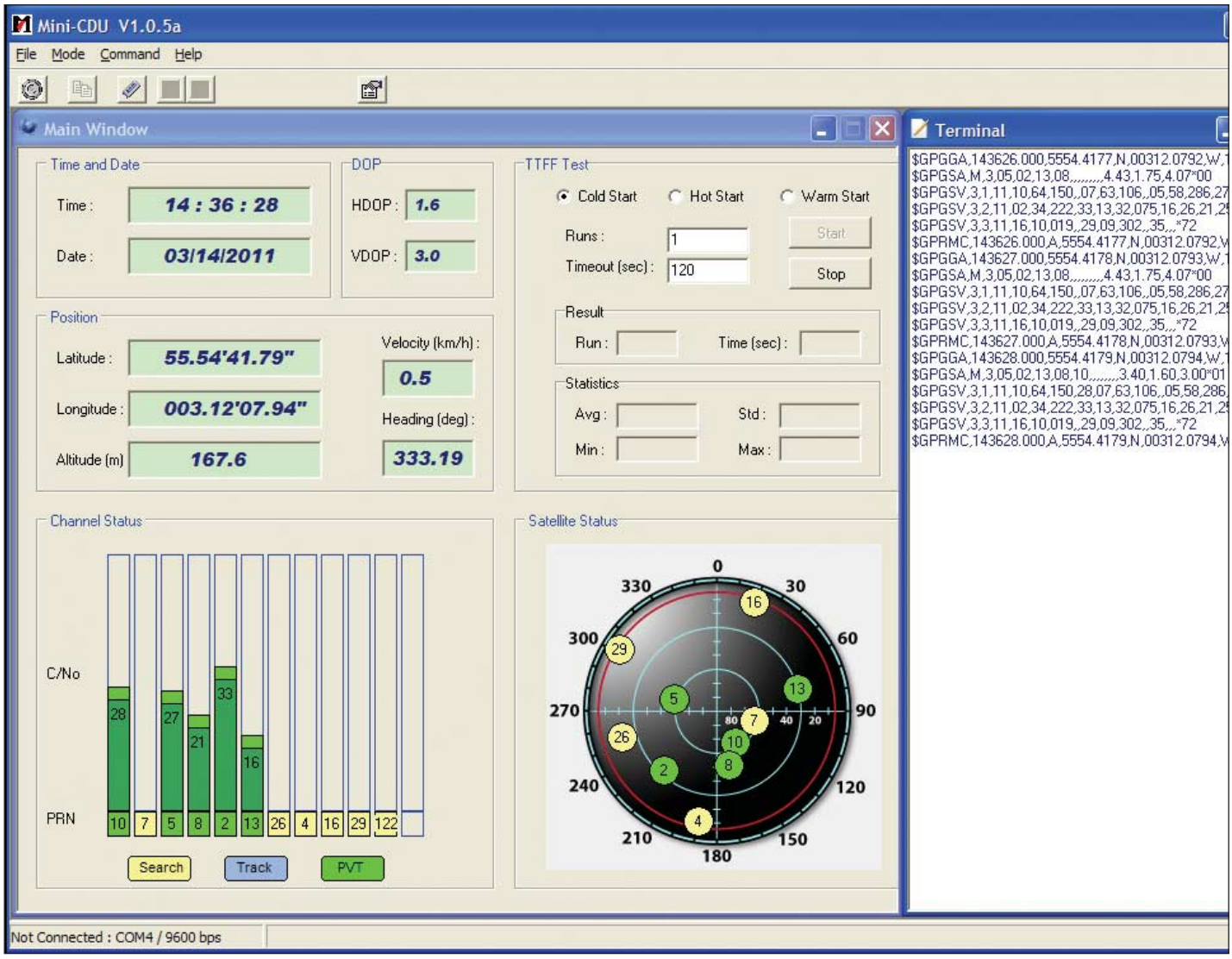


Figure 9 - The active terminal Window

and, in the confirmation dialogue that follows, click 'OK'. You should now see a 'success' message confirming the change (figure 11). You can check that the baud rate has indeed changed by re-running the *MiniCDU_V1.0.5a.exe* program and setting the 115,200 baud rate there before pressing the 'Connect' button.

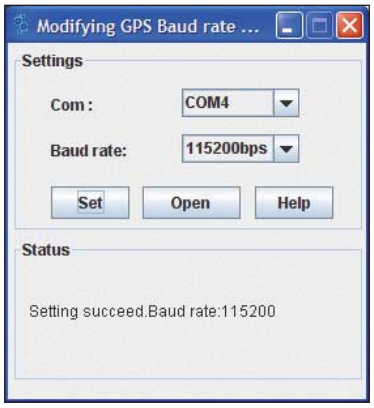


Figure 11 - Successful Baud Rate Change

Configuring your Network for NTP

For readers less familiar with *NTP*, here is a very brief guide to setting up the various *Windows* PCs. I assume that you have already installed *NTP* for *Windows* and have a working configuration.

In what follows, I assume that at least the stratum-1 PC has a fixed IP address of 192.168.0.3. If need be, you will need to alter this to suit your own network. Alternatively, you can use the PCs name if it's a *Windows* PC or you know how to edit your *HOSTS* file. It is also assumed that *NTP* is installed in the *C:\Tools\NTP* folder: which you may also have to change to suit your own installation. The basic minimum configuration is shown.

If you don't have a COM port on the back of your PC, don't worry as many modern PCs do have COM port support built into the motherboard, although the 9- or 10-pin header is not wired to a 9-pin male connector on the back panel.You may be able to cannibalise an old PC for a suitable back-plate and header, or get one from Amazon—search on '9-pin serial header'. Choose the right size for your PC's backplane: for example, StarTech.com 9-Pin Serial to 10-Pin Motherboard Header Slot Plate (figure 12).

Figure 12

Configuration for the Reference PC

This PC requires to be connected to the *Sure GPS* unit. Ideally, a real serial port is preferred, and COM1 is assumed in the configuration file (figure 13).

If all you have is a serial port over USB (i.e. a USB to serial cable adaptor) that's better than nothing—provided the port emulation includes the DCD line (pin-1 of the 9-pin RS-232 connector).

As the serial-over-USB built into the *Sure* board may not include emulation of the DCD line with the pulse-per-second signal, it is unlikely to be anything like as accurate, and I do not recommend that you to use it.

You will want to play with using the kernel-mode *serialpps.sys* driver for better performance on this reference PC, as well as trying NTPD_USE_INTERP_DANGEROUS=1 on *Windows Vista* or *Windows-7* systems, but you will not need to alter the configuration file to test these options [6].

```
# Use drift file
driftfile "C:\Tools\NTP\etc\ntp.drift"

# ref-clock drivers - Sure Electronics GPS board
server 127.127.22.1 minpoll 4 # PPS - serialpps.sys
server 127.127.20.1 minpoll 4 mode 18 prefer # NMEA serial port, 16 = 9600 baud, 2 = $GPGGA

# Use pool NTP servers as a backup
server 0.uk.pool.ntp.org minpoll 10
server 1.uk.pool.ntp.org minpoll 10
server 0.nl.pool.ntp.org minpoll 10
server 1.nl.pool.ntp.org minpoll 10
```

Figure 13 - Configuration File for the Reference PC

Configuration for the Connected PCs

The aim here is to make the LAN- or wireless-connected PC talk to the stratum-1 server more frequently than normal, so that it has a better timekeeping performance. This is achieved with the 'maxpoll 5' option, which forces polls to be at 32-second intervals maximum ($32 = 2^5$). To make sure that the Internet backup servers are contacted no more frequently than is absolutely necessary, they are set to a 1024 second interval ($1024 = 2^{10}$).

The configuration file appear in figure 14.

```
# Use drift file
driftfile "C:\Tools\NTP\etc\ntp.drift"

# Use local stratum-1 NTP server - you will need to alter this address
server 192.168.0.3 iburst maxpoll 5 prefer

# Use pool NTP servers as a backup
server 0.uk.pool.ntp.org minpoll 10
server 1.uk.pool.ntp.org minpoll 10
server 0.nl.pool.ntp.org minpoll 10
server 1.nl.pool.ntp.org minpoll 10
```

Figure 14 - Configuration File for the Connected PCs

Have fun with the *Sure GPS* evaluation board, and do report back to us on how you get on. You can email me at

david-taylor@blueyonder.co.uk

References

1 Setting the correct time on your computer - GEOQ 1, page 25
2 Sure Electronics
http://www.sureelectronics.net/goods.php?id=99
3 Serial Port LEDs Program
http://www.satsignal.eu/software/net.htm#SerialPortLEDs
4 Dave Hart Serial Driver
http://www.davehart.net/ntp/refclock/serialpps-20091228.zip
5 NTP on 64-bit Windows-7 with GPS/PPS
http://www.satsignal.eu/ntp/NTP-on-Windows-Vista.html
6 Windows Serial Port GPS/PPS reference clock for NTP
http://www.satsignal.eu/ntp/NTP-on-Windows-serial-port.html

ULURU

Silent Sentinel of Australia's Red Centre

Les Hamilton

Figure 1 - A 1-meter IKONOS satellite image from January 17, 2004 depicts Australia's famed Uluru, a massive sandstone rock formation located in the outback.
Satellite image courtesy of GeoEye (www.geoeye.com)

If there is one single feature that epitomises Australia more than any other, it must surely be the Uluru rock formation of the island continent's *Red Centre*. Located in the Simpson Desert, 450 kilometres southwest of Alice Springs, Uluru is portrayed here, at 1-metre resolution, by the sensors aboard *GeoEye's* IKONOS satellite.

Uluru is composed of red arkose sandstone and rises to 849 metres above sea level, though only 348 metres above the surrounding terrain. Possibly the largest single rock on the planet, Uluru measures 3.6 by 2 km and 9.4 km in circumference and extends several kilometres beneath the Earth's surface (though its exact extent has not been established).

Uluru is a major tourist attraction and travellers come from all around the globe to visit it. Apart from its imposing bulk as it rises steeply from the plains, the most captivating aspect of Uluru is its beautiful range of colours, which change throughout the day. Sunrise and sunset are particularly remarkable, when the rock glows deep rusty red. Photographs of Uluru almost invariably show the rock to be red, although the arkose sandstone of which it is composed is actually grey in colour. The sandstone is, however, rich in iron-containing minerals, and it is oxidation of these, resulting in the formation of iron oxides (basically rust) which is responsible for the red colour. The glowing effect at sunrise and sunset and the shimmering changes of hue shown by Uluru arise from reflective minerals such as quartz and mica within the sandstone which reflect and refract the sun's rays. The reddish soils surrounding Uluru and their location in the heart of the Outback have given rise to the region's nickname: Australia's 'Red Centre'.

Climbing Uluru

The local Anagu Aboriginals do not climb Uluru because they consider it sacred and they have positioned a sign at the base of the rock requesting that visitors do not climb it either. But many of the tourists who arrive at Uluru do so with the specific intention of making an ascent to its summit. Since the rock stands in one of Australia's national parks, there is nothing in law to prevent visitors climbing it.

Indeed, it was made a condition that the Uluru climb should remain open for tourists when the Anagu owners received the title to the lands in 1985. So, although climbing is not encouraged locally, the tourist industry actually promotes the climb. The first tourists are likely to learn of the 'no climb' request comes if they read the details on their entry ticket to the Uluru-Kata Tjuta National Park. And understandably, after travelling perhaps thousands of kilometres to reach Uluru, they are unlikely to forgo the ascent, given that it is not actually illegal to do so.

The climb is not without risk, even though there is a marked route to the summit, with, on the steeper sections, chain hand holds. These are illustrated in figures 5 and 6 opposite, kindly sent to us by GEO reader Ken Morgan. In hot desert weather, the climb normally takes over an hour to complete, and prospective climbers must be fit, carry plenty drinking water and be sensibly attired against the sun's rays. Over the years, there have been over 30 fatalities on Uluru, mostly due to heart attacks, and emergency radio alarms are installed at numerous locations around the rock.

Creation of Uluru

Uluru stands within the *Uluru-Kata Tjuta National Park*, in Australia's Northern Territory. Kata Tjuta, meaning 'many heads', refers to another impressive rock formation 25 km west of Uluru, commonly known as *The Olgas*. Another sandstone rock formation comprising 36 magnificently domed and coloured shapes, Kata Tjuta covers about 35 km^2. But just how were these amazing rocks formed?

900 million years ago, the region that is now *Uluru-Kata Tjuta National Park* was a shallow sea known as the Amadeus Basin. For over 300 million years, rivers transported huge quantities of sand and gravel from major mountain ranges nearby into this basin. Among the deposits were two particularly large alluvial fans, several kilometres deep: one, composed primarily of sand eventually became Uluru, the other a conglomerate of sand, gravel, pebbles and boulders became Kata Tjuta. Over the aeons, both fans became buried under further sediments and were subjected to pressure, folding and uplift, so much so that the strata in Uluru are now almost vertical. The rock masses of Uluru and Kata Tjuta are much more resistant than those surrounding them and erosion over millions of years has left them standing proud above the neighbouring plains.

Uluru Today

Uluru is located in a semi-arid desert region which you would anticipate to imply that it experiences a hot, dry climate. And so it does—most of the time! Uluru is generally photographed basking under a cloudless blue sky (figure 3), which is probably why many who have never been there mistakenly believe that it never receives any rain at all. But the long-term mean annual rainfall at Uluru is 27.8 cm. It is this rain, as it flows from the rock, that encourages the growth of the dark algae that highlight the rock channels in its sides and maintains the verdant pools around its base (figure 9), with lush, green foliage and a multitude of wildlife. Nevertheless, the majority of its visitors never see Uluru in the rain. Also, temperatures can fluctuate wildly: from 5°C in July to 37°C in January. So hot is it during the summer that climbs on Uluru must be completed by mid-morning.

Figure 2 - Kata Tjuta, photographed by Christian Mehlführer
Image licensed under Wikipedia Creative Commons

Figure 3 - A typical sunset view of Uluru
Photo: Ken Morgan

Figure 4 - Hordes of visitors setting off on the trek to the summit of Uluru
Photo: Ken Morgan

Figure 5 - The waymarked path up Uluru
Photo: Ken Morgan

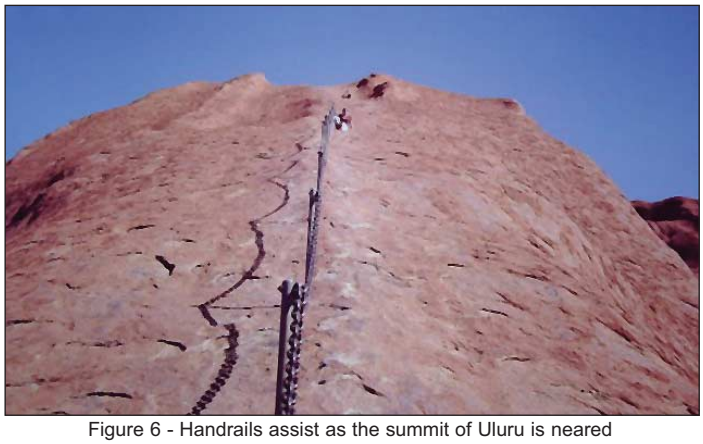


Figure 6 - Handrails assist as the summit of Uluru is neared
Photo: Ken Morgan

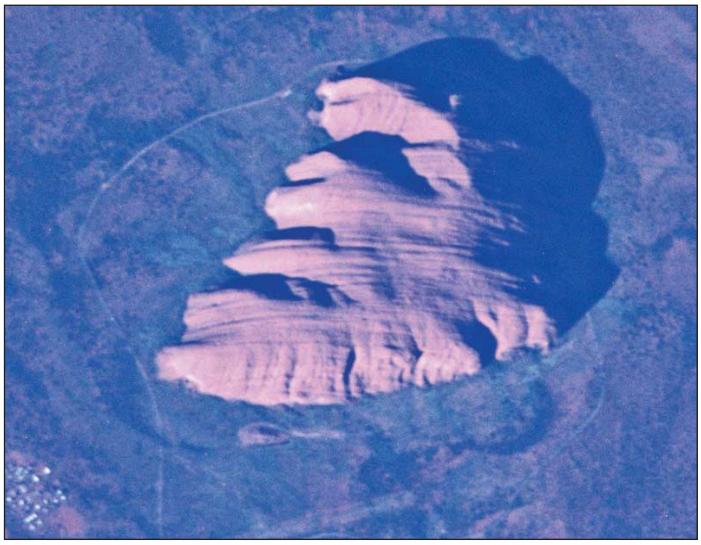


Figure 7 - Uluru from the ISS on March 8, 2011
Image: NASA/Douglas Wheelock

Figure 8 - Kata Tjuta from the ISS on April 30, 2010
NASA Astronaut photograph ISS023-E-29806

Despite its harsh climate, *Uluru-Kata Tjuta National Park* is home to numerous species of animals: 21 native mammals, 178 birds and 73 reptiles plus thousands of invertebrates, including ants, spiders and bugs. The park is also home to at least seven species of bat which spend the hot daytime hours roosting in the many caves and crevices of Uluru and Kata Tjuta.

Uluru contains countless interesting cracks, canyons, caves and natural formations, all of which the Anangu attribute to the activities of their ancestors at the Creation. Some of the shallow caves at the base of the rock contain carvings and paintings, some ancient and others contemporary.

Often, old cave drawings are painted over with new ones, so that the rock art, which includes figures like boomerangs, human beings, water holes and abstract symbols, is impossible to date with any certainty.

Views from the ISS

Uluru and Katya Tjuta have both been imaged from the International Space Station. Figures 7 and 8 highlight the deep clefts in both massifs as they are imaged from above with the sun low in the sky.

Mythology of Uluru

Archaeological finds indicate that there has been human settlement around Uluru for over ten thousand years. The Anagu believe that, in the *Dreamtime*, their ancestors created the entire landscape as well as all living things found there. Uluru itself is considered as a particular manifestation of this activity and is therefore held to be highly sacred by the Aboriginal tribes in the area: to this day they continue use it for rituals and leave paintings in its caves.

Magic at Uluru

The low annual rainfall around Uluru, coupled with generally high temperatures, means that such precipitation as occurs rapidly dries up. Just occasionally, however, Uluru receives torrential rainfall, such as the overnight storm that hit it on October 14, 2010. Given that only 15 centimetres of rain fell on the rock during the whole of 2009, nearly half a year's total—almost 7.5 cm—fell during that single overnight storm.

Landscape photographer Peter Carroll was in the right place at the right time when the rain came bucketing down, and took a series of photographs in which Uluru is barely recognisable. Peter was at Yulara, the township near Uluru, when he was wakened at 3 am by the sound of torrential rain. Peter had visited Uluru many times previously but never in conditions such as these, and it had been a 20-year dream of his to eventually see the rock with water pouring down its flanks.

Before the sun had even risen, while it was still dark, Peter drove the 15 kilometres to Uluru, with the rain still descending in torrents. When he arrived at the Mutitjulu water hole carpark, the road was a flowing torrent 30 cm deep, and he stood in shin deep water for ten minutes in awe of the magic he was witnessing. Cataracts of white water, roaring and tumbling down the sides of the rock, were starting to reveal themselves as the dawn broke. It was pretty spectacular. The result of Peter's work is an amazing collection of images (figures 10-15) that show Uluru in a whole new light. Barely recognisable, with silver lines snaking down the surface and eerie fog hovering above, the images will no doubt find a large audience. Several have already appeared on the front page of *The Australian*.

Figure 9
One of the many pools to be found around the base of Uluru
Photo: Ken Morgan

If you think rain over Uluru is unusual, what about snow? Even deep in the outback, temperatures can, very rarely, fall low enough for snow to decorate the summit of Uluru. The last time this occurred was in July 1997.

Acknowledgement

Thanks to Peter Carroll for granting permission to reproduce his photographs of Uluru in the rain. You can view more of Peter's photographic work on his website.

Peter Carroll Photography
PO Box 7915
Alice Springs, NT 0871
Australia
www.petercarroll.photoshelter.com

Further Reading

1 Fauna of Uluru
http://www.ayersrockresort.com.au/fauna/
2 Uluru-Kata Tjuta National Park
http://www.environment.gov.au/parks/uluru/
3 Peter Carroll's Blog
http://petercarroll.visualsociety.com/?p=936
4 Climate of Uluru
http://www.ayersrockresort.com.au/climate/

Figure 10 - Waterfalls cascade down the face of Uluru following torrential overnight rain on October 14, 2010
Image: Peter Carroll

Figure 11
Magic at Uluru as a river of rainfall cascades into Mutijulu Waterhole
Image: Peter Carroll

Figure 12
Streams cascade down the slopes of Uluru
Image: Peter Carroll

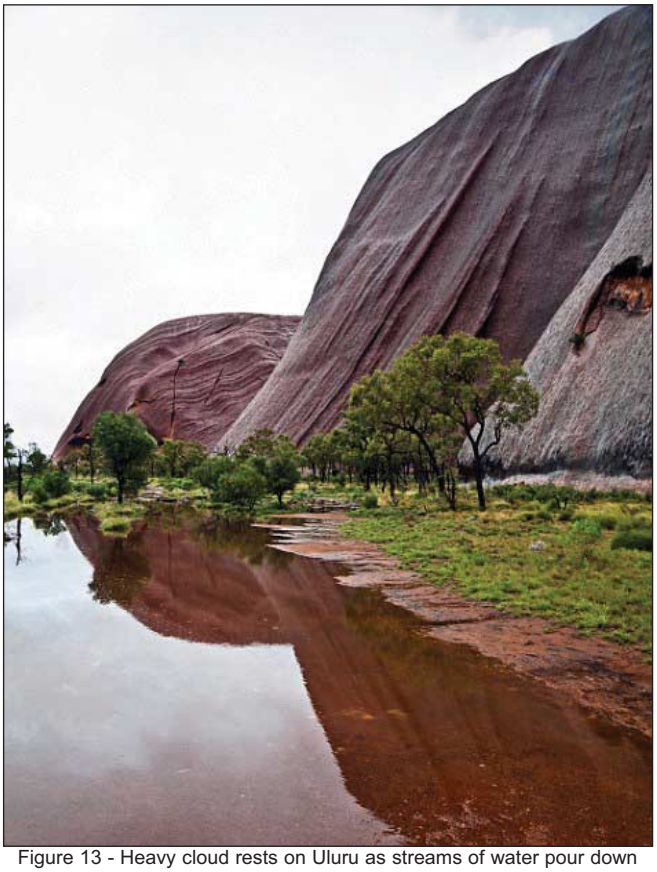


Figure 13 - Heavy cloud rests on Uluru as streams of water pour down the flanks of the red rock into a pool at its base.
Image: Peter Carroll

Figure 14 - A view of Uluru in the rain, from one of its many caves.
Image: Peter Carroll

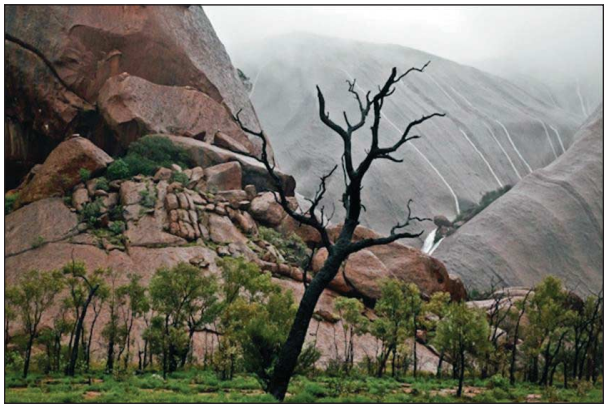


Figure 15 - Another magical picture of cloud-shrouded Uluru in the rain.
Image: Peter Carroll

New HRPT Decoder

Rob Alblas

About 15 years ago, back in 1995, I designed a decoder for HRPT (High Resolution Picture Transmission), the digital datastream as transmitted by the NOAA's. The decoder was built using FPGAs (Field Programmable Gate Arrays) instead of conventional TTL-like components. The functionality of a FPGA is determined by a bit-file, loaded at power-up. This makes the design very flexible: the functionality can easily be altered by just changing the bit-file. Decoders for CHRPT (transmitted by the Chinese Fenyung) and HRI (or PDUS, for the old Meteosat first generation satellites) were built with the same hardware, as well as generators for each type. The six bitfiles are stored into different segments of an EPROM. By selecting the correct segment before power-up the bitfile for the desired decoder or generator is loaded into the FPGA.

Note that an FPGA is not something like a processor. It doesn't execute commands; it is more like a big box of logic gates and flip-flops, connected to each other in a programmable way. It is comparable with PLAs (Programmable Logical Array's), but it can handle much more complex designs.

Shortly after finishing these decoders/ generators I lost access to the software-environment needed to convert a digital design into a bitfile. So changes weren't possible.

Some years ago Werkgroep Kunstmanen decided to design a new APT/HRPT receiver. A new decoder, using state of the art components, was also something we wanted.

In the meantime Russia launched a new polar satellite, which transmits HRPT-like data: the Meteor-M. A lot of parameters are the same as for NOAA: same transmission band (around 1700MHz), same bit-speed, same bandwidth. So no changes are needed for receiver, rotors and dish.

The digital information differs just a bit compared to NOAA's HRPT: 6 channels instead of 5, but resolution a bit lower (1540 pixels per line instead of 2048). As such it looks like Seastar: this satellite did transmit 8 channels with 1280 pixels per line. The important parameters in these formats, to make it decodeable, were the same for HRPT and Seastar: amount of bits per line and synchronisation pattern were identical. The rest can be handled by software.

When the SeaStar satellite first launched (1997) data was not encrypted and the old decoder was indeed capable of handling the data.

Alas, the digital format from Meteor differs with respect to framelength and synchronisation pattern, making the old HRPT-decoder unusable. Another reason for a new decoder! More digital formats are coming or are already present (LRPT, LRIT). These differ a lot compared to HRPT. In the future when the last NOAA (and with it APT) dies, we will have to switch to formats like this anyway, should we wish to continue direct reception of weather satellites.

Searching for new hardware

The requirements we had in mind for a FPGA, to realize a new decoder were:

- *Unlimited access to free design-environment, to generate the loads for the FPGA*
- *Easy to handle components*
- *Easy to get, not too expensive Available for a long time*

These requirements appeared not so easy to meet. Modern FPGAs do have lots of pins, and are SMD. So we looked for assembled modules. The problem with most modules is that they are expensive because they contain LCD displays for example. Also, they are available just for a short time. After a year or so they are replaced by other boards. These boards are meant for prototyping and experimenting, not really for finished products.

Fortunately we found a suitable small FPGA-board, containing only the hardware we really needed. The name of this module, GODIL, points to another advantage: it stands for Good Old DIL. The module is fully assembled, and can be plugged into a motherboard using connectors with DIL-spaced pins, so it is easy to handle.

And there are more advantages. Modern FPGAs need multiple power-voltages and 3.3V levels on their pins. The GODIL-module contains level-shifters, making it possible to connect it with a 5V environment. The FPGA on the module (a Xilinx device) needs three voltages, but the module contains voltage regulators for all of them. Therefore just one single 5V power-supply for the module is sufficient.

Fig1 shows this module. It contains:

The FPGA (in the middle)
Level shifters (the ICs on both sides of the FPGA)
Flash memory for the bit-file, in here the functionality of the FPGA is stored
A XTAL oscillator (49.152 MHz)
voltage stablizers for all needed power supplies.
At the top side of the module 2 connectors: one for the program cable and one for other functional use.

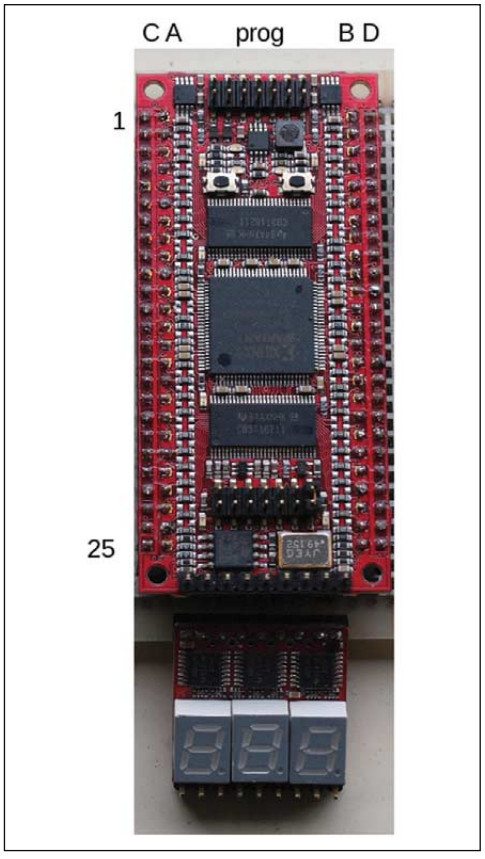


Fig 1 GODIL module

The bottom side of the module contains two 50-pin connectors (each has 2 rows of 25 pins; see fig. 2). From these 100 pins 50 are connected to the FPGA, to interface with the outside world. The remaining pins are connected to VDD and GND. (just 1 VDD and 1 GND-pin need to be connected).

The voltage stabilizers are extremely small switched types; they don't need any cooling. (They are hard to find on the PCB)

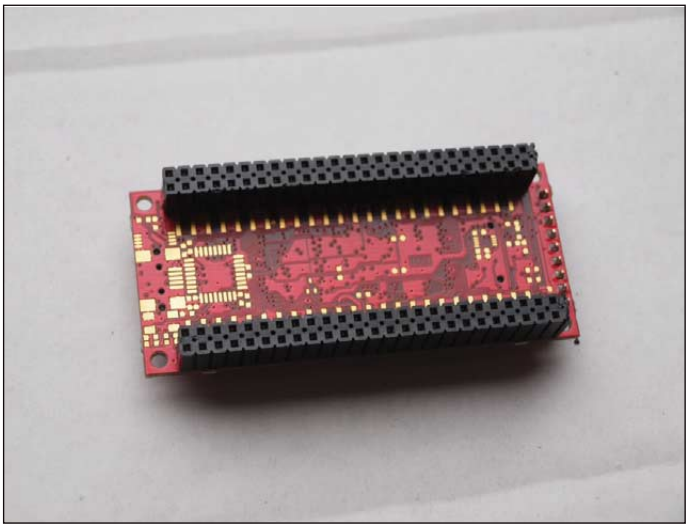


Fig. 2 The bottom side of the GODIL module contains two 50-pin connectors (each has 2 rows of 25 pins)

The display shown at the bottom of Fig 1 is sometimes delivered for free, together with the GODIL. It can be plugged directly in the connector shown in Fig. 1 at the bottom of the module. The design loaded into the FPGA determines what this display shows.

The new decoder.

The GODIL-module needs just a few extra components to build a decoder: (see Fig. 3)

A VCO, used to generate a synchronized clock signal (right in fig. 3)

A USB-module to connect the decoder with a PC (left)

5V supply

Optional: A 3-digit LED-display, showing e.g. decoder type, synchronisation state etc.

(There are also a few monitor pins which may be connected to LEDs. In Fig. 3 a dual-LED is used to show the in-sync state. So the LED-display is not a 'must'.)

For the USB interface it's possible to use a chip (FT245, SMD) with a few extra components, but there are also modules containing all needed components including a USB-connector.

The VCO contains a few components (IC, varicap, trimmer etc).

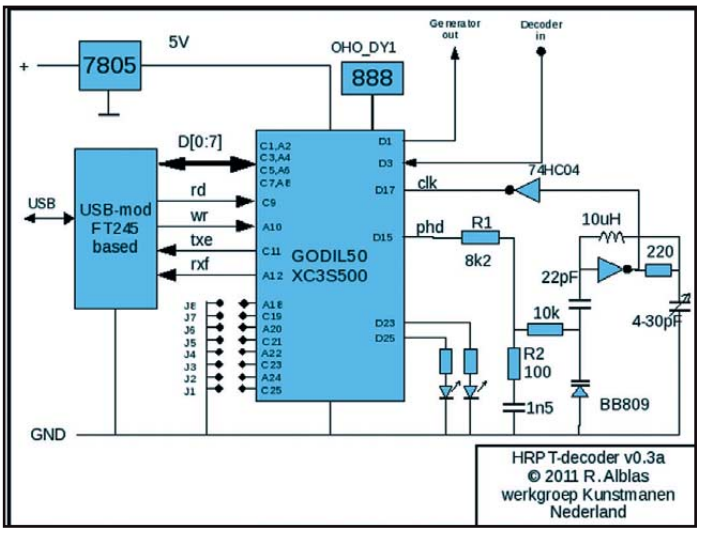


Fig 3 Decoder schematic.

All in all the amount of components to connect to each other is so small that it can easily be build on a experimental circuit board (fig. 4). In this experimental setup the wire top-right connects generator output with decoder input.

Nevertheless a 'real' PCB is designed by one of the members of our working group.

For up-to-date schematics, bit-files and other details see my web page [1].

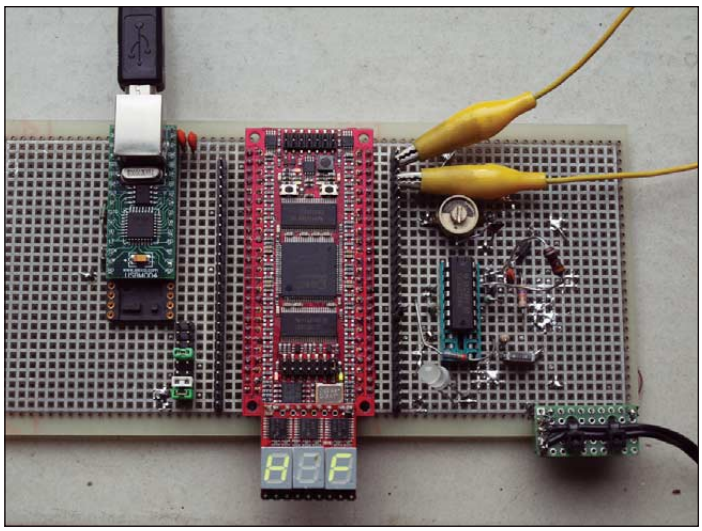


Fig. 4 Experimental setup

The FPGA

The GODIL-module is available in a few configurations and FPGA sizes. Price doesn't differ very much between smallest and biggest FPGA, so I bought the largest one,the XC3S500. Although not needed at all for the current decoders (the XC3S250, with half capacity, can easily hold the same design) it gives some space for possible future decoders and/or extensions.

The old decoder did need two FPGAs and a RAM module to buffer the data-stream to the PC. It could hold just 1 of the decoders or generators. The new FPGA can easily contain all decoders, generators and the buffer-RAM, and still there is plenty of space available for future decoders. An LRIT/LRPT-decoder, including Viterbi and reed solomon decoding, should be feasible.

Because generator and decoder are active at the same time the decoder can easily be tested by simply connecting the generator output to the decoder input. The generator uses the XTAL oscillator present on the GODIL-module.

Software.

The decoded HRPT-data needs to be captured by a PC. The old decoder did use the parallel port (there is a separate USB extension, though). The new decoder uses USB only.

I did create software for the old decoder, to write the incoming data-stream to a file. This software, *wsat* (NOT wxsat!), is now adapted, so it can be used with the new decoder, supporting several new features. With wsat you can also view the result and do some simple processing (including mapping channels on different colours). The generated file format is also supported by David Taylor's HRPTReader, including the new Meteor.

There are executables for both Linux and Windows see fig 5.

The decoder-type (HRPT, CHRPT, MHRPT) can be set by this software. But it is also possible to set the decoder-type via input pins connected to switches or external logic like a

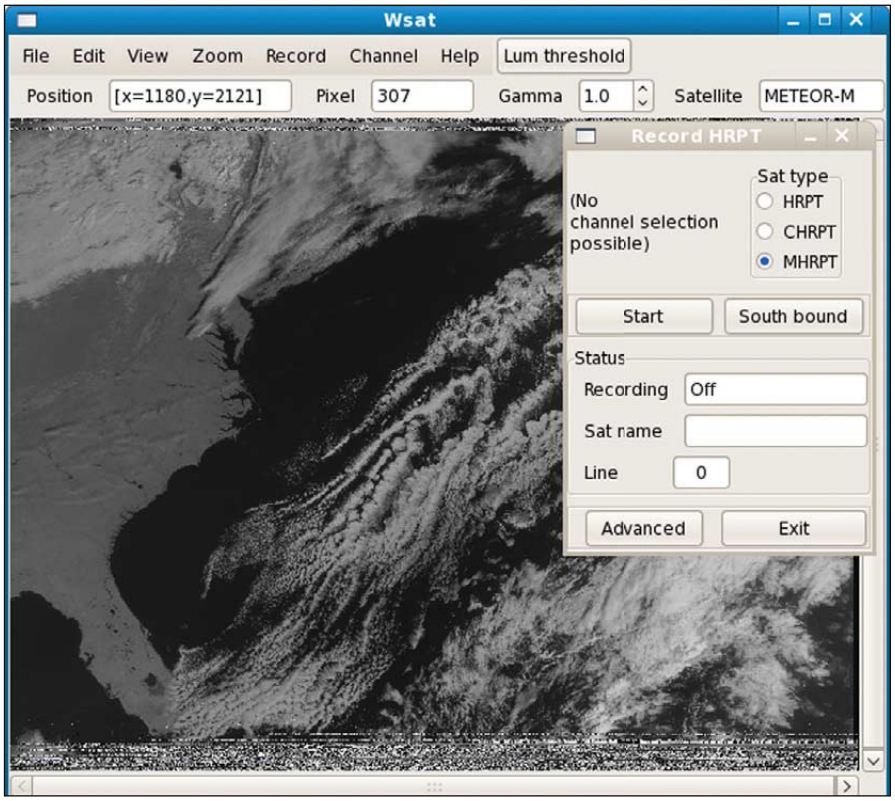


Fig 5 wsat program running Meteor-M reception

microcontroller. In that case the software can read which decoder-type is active. So instead of software setting the hardware the opposite is the case, hardware setting the software. This is all done via the same USB-interface.

Programming the flash

The flash-memory on the GODIL-module needs to be written once, and can be updated later if needed. At power-up the FPGA reads the content of the flash and the functionality is set.

To program the flash extra software needs to be installed and a special cable is needed to connect the PC with the program connector on the module. There are cables for parallel-port or USB. Unfortunately the USB-cable is very expensive (more expensive than all the components of the decoder together!) therefore currently I use a parallelport cable.

The programming software is freely available from Internet. The program is called *Impact*, which is part of *Lab Tools* see [3]

The *Impact* software has a GUI which I don't find easy to use. I know that nowadays it is uncommon to type commands especially into a Windows environment, but for loading a bit-file into the flash it is really much easier to do it this way than using the Impact GUI! I have added a .bat file on my website to make this as easy as possible.

An automated HRPT-system

The new decoder makes it possible to realize a fully automated HRPT receiving station. This includes setting the right decoder type for the “satellite to receive next”. One of the methods, tried out by one of the 'early users', works as follows: WXtrack determines when which satellite will pass. Via the serial port (RS232) it outputs info about satellite position to a microprocessor which in turn drives the rotor system. Wxtrack can also output pre-pass info like receiver frequency and catalogue number (i.e., satellite id). From this the decoder type (HRPT, CHRPT, MHRPT) is determined.

The decoder, connected to the microprocessor, is set to the right type. wsat polls the sync-state of the decoder, and waits. As soon as the expected satellite is received the decoder gets in-sync.

wsat reacts by reading the decoder-type which was set via-via by WXtrack.

wsat makes a new file and starts recording.

If satellite signal is lost wsat stops recording, and closes the file. This can now be examined by e.g. HrptReader.

wsat waits for next satellite pass (relying on Wxtrack doing the right preparations, as described).

Results

Unfortunately I still don't have a HRPT receiving station here so I have to do it with reports of others. At least three people have the decoder in use, and are very satisfied with HRPT and MHRPT quality. For HRPT it's better than the old decoder, CHRPT the quality is comparable with the old decoder, but that is something I want to improve. The new decoder has the possibility to use a VCO at 21.2 MHz instead of 10.6 MHz, which may increase the quality of CHRPT.

The results from the new METEOR-HRPT satellite are stunning, see fig. 6. This satellite has channels in the visual/near-ifrared area comparable with those of MSG, and it is easy to produce a nice coloured picture without the need for any fancy processing. Although it is said that this satellite is a partial failure (probably because of failing calibrations) and therefore from a professional point of view not 100% usable,for us it's a very nice addition to the HRPT (like) weather satellites.

Summary: What's needed

This article doesn't contain all the details and schematics. You can find these on my website, including the bit-files. Here you can also find links to websites where to obtain the GODIL and USB modules.

Hardware needed

- *GODIL50 XC3S500E including female connectors (note that there are different variants of this module!)*
- *USB-module, e.g. UM245R of FTD, USBMOD4 of Elexol, or Arduino's breakout-board (module should contain a FT245 USB-chip)*
- *10.646 or 21.292 MHz VCO: 74HC04 + some small components.*
- *Optional OHO_DY1 3-digit display, sometimes delivered for free with the GODIL module*
- *Or some LED's to show in-sync state etc.*
- *5V power-supply (500 mA)*
- *PCB (or exp. board)*

Software needed:

wsat (Linux or Windows [2])

- *Programming the flash, if you want or need to do this yourself: (only 1 needed at a time, and if an update of the bit-file is required)*
- *GOPLCP GOP JTAG adaptor (to connect PC with GODIL during programming)*
- *bit-file, available from my web-site*
- *ISE development software. Free available from internet; only the Impact software is needed.*

Links

[1] Decoder hardware: http://www.alblas.demon.nl/wsat/hardware/hardware2.html

[2] Software: Windows: http://www.alblas.demon.nl/wsat/software/soft_win.html

[2] Software Linux: http://www.alblas.demon.nl/wsat/software/soft_linux.html

[3] GODIL-module: http://shop.trenz-electronic.de/catalog/product_info.php?products_id=635

(This site also contains the programming cable.)

[4] Xilinx ISE environment: http://www.xilinx.com/support/download/index.htm

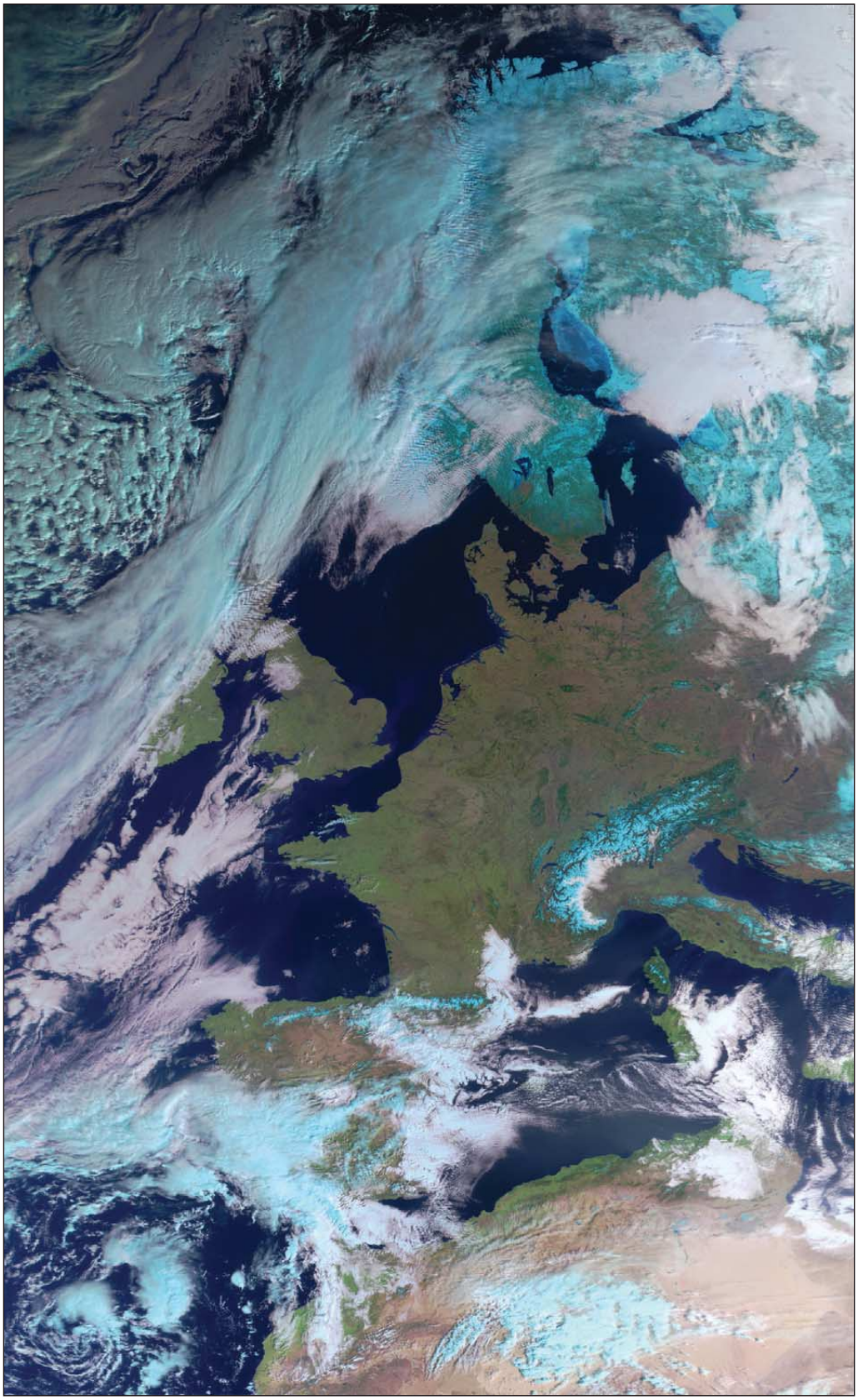
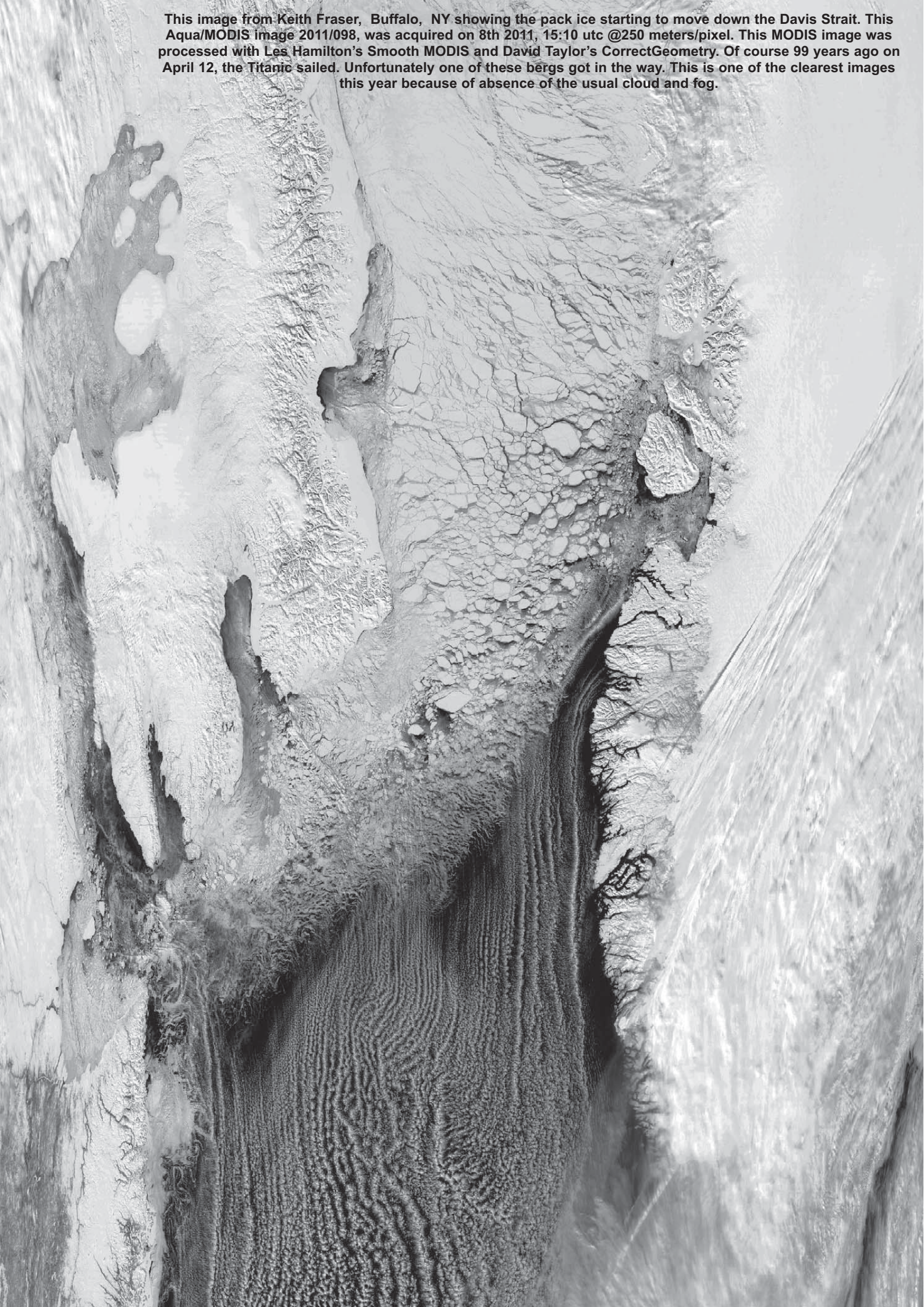


Fig. 6: MHRPT image received by Friedrich Duttke using the decoder and software mentioned above

This image from Keith Fraser, Buffalo, NY showing the pack ice starting to move down the Davis Strait. This Aqua/MODIS image 2011/098, was acquired on 8th 2011, 15:10 utc @250 meters/pixel. This MODIS image was processed with Les Hamilton's Smooth MODIS and David Taylor's CorrectGeometry. Of course 99 years ago on April 12, the Titanic sailed. Unfortunately one of these bergs got in the way. This is one of the clearest images this year because of absence of the usual cloud and fog.



A 'Space' theme weekend with Brownies

Francis Bell

I have reported before that my local Amateur Radio Club (TCARC) have a friendly relationship with the Alton Brownies. Twice a year the brownies have special events with a sleepover in their HQ building. This spring the theme for their weekend was 'Space'. A member of the local astronomy society came and gave a well illustrated talk to the brownies, my radio club provided world wide amateur radio contacts with other Brownie groups and to enrich the 'Space' theme I took some GEO materials and also ran live EUMETCast.

I have to say the Brownies took a genuine interest in the space equipment and incoming images; plus given to opportunity would quite sensibly and skillfully operate the software to feature something in which they had a particular interest.

Other GEO members may consider supporting their local youth or adult groups in a similar way. It is very rewarding to see how easily young people grasp the technology and concepts which only a few years ago was at the frontiers of my own perception.

Four Brownies using the GEO stand at the Alton meeting March 2011. The brownies from left to right - Phoebe, Kitty, Ffion and Rebecca.v

GEO at the Kempton Rally 2011

Francis Bell

The South London Radio and Computer Rally is held twice an year at Kempton and GEO usually have a stand at this rally. Setting up the stand does tax your resourcefulness because we like to run live EUMETCast signals together with laptops running archived images. Deployment of the dish with its associated cable run is usually the first priority and is dependent on which stand we have been allocated and access to the sky. The photographs of the two dishes indicate the contrast between two dish location we have used recently. It is difficult to assess the number of visitors we have to our stand during the day, perhaps several hundred. We take some membership renewals and new memberships on the stand but as importantly is the interest that visitors do express in home reception of weather satellite images that we have on display. EUMETSAT are very supportive and send us posters and literature which is then freely available from our stand. I always say the best place for such materials in on the wall of a school, bedroom, radio shack or study: much better than such stunning posters sitting in boxes. Also our own GEO literature is available to visitors expressing particular interest.

My thanks to David Simmons who manned to stand with me for the whole day. I expect that GEO will attend the autumn Kempton rally on 6th November 2011.

Invitation to Submit Envi-Ham Images

Francis Bell

As a licence holder I have been receiving earth images from the Envisat satellite for about 18 months. I continue to be impressed with the spectral range and resolution of these images. I have written before in GEO Quarterlies about how to apply for a Envi-Ham licence and listed the hardware and software necessary for direct image reception. I have also given illustrated talks to amateur radio groups and others relating to direct home reception of earth images, my purpose being to encourage others to participate in this dimension of satellite image reception. The reward has been that a number of GEO members and others have applied for and been granted their own Envi-Ham receiving licence.

The Invitation

To continue the promotion of direct reception of Envisat images I thought it would be great to publish different examples of images on a regular basis. This is an invitation for anyone receiving Envisat images to submit to our editor their most interesting image each quarter - or when you may have something special worth sharing with others. Any part of the world, any spectral combination, with or without colour and any resolution will be acceptable. The only qualification will be that it was received directly via Envi-Ham and not an image extracted from the Internet. At the editor judgement one or more of these could be published each quarter. Submissions directly to the editor please.

I repeat the rationale behind this idea is to stimulate others who I hope will be impressed with the variety and quality of the images available via the Envi-Ham project. It may also be worth noting that ESA may in due course release other satellite data via the Envi-Ham project, so existing licence holders will have a head start for accessing any new data streams.

Below is an image I received showing Los Angeles. It is a single channel black and white image but its high resolution is such that the urban sprawl of the city can be seen. Remember this is single channel black and white image but a three channel colour composite image is even more impressive. Carelessly I have lost the exact date this images was received but it looked a sunny day with snow on the mountains. Beach in the morning skiing in the afternoon.

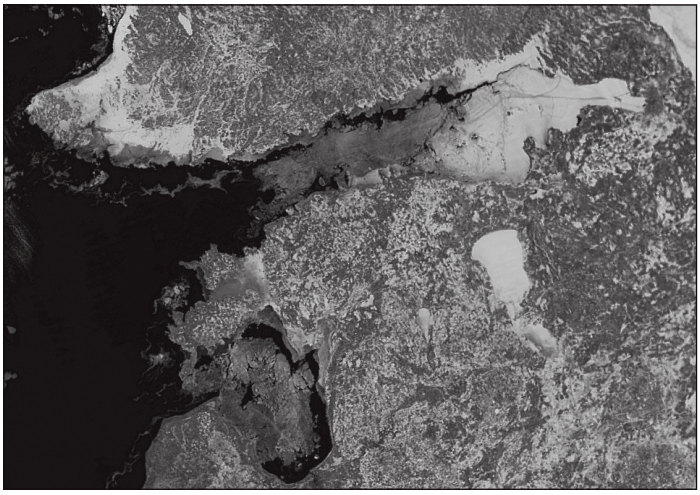
Although Francis says above any resolution, it is important to remember that what looks good on a PC monitor (72 dpi) does not always looks as good on the printed page (minimum of 300dpi), so please send me your images in full resolution Ed.


WERKGROEP
KUNSTMANEN
esa
A new decoder for
RPT / CHRPT / MHRPT

Ice in the gulfs of Scandinavia - MODIS image

David Taylor

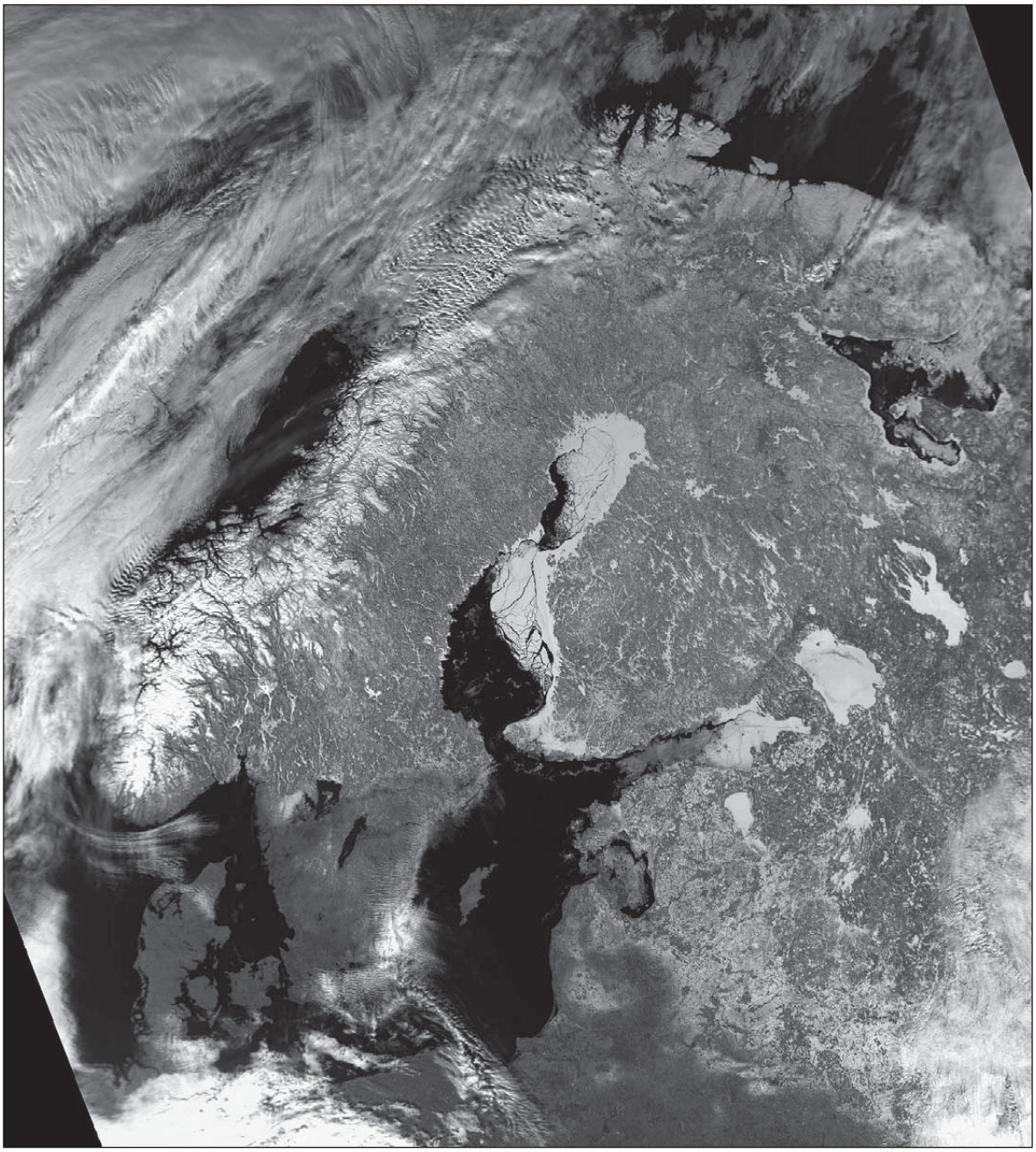
This combination of two MODIS segments from 11:05 and 11:10 UTC on 2011 March 16, shows ice in three gulfs in Scandinavia. In the centre of the image, between Sweden and Finland there is considerable ice still in both the northern and southern parts of the Gulf of Bothnia. Coming further south and east, the Gulf of Finland shows both full and partial icing, with tracks likely formed by icebreaker activity from St. Petersburg and other ports on the Finish, Russian, and Estonian coasts. Further south again there is icing in the Gulf of Riga, off the Estonian and Latvian coasts.



In Sweden, the North Dellen Lake and Siljan Ring meteorite craters discussed in the GEO Quarterly no.29 by Ander Höök are clearly visible.

The Aqua/MODIS data was acquired via EUMETCast, and processed with my MODIS L1 Viewer software:

http://www.satsignal.eu/software/modis-L1-viewer.html



FEEDBACK

The Column for Readers' Letters and Queries

email: geoeditor@geo-web.org.uk

Dear Pete,

Thanks again for compiling a really excellent issue, GEO Quarterly 29, which I thoroughly enjoyed.

However, I could hardly believe my eyes when I read Storm Dunlop's letter, suggesting, on the one hand, that everyone provides satellite image dates where the month is expressed in letters, then, on the other, asking that we use 'the internationally recognised scientific method of specifying the date and time'. These two notions are in fact incompatible. I'll explain.

The international expression of date and time is described by International Standard ISO 8601, and is a **purely numeric** format—hence the incompatibility problem: this standard does not permit the expression of any part of the date in letters. All dates are expressed in the familiar year/month/day (yyyy-mm-dd) format, which is readily extended to include hours, minutes and seconds (yyyy-mm-dd hh:mm:ss). The advantages of this format are that it is language independent (even China uses it), is readily amenable to sorting procedures and has a constant length. It is completely wrong to express the 'month' part of this date in letters, as Storm Dunlop's hybrid system would have us do. I personally value the ISO date format, and have used it extensively for many years in cataloguing and storing both photographs and electronic documents. This is also the format in which digital cameras embed the date and time within the format field of each image.

In narrative text, 'readability' is the key and it is much to be preferred that dates are expressed in the same way as one would refer to them in casual conversation: 'January 21, 2011', for example. In other words, 'in plain English'. This is the grammatically correct format for including a date in text or letter headings, having many years ago superseded the form 'January 31st, 1961' taught to me in my schooldays, almost too long ago to remember now. In a magazine such as GEO Quarterly, it is highly desirable that all dates follow the same format. This gives a unified feel to the whole.

As editor, I always tried to adopt the 'plain English' approach to dates and times, using easily understandable wording such as: 'This NOAA-19 image was acquired at 14.23 UT on May 25, 2008. There is absolutely no ambiguity about this, and it is the simplest task for super enthusiasts like Storm Dunlop to convert this to '2008-05-25' for his own purposes if he so wishes. Why does Storm Dunlop expect to see dates in GEO Quarterly expressed in this grotesque format, one to which hardly anyone relates? It is simply another example of over zealous Political Correctness. I am a scientist myself, and while I do use and value this format for data archiving and retrieval purposes, I would never remotely consider using it in descriptive text. And it certainly has no place in the pages of GEO Quarterly.

So on with the debate. What do other readers think of this matter?

Les Hamilton, Aberdeen, Scotland.

Hi again,

Yes you guys are spoiled (??) with EUMETCast, out here we are lucky to get 64kbs internet! In the islands anyway.

There is a move to get a EUMETCast type service over the Pacific (a joint NOAA / Australian Bureau of Met project) and tentative startup is August this year.

Present plans are for a Ku Bend service so will be able to use small antennas and cheap equipment.

That will assist many small island countries to get better and more regular data.

The installation of LRIT receivers has helped a lot but the region is split in two with GOES W being received in the eastern Pacific and MTSAT in the West. Only a few countries can see both and this presents problems with imagery and data. GOES has lots of data other than imagery where MTSAT has only imagery,so a Pacific wide data feed will be magic.

Bit from Miami conference:

• Pacific Island states have noted the low availability of environmental and EO information to users in the region

• Mainly due to poor internet access and communications infrastructure

• There have been calls expand the GEONETCast broadcast footprint over the Pacific region to address this issue.

• GEO could assist in determining requirements and securing funding for the expansion of the system into this region.

• U.S. and Australia working jointly on a project (RAPIDCast)

So maybe we won't be so isolated in the future!

Thanks for the interest ...

Regards
Colin Schulz Australia

Hi,

The actual "act" of receiving the satellites was what got me into this hobby in the first place, now the vast quantities of data are actually more complicated to process than receive. A possible "future" maybe to follow in the footsteps of others perhaps?

Many organisations have successfully launched satellites on the back of other programmes, AMSAT and the highly successful Surrey Satellite Technology spin off from a small university programme are some examples. Is it possible with our resources to provide a package to fly with another satellite?

What would be involved?, the costs, deadlines etc are unknowns; possible investigations may reveal it is now more likely that the technology is there now to provide at least a small imaging presence on a small satellite somewhere?

The highly successful FUNcube dongle receiver seems to be a winner for radio users (only 80Khz bandwidth), but shows what is achievable as a receiver project; over 500 sold worldwide to receive amateur satellites, put into orbit by amateurs!

http://www.funcubedongle.com/

Why we receive these things?, we all have our own reasons; we may not be able to put together a radiometer but many balloon mounted cameras have made it into orbit; and many more plan to!

http://www.huffingtonpost.com/2010/10/16/father-and-son-send-iphon_n_765369.html

Continued page 44

GEO Shop

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

The 'Pager-Hardened' R2ZX
APT Weather Satellite Receiver

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

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

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

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

John Silver's Lightning Radar Board

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

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

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

UK members price - £24.00
UK non-members price - £24.50

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

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

DVB World DVB-S2 USB Receiver

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

UK members price - £90.00
UK non-members price - £95.00

Universal Ku-band Satellite TV LNB 0.20 dB
(or equivalent)

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

UK members price - £12.50
UK non-members price - £19.00

GEO PIC 1.0 for the RX2

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

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

Current Price List

	Members Prices UK	EU	RoW	Non Members UK	EU	RoW
APT Equipment						
R2ZX APT Receiver (no PSU)	210.00	214.00	222.00	224.00	228.00	236.00
R2FX APT Receiver (no PSU)	180.00	184.00	192.00	194.00	198.00	206.00
BNC Lead (0.25 metre)	5.35	6.10	6.60	7.35	8.10	8.60
UK Power Supply Unit (12 volt)	9.50	-	-	12.00	-	-
Dartcom High Quality QFH Antenna	275.00	355.00	-	295.00	375.00	-
John Silver Preamplifier (built)	35.00	36.00	37.50	40.00	41.00	42.50
John Silver Lightning Radar Board	55.00	68.00	61.00	65.00	68.00	71.00
Bias Tee	24.00	24.50	25.00	28.00	28.50	29.00
GEO-PIC 1.0	7.00	7.80	8.40	7.00	7.80	8.40
Martelec MSR40 EPROM	10.00	10.75	11.25	10.00	10.75	11.25
EUMETCast Equipment						
DVB-S2 USB Receiver	90.00	95.00	-	100.00	105.00	-
Telestar 80 cm dish with LNB	69.50	-	-	76.50	-	-
Telestar Ku band universal LNB	12.50	14.00	-	19.00	20.50	-
Technisat Satfinder Alignment Meter	26.50	29.50	-	29.50	33.50	-
Miscellaneous						
GEO Quarterly Back Issues (subject to availability)	3.50	4.20	5.10	n/a	n/a	n/a
GEO Quarterly (PDF issues on CD) Annual compilations 2004-2009 (state years required)	8.00	8.80	9.30	n/a	n/a	n/a
GEO Membership (4 x *GEO Quarterly*)	20.00	24.00	28.00	20.00	24.00	28.00

All prices are in £ sterling and include postage and packaging

Ordering and Shipping

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

Orders should be sent to:

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

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

+44 (0) 1202 893 323

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

Not a GEO Member?

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

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

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

TechniSat SatFinder Antenna Alignment Meter

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

UK members price - £26.50
UK non-member's price - £29.50

Telestar 80 cm dish and Universal 0.2 dB LNB
(or equivalent)

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

UK members price - £69.50
UK non-members price - £76.50

EUMETCast On-Line Registration Guide

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

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

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

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

GEO Helplines

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

- telephone:(01786) 82 28 28
- e-mail: dsdeans@btinternet.com

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

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

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

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

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

- email: stevens312@btinternet.comf

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

- gmartin@electroweb.co.uk

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

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

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

Internet News/ Discussion Groups

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Weather Satellite Reports
This group provides weekly reports, updates and news on operational aspects of weather satellites.

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

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

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

The Copy Deadline for GEO Quarterly No 31 is Saturday, 30th July, 2011

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

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

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

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

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

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

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

Submission of Copy
All materials for publication should be sent to the editor,

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

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

geoeditor@geo-web.org.uk

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

Group for Earth Observation

Membership Application Form

Current Subscription Rates

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

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

- **PayPal** - Visit the GEO Shop website at ***http://www.geo-web.org.uk/shop.html*** and add your subscription to your basket
- UK residents may pay by means of a **personal cheque** or **Postal Order** made payable to '*Group for Earth Observation*'
- Payment by **direct bank transfer** can be arranged. Please email francis@geo-web.org.uk for BIC and IBAN details.

Name (please PRINT clearly)

Address

Town/City

Postcode/ZIP Callsign

Country

Telephone Number FAX

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

Declaration

I wish to join GEO, the Group for Earth Observation, for a period of one year.

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

Signature

Date

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

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

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

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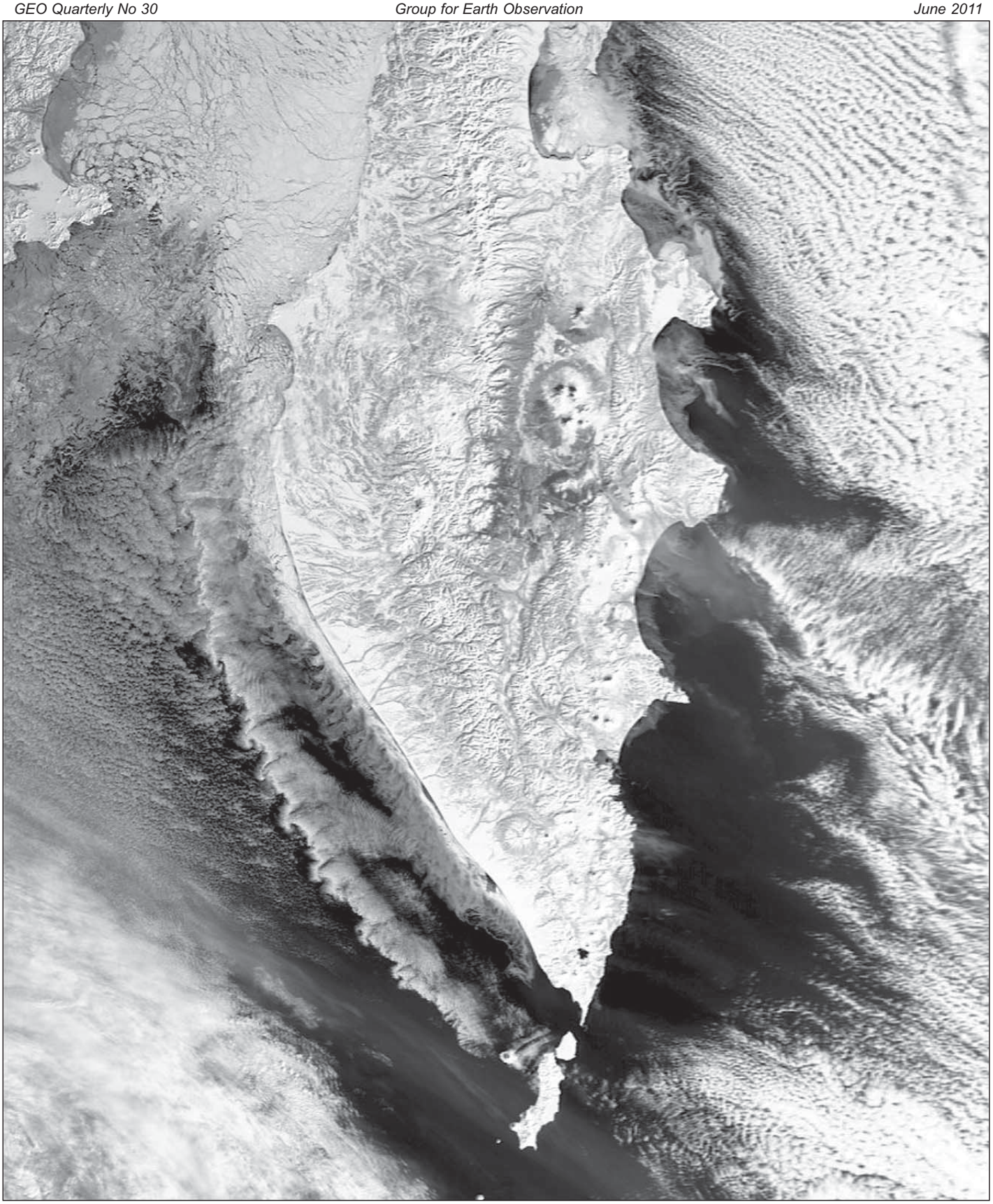


Towards the end of February 2011 there was relatively little cloud cover over the Kamchatka Peninsula and the illumination had improved considerably since mid-winter. I have written for GEOQ about the peninsula before, but the image on the 24th was especially interesting and – it has to be said – very beautiful. Many of the volcanoes are visible in this image but it is the western coastline that is worthy of closer attention. The temperature on the land around the Sea of Othotsk varied around about minus 21 degrees C. It looks as if cold air was flowing down the contours on the west of the peninsula where it passed over the much warmer sea, at – 2 degrees C giving rise to coastal fog. The warmed air rose and was cooled again, but having picked up moisture over the sea the cooling condensed out to give a band of cloud (at around -13 degrees C) running parallel to the coast. The general picture in the Sea of Othotsk was of a south easterly air-stream flowing off the ice which can be seen breaking up towards the north of the Sea. It might have been this that caused enough wind sheer to create the interesting vortices along the western edge of the offshore cloud. This, anyhow, is my amateur interpretation of the image. I could be quite wrong, so it would be interesting to hear an alternative interpretation from another reader. Robert Moore

USB Receiver Installation

Geoff Morris gw3atz@btopenworld.com

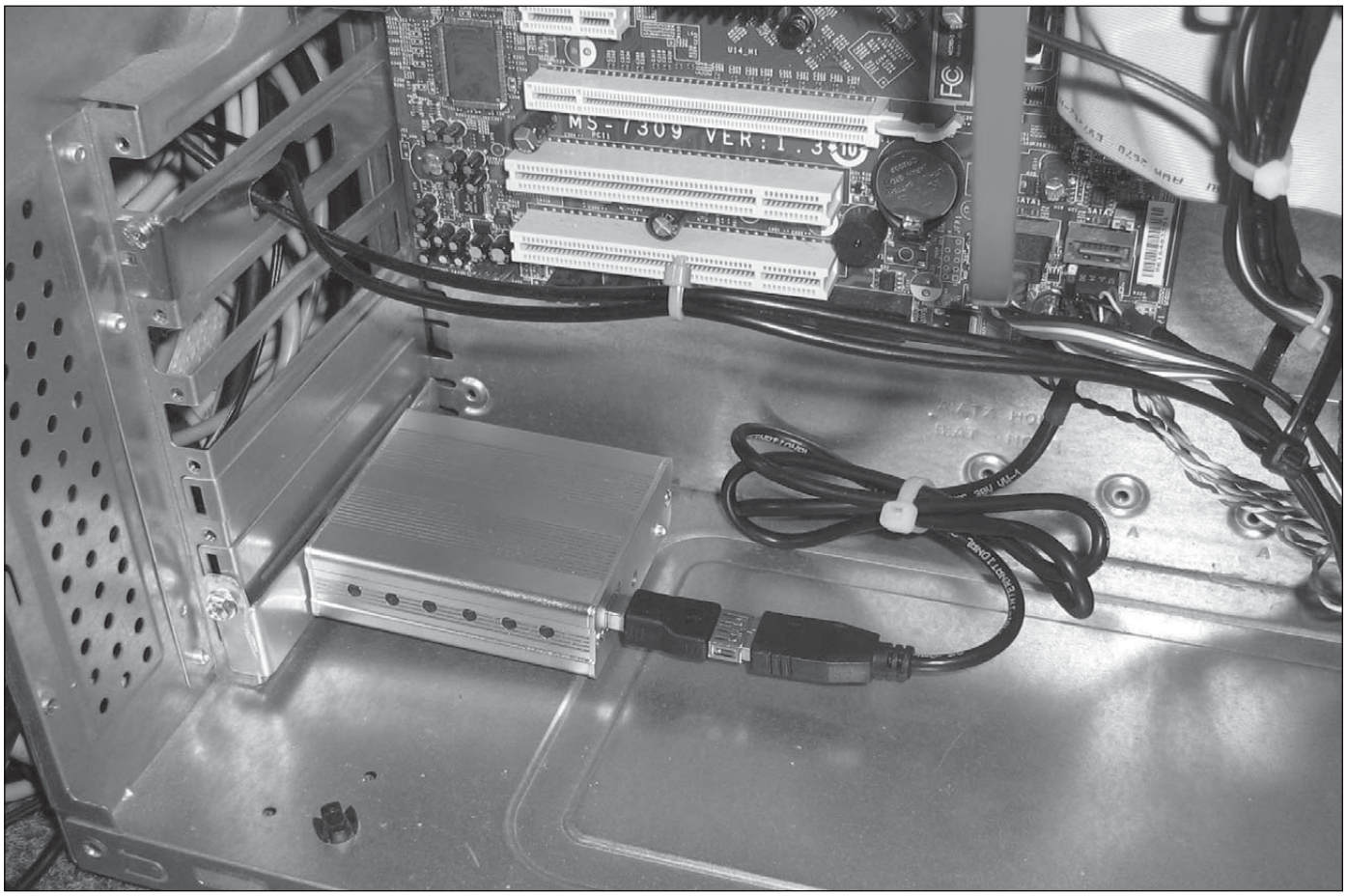
When a couple of years ago, I changed from the Skystar internal card to the DVBWorld external USB receiver, the problem arose as to where to have it. In the end it sat on top of my main PC with its cables strapped together. This really was not very satisfactory, as it tended to slide around. I suppose I could have stuck it down, but never got round to it.! I then thought of how I could tidy the whole thing up, being somewhat fanatical when it comes to cables being neat and tidy. It occurred to me that it would be possible to install it inside the PC.

Skystar 2 internal card replaced by DVBWorld receiver fixed to new back plate

To that end, I first used a blank plate from the back of the PC. The type that is used for extra serial/USB ports etc. To fix it to the plate, I decided after taking the board out of the case, that the best way to do it would be to take the nuts off the antenna sockets, and use them to fix the plate. This worked well, but great care must be taken when undoing the nuts and also when replacing. Do not over tighten. However I was not pleased with the result, as the metal of the PC plate as fairly thin, and tended to buckle when being drilled. So I made a new plate from thicker aluminium, and the end result can be seen in the picture. Its still not perfect, but does the job.

As the USB port on the receiver is now inside the PC case, I then had to decide how to connect it to the PC. I could have used the original lead, taken it out of the case and back into its original USB port. However I decided that I could take it directly to a USB header on the PC motherboard. To do this I had to purchase a lead that would go onto the header. After a web search I found a supplier for this,(Amazon) but could only get one with the normal flat USB plug on it, so I bought an adaptor from the square socket on the DVBWorld box to a USB female socket. This can be seen in the picture of the receiver installed inside the PC. The USB port I used on the PC motherboard was different from the original. On starting the PC, it found the DVB receiver as a new device and installed the drivers for it.

Overall I am pleased with the result. It is fairly easy to do, but if in any doubt as to how to carry it out, or how to connect to your PC motherboard, leave well alone. I build all my own PC's so am aware of the motherboard connections, but please do not try this if you are uncertain as to how to proceed. There are other ways of doing this, and I have done what works for me. BUT…….If in doubt DON'T.



EnviHamBrowse

A Front-End for Displaying EnviHam Images

Francis Breame - vf0123@btinternet.com

Introduction

GEO Quarterly has covered the *EnviHam* project [2,7] in a number of articles in recent issues. Briefly, this project allows non-professional users to receive a selection of *Envisat* image files in a similar manner to those broadcast by *EUMETCast*, using the Envisat Data Dissemination System (DDS) [6].

These images are of particular interest because of their high resolution. For example, figure 1 shows the area around the Strait of Hormuz; figure 2 is an enlargement of figure 1, showing the artificial islands in Dubai; figure 3 shows the Kennedy Space Centre and locality (the pads used by the Apollo/space shuttle launches are the Y-shaped feature on the coast at the top centre).

Licence holders can use the very comprehensive *VISAT* software provided by ESA [5] to view the files. However, one problem I found was in locating the field of view of each image file, as they are either very small or very long and thin. *VISAT* does provide a world map showing the coverage of each file but unfortunately, although excellent for making use of the data in the files, *VISAT* is very slow in opening them and displaying their coverage areas (at least on my computer). This seems to be because *VISAT* decompresses and reads each file in its entirety, and some of the files can approach 1 GB in size.

Thus, I wrote a simple front-end browser, *EnviHamBrowse*, which displays on a world map the areas covered by the *Envisat* data. Files of interest can then be selected and *VISAT* started automatically to display them in all their glory. *EnviHamBrowse* can do this very quickly as it reads just enough of the file to determine its coverage area.

Using EnviHamBrowse

EnviHamBrowse can be downloaded, together with a user guide, from my Internet site [1]. Setup and full usage details are given in the user guide. The program is very simple to use, so I'll just give a brief overview of it here.

The screen is as shown in figure 4. The file to be displayed can be filtered by date and/or type. At the moment, *EnviHam* transmits three file types, which can be selected as

- ATS AATSR (Advanced Along Track Scanning Radiometer) level-1 gridded brightness temperature and reflectance,
- MER RR MERIS (Medium Resolution Imaging Spectrometer) level-2 reduced resolution geophysical product,
- MER FRS MERIS level 1B full resolution European coverage (although in practice there are a number outside Europe).

On pressing 'Display directory', the coverage outline of the chosen files will then be displayed as shown in figure 4 (in this example, some of the passes overlap slightly). Each outline has a tag, initially green, at the start of the pass. Hovering the mouse over the tag gives details of the file. Clicking it turns the outline to red and selects that file. Any number of files may be selected, but it is advisable not to chose too many in the interests of *VISAT* starting within a reasonable time. Press 'Launch VISAT' to start the viewer with those files.

Please email me at the above address with any bugs, comments, or suggestions. I'm happy to make changes if they're feasible.

Caveats

- Minimum screen size is 1280 x 1024, otherwise the main window will overlap. If there is a need for smaller resolutions, let me know.
- It is assumed that all files are in the same directory, as deposited by the DDS download software.
- If you have put in place a more complex (and better) arrangement based on multiple directories (say by year/month/day), you will have to keep changing the directory via the menu. Again let me know.

Links and References

1 Francis Breame's Web site
http://www.vf0123.btinternet.co.uk/

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

3 Envisat Operations
http://www.esa.int/SPECIALS/Operations/SEMOZY8L6VE_0.html

4 Envisat Documents
http://earth.esa.int/pub/ESA_DOC/ENVISAT/

5 VISAT/BEAM
http://www.brockmann-consult.de/cms/web/beam

6 DDS Operations
http://dwlinkdvb.esrin.esa.it/DDS/welcome.html

7 David Taylor's notes on setting up EnviHam reception
http://www.satsignal.eu/wxsat/EnvisatDDS/

Cover and Back Cover Images

Envisat observes Saharan dust and plankton blooms. Envisat captures dust and sand from the Algerian Sahara Desert, located in northern Africa, blowing west across the Atlantic Ocean.

Stretching across the eastern Atlantic, strong winds carry the plume over the northwestern tip of the Iberian Peninsula (bottom), the western tip of France, the southwestern tip of England (top right) and the southwestern coast of Ireland (top left).

Dust from the Sahara Desert – the world's largest desert, encompassing around 8.6 million sq km – can be transported over thousands of kilometres by atmospheric convection currents. These convection currents form when warm, lighter air rises and cold, heavier air sinks.

Continued on page 42

Figure 1 - An Envisat MERIS full resolution imageof the Strait of Hormuz, acquired at 06:43 UT on March 3, 2011.

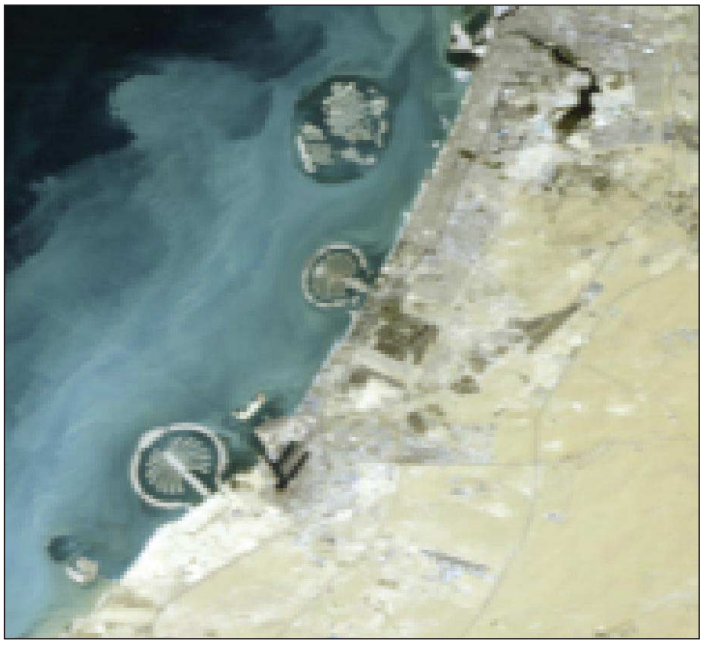
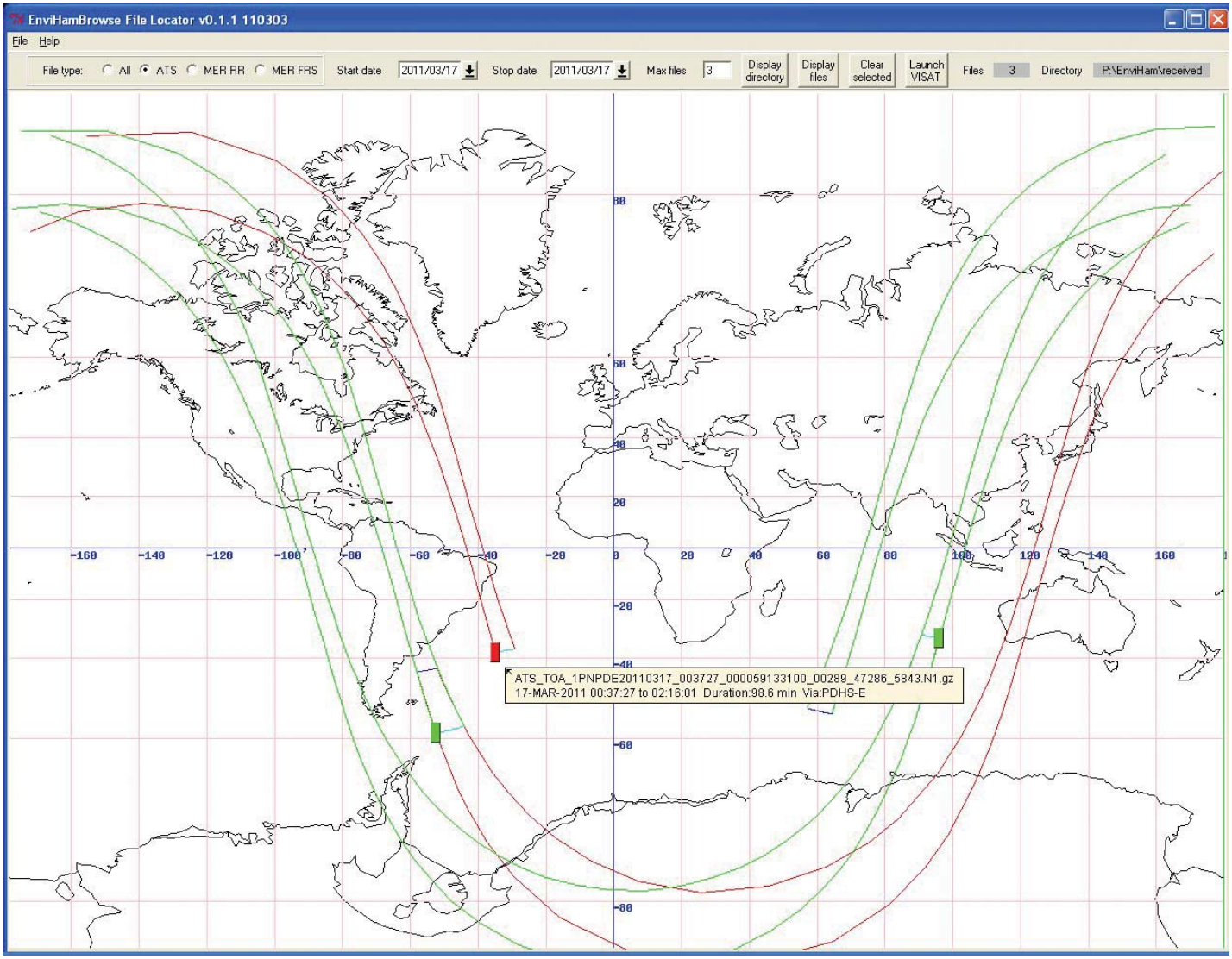


Figure 2 - A zoomed section from figure 1.

Figure 3 - An Envisat MERIS full resolution image showing Kennedy Space Center, acquired at 15:40 UT on March 2, 2011.



Why I Succumbed To A Digital Satellite Meter

Francis Greaves – francis@choughs.net

I have been interested in Weather since I was about 10 years old. I am still using the Stephenson Screen I built from a kit I received on my 12th birthday. I have been receiving weather satellites since about 1999.

My location since 2007 is a very exposed one at 51° 33.3'N 9° 37.7'W at an altitude of 60 m above sea level,ideal for weather. I live in the countryside with sheep farms all around, and the neighbour's sheep to keep the grass down. I am on the north side of the Mizen Peninsula looking out across Dunmanus Bay to Sheeps Head and into the Atlantic. I keep manual records of the weather and have three automatic weather stations accumulated over time. (Fig 1) My internet connection is wireless from a small dish pointing at a mountain top with a speed of 1 meg. This gives me a download speed of about 2.39 Mbps and upload speed of 0.46 Mbps. The dish is on the tallest mast in the background with my wind sensors on the same mast. The highest being at about 10 m.

I am using an 80cm dish for Eumetcast reception which was replaced recently. Sea air does rot dishes! When I saw the article by Francis Bell in GEO 25 and later David Taylor's article in GEO 26 on the Envi-Ham project, I decided to have a go, despite being well out to the west and outside the 48dbW footprint as shown in GEO 26.

I purchased a 1.2m dish and an LNB MTI (0.2db). My dish is on a tripod with wire round the bottom to keep the sheep off (Fig 1) and I have just under 20m of cable to get it into the house and feed my DVBWorld USB receiver.

My computer setup consists of two Intel Pentium M 1.7GHz with 1G RAM computers, one to purely receive Eumetcast, the other to receive Envi-Ham data. I have an Intel Quad Core 2.4GHz with 3G RAM to process the data and run my weather stations. (see Fig 2 of work always in progress) I have a pair of 19” screens as twin for the Quad Core machine and the left screen switching between all the computers. My weather station data is displayed using programs I have written in Java, Perl and Visual Basic. Most of this data is uploaded to my website. I have a MYSQL Database on the site to store the data. The satellite images are displayed using David Taylor's excellent suite of software.

I was accepted onto the Envi-Ham project in the middle of January, and returned my forms by email a couple of days later. Then I heard nothing, so no software or key to start receiving data. This was OK, because I just could not get my dish tuned in. The DVBWorld software is not the best to try and set up the dish. To get the dish pointing correctly I used an analogue meter to find Eurobird at 9° E. Then with a pair

of two way hand held radios, and my long suffering wife looking at the signal on the computer screen, I attempted to locate Eutelsat W2A at 10° E. No problem finding Hotbird at 13° E, but I could not find Eutelsat. I had the software set to the ANB (Arabic News Broadcast) as per David Taylor's article in GEO 26. Nothing! We were by now nearly into March and still nothing from ESA about my key and software. I finally phoned Stefan Badessi, a delightful man, who was extremely helpful regarding my lost email (I had sent several). They were all in the spam bin. Finally that was sorted out and I got my key, but still no signal from my nice big dish.

Desperate measures were called for. I decided to buy a Digital Satellite Meter with Spectrum Display. Well they can be a bit pricey to say the least! After a bit of searching I decided to get a Horizon Digital Satellite TV Meter Plus with USB from satellitetv.ie from whom I had purchased my dish and LNB. It arrived very promptly and turned out to be just the job. I was able to adjust the alignment of my Eumetcast dish to give about 5% improvement on the signal. The thing that caused me the most problem was the LNB on my Envi-Ham dish. I nearly sent it back, but Steve at satellitetv.ie asked me if I had skewed the LNB to about 25° or so. I thought I had, but decided to try again. As soon as I skewed the LNB well round to about 45° I got a signal! (Fig 3) Fine tuning the dish was so much easier with my new meter than trying to convey signal readings via the two way radio I would recommend it to anyone having problems of dish alignment, especially where the signal is weak. I now have a 96% signal strength with 59 – 60% quality (Fig 5).

I am now trying to get to grips with the data from Envi-Ham. I am not able to receive all the images. There is signal loss often mid to late morning, but I do get a diurnal dip in the EUMETCast data signal, so I suspect this is the same problem. I have included an early image processed in the Vista Beam software using the MERISL1b 13,4,2 RGB filter. The pass was on 2011-03-14 at 11:32:06 to 11:35:12 (Fig 6)

I really do enjoy a challenge. I also enjoy overcoming the problems. This sort of exercise helps keeps my 'Little Grey Cells' active.

Links:

ESA Envisat Website www.envisat.esa.it

Dish, LNB and meter www.satellitetv.ie

David Taylor's Site www.satsignal.net

Authors website www.choughs.net

Fig 1 Automatic weather stations & antenna farm

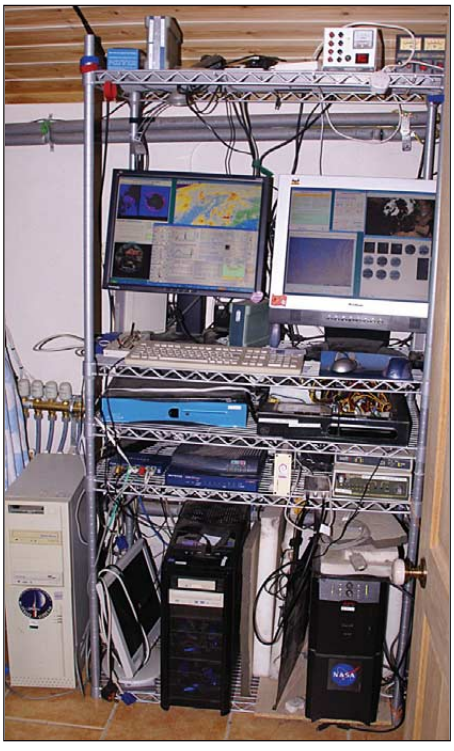


Fig 2 The nerve centre!

Fig 3 LNB skewed to 45°

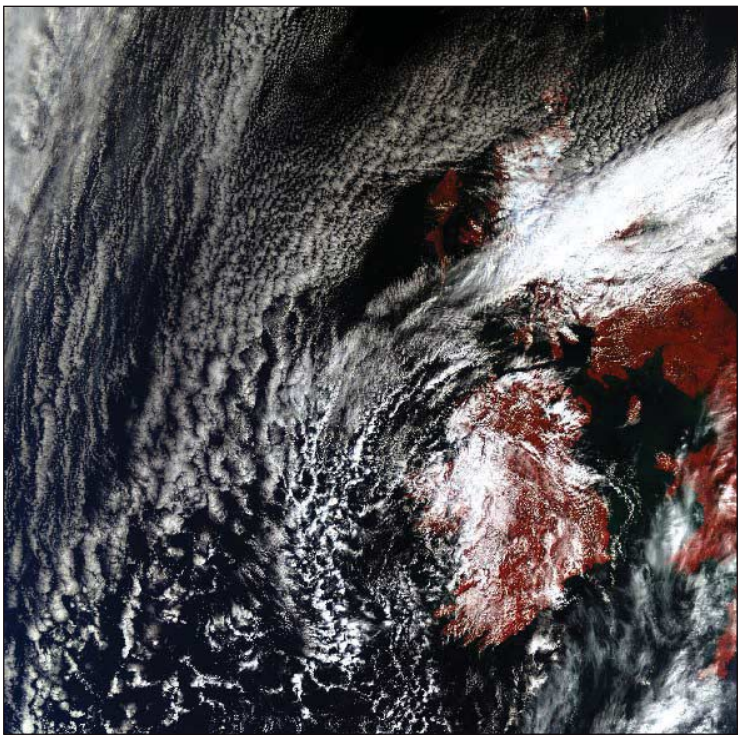


Fig 6 Early example of processing using Vista Beam software

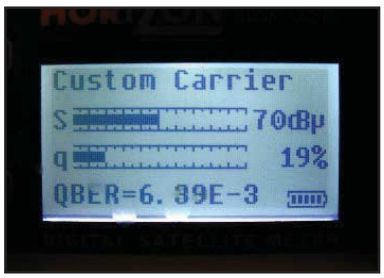


Fig 5 Readout from Horizon Digital Satellite TV Meter

The magic of multi-spectral imaging

James Brown

Many of us are by now familiar with the kind of image data routinely disseminated on EUMETCAST. From polar orbiters such as METOP to the geosynchronous MSG fleet. Then there are also the third-party relays from MODIS, which consist of data thinned by geographical area, resolution to an aggregate of 1km and to 18 selected channels out of the AQUA 36 channel raw data, as well as the AVHRR data from NOAA. All of these can enable those with the right software to produce composite images, and the often stunning near true colour composites are the bread and butter viewing of so many of us. But why are there so many other channels? Well the simple answer is that the primary users of many of these satellites is the meteorological community, and for them visual channels are only one of many tools they need for surveying the earth's atmosphere and climatology. But here's my challenge to us – are you making full use of all that great data?

For me, although I mourn the loss of the days when soldering irons were rarely cold, and equipment was largely home brewed, one of the most exciting things about our hobby in recent years is that thanks to the generous data access we continue to enjoy, and the software programmes that are available, mere amateurs like myself can view in detail most of the fascinating images that the professionals use. We may not have the depth of knowledge or understand all the physics behind the use of some of this data, but with the help of a few primers and in particular e.g. the excellent software suite of David Taylor's GeosatSignal7, it is possible to get so much more out of these multi-spectral imagers.

In the first place I want to concentrate on Eumetsat's MSG dissemination – relevant for both the prime 0 degree longitude satellite of Meteosat 9 (MSG-2) and the secondary Meteosat 8 (MSG-1) at 9.55 degrees east - now used e.g. for 5 minute rapid scan transmissions. Both these satellites give us access to 12 channels of data, though MSG-1 is spatially limited to the more northern hemisphere. So what can be achieved?

Simply put – to get detailed information about what is happening in the layers of the atmosphere we can need to look at specific channels. On board each of the MSG satellites is an optical imaging radiometer– or to give its full title - Spinning Enhanced Visible and Infra-Red Imager. These SEVIRI channels represent energy spectrum bands, 4 assigned to the visible or near-infra-red bands, and 8 to Infra red channels. I don't want to get too technical with this article but to give you an idea of why these channels were chosen – the NIR (near-infra-red)1.6 mm is useful to discriminate clouds from snow, and in combination with the two visible channels 0.6 mm and 0.8 mm, soil moisture and vegetation indices can be calculated. The IR6.2 and 7.3 mm ones are good for water vapour calculations and the 9.7 mm can look at ozone absorption etc. etc.

We can then add or subtract these channels in varying degrees, and by using the conventional RGB method of colour combination we can assign a colour and radiance level to each channel to give an image which to the human eye accentuates the aerosol content that we wish to discover. We can also apply colour look-up tables (LUTs for short) that can assign specific colours to desired radiance levels.

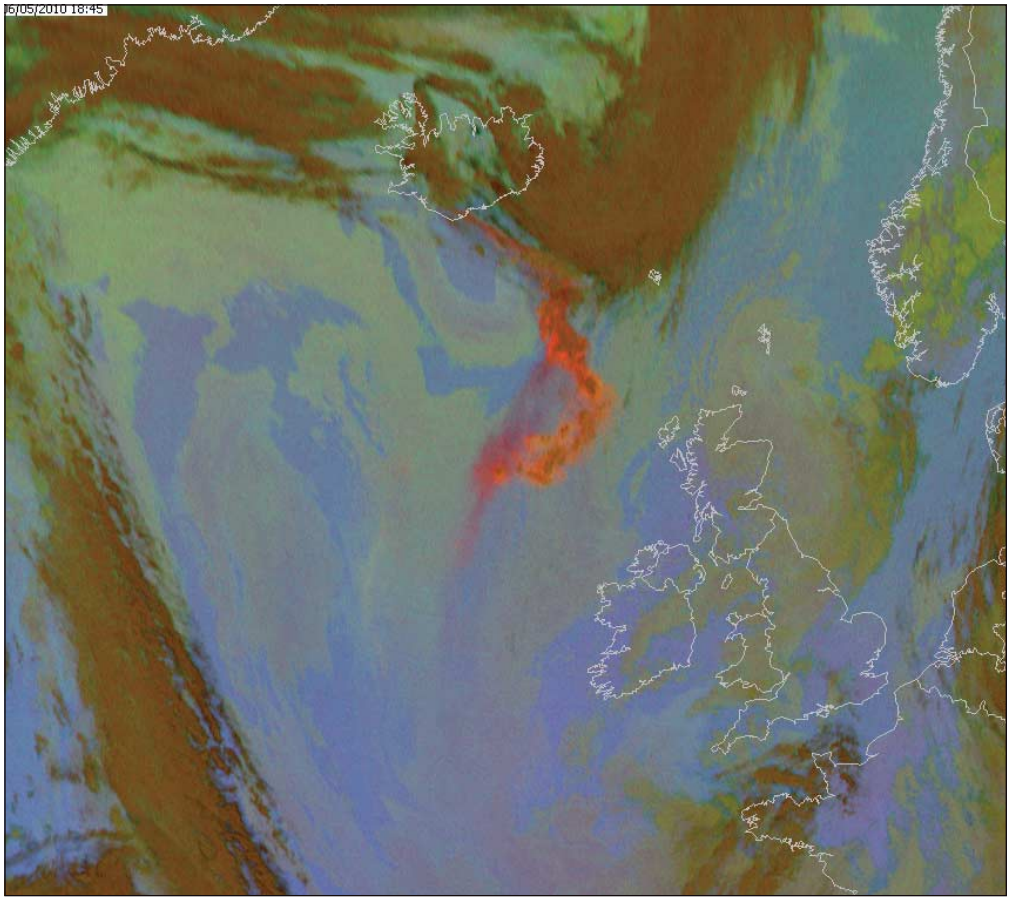


Fig 1

Let's give a simple example:

May 2010 went down in our recent history as the day planes stopped flying in and out of Europe – because of the eruption of the Icelandic volcano, Eyjafallajokull. But how did that show up on the MSG imaging? On the visual channels a plume of white steam was visible during the day, but as it became mixed with cloud it was soon hard to discriminate the ash signature. However, by using the SEVIRI channels 8.7, 10.8, and 12.0 mm in combination the ash particles, sulphur particulates etc. could clearly be seen. (see fig1). Clearer examples are available from the MODIS data stream, but the great advantage of MSG-2 is the animations which can so easily be made, and hence the strength of the emissions and their direction are easy to spot. Fig1 was taken on May 6th 2010. But there are many more potential eruptions due and not just from Iceland. This remarkable ability to discriminate atmospheric pollutants will be there for us follow the next one.

But in the mean time, our generally benign atmosphere interacts with the earth surface, and occasionally a storm over the more desert landscape will scour the land and lift vast clouds of desert dust and sand high into the lower atmosphere. An intense one on April 15th 2011 had dust plumes extending from the western shore of the Persian Gulf to the eastern shore of the Caspian Sea. Shown in fig 2 the dust is thickest over northern Saudi Arabia, southern Iraq, and Kuwait—Once again by judicious channel selection of the same channels, but in a different combination we are enabled to pick out the dust from other atmospheric processes.

And once again animations can reveal the motion of the dust cloud and track its thickness and spatial extent.

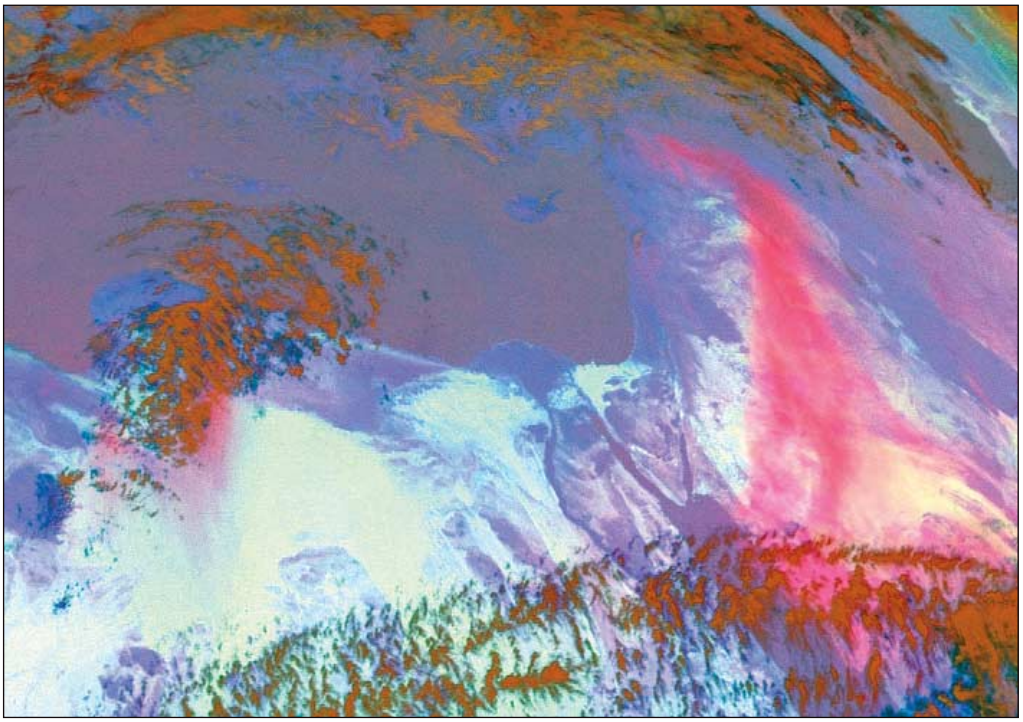


Fig 2

Then again there are so many more great possibilities with these data channels. Fog can be particularly hard to differentiate as it lurks in the lowest boundary layers of the atmosphere and is often not far in temperature terms from the surrounding ground. It can also become freezing fog and when the sun gets to work on it the fog may transform into low level stratus, and again the difference between the two is extremely hard to detect even with satellite imagery. And just to complicate things night time fog and day time fog exhibit different signatures to the sensors. I have been experimenting with this just recently, and although the colour is perhaps not the most suitable I could separate fog from low cloud in the image below. The fog is the brown colour in the western Italian Po valley and also in the SE of France. You could see it gradually burn off as the day progressed. Why not see if you can do better?

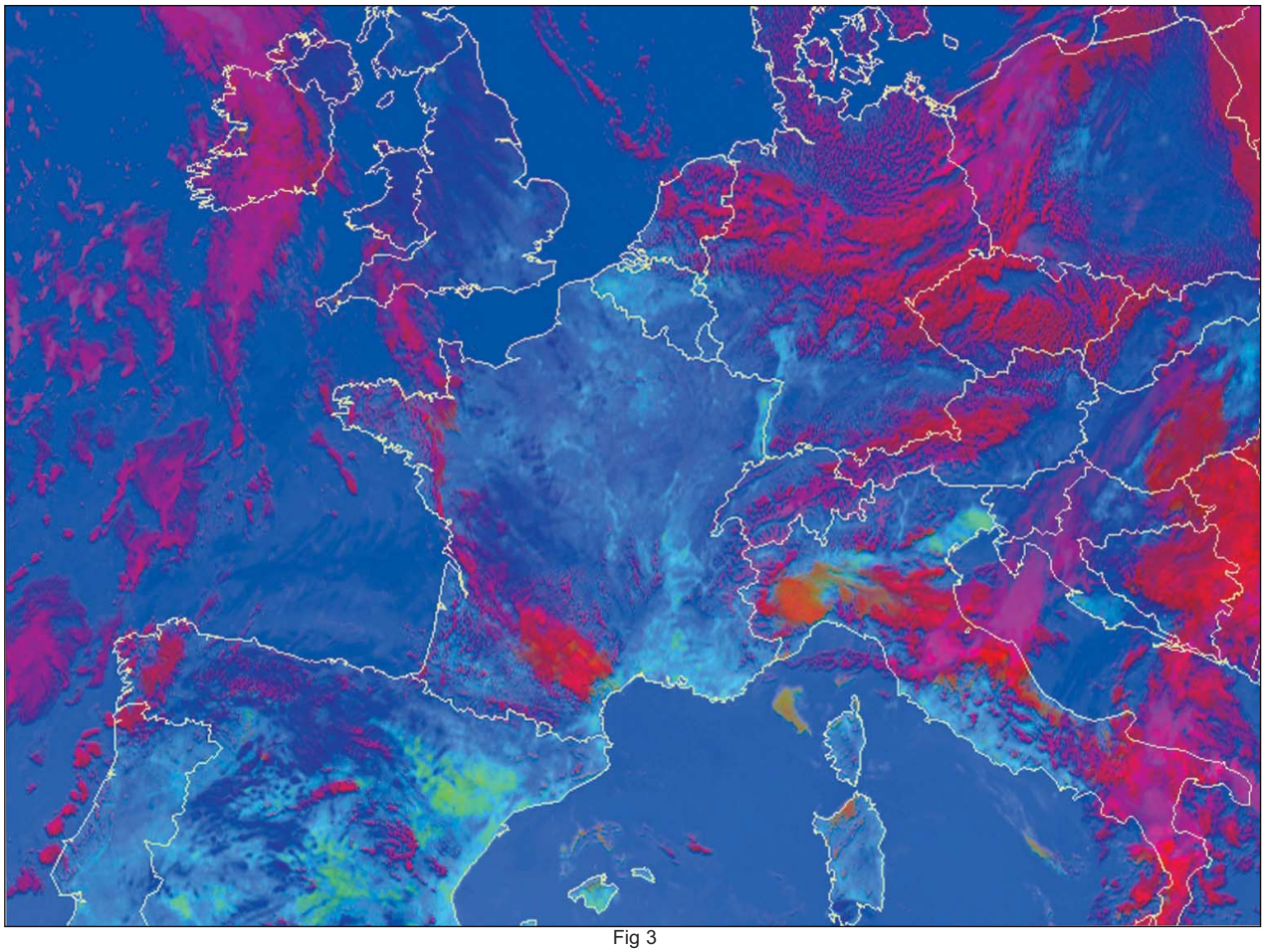


Fig 3

Another use is in detection of ice and snow. Fig 4 taken from data on April 30th 2011 shows detail of sub-zero data in pale blue – the semi-permanent snow and ice along the spine of Scandinavia can be seen – as can the remnants of the Baltic ice. Effective as these results are, the full potential is realised with imagery that has greater resolution at the sub-satellite point.

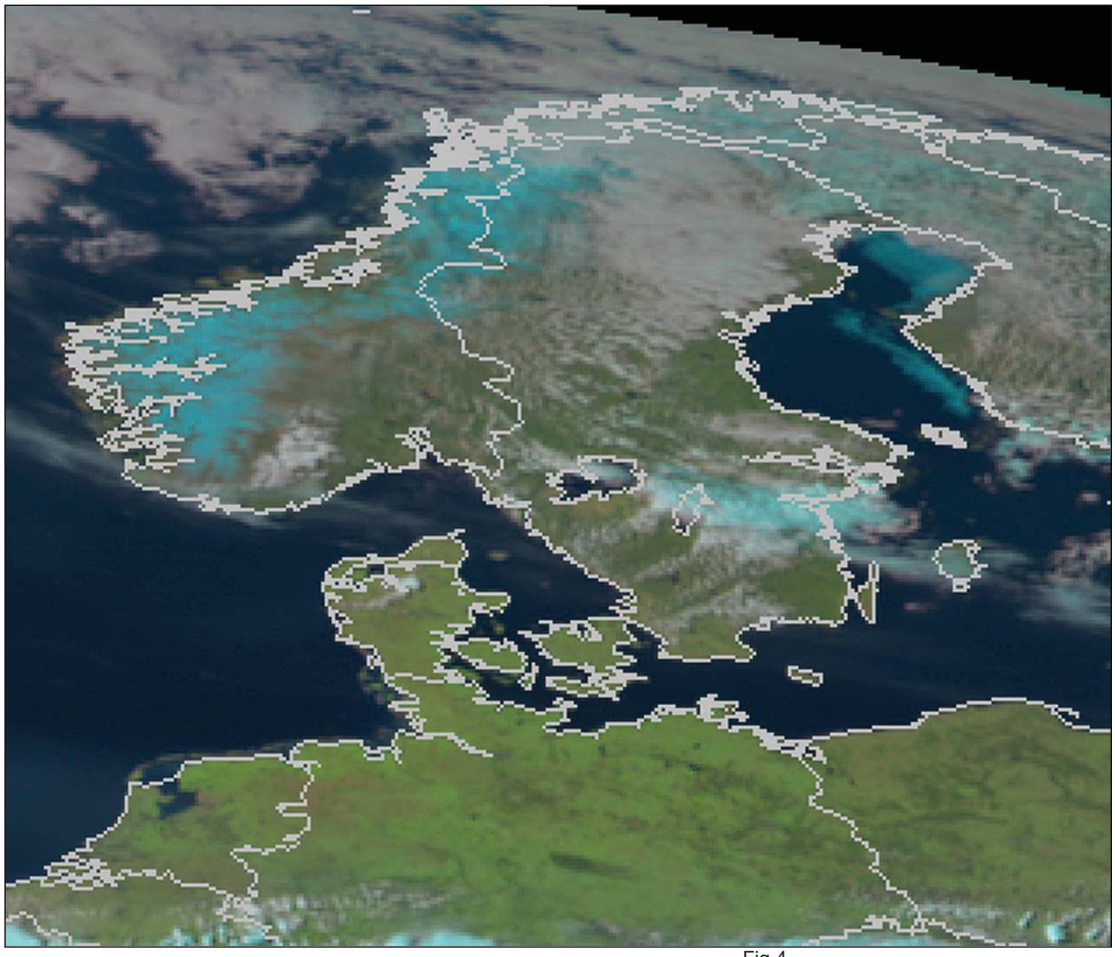
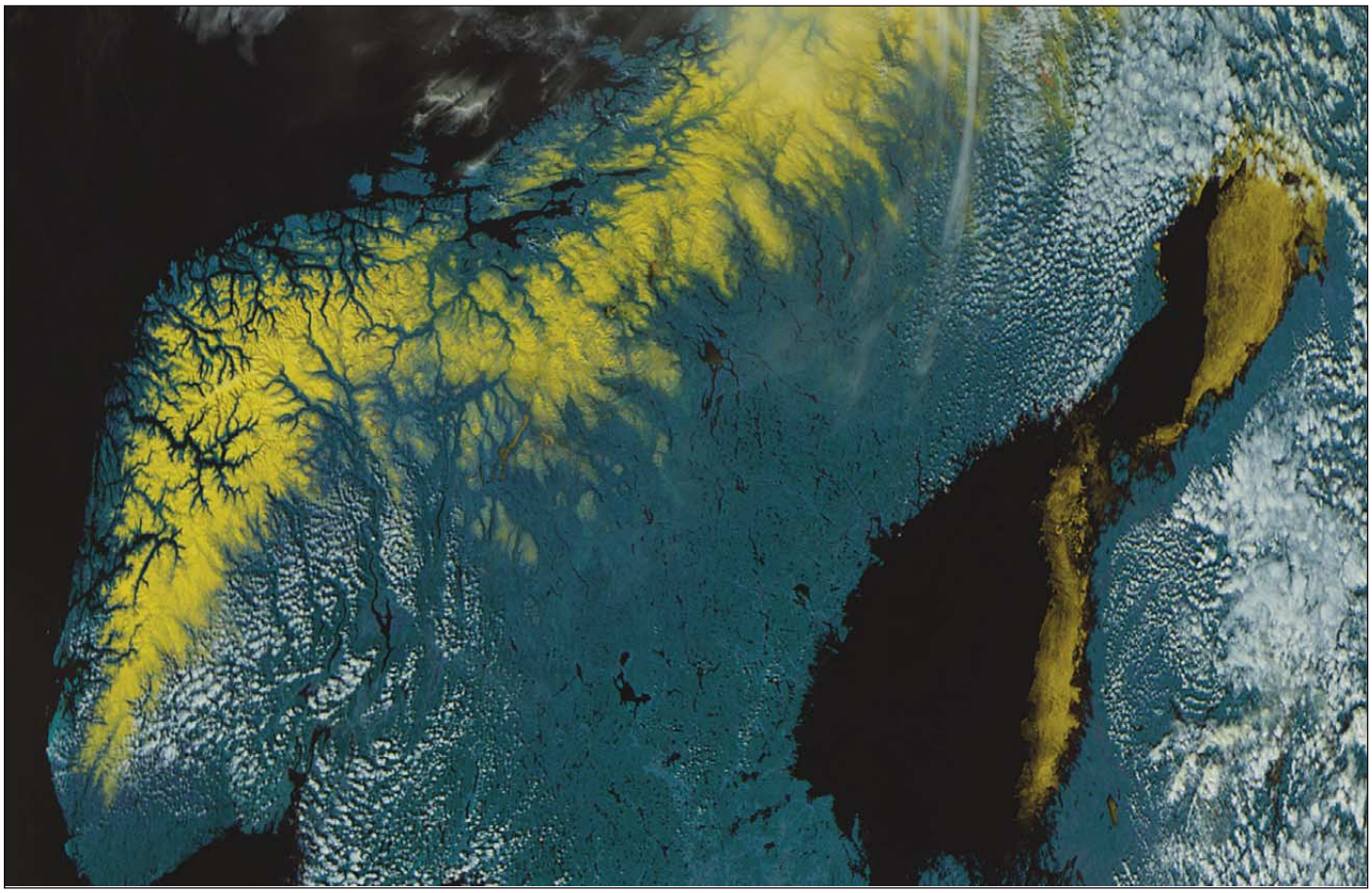


Fig 4

The next fig shows the same area but viewed with David Taylor's L1 MODIS viewer. This has a number of presets and one of them is for snow – set for RGB521 the snow cover is clearly revealed -and even this image is not at full resolution.

But practically speaking – how can we arrive at these really useful images? Well, there is a hard way and an easy way. The hard way is to save the channels separately and import them into a high-end graphics package, and there manipulate the relationship between the images. The much easier way is to let a processing package do the hard work. I have used a couple of different image processing packages in the past including Rob Alblas's xrit2pic and they perform admirably. However I am an unashamed advocate of the latest iteration of David's GeosatSignal7 program suite for ease of use and flexibility.

Fig 5



The image shown here has the processing tab open, revealing access to the various preset and user definable settings. After selecting the RGB option under false colour all the settings controls become accessible and by assigning images to the RGB channels they can then be combined and altered to achieve the desired display. There are several useful primers available courtesy of Eumetsat, (see the references at the end) and these can make the learning curve a much easier proposition.

There is not the time or space to give every example in this rich vein of satellite processing, but I just wanted to whet your appetite and if you really want take MSG to the max – take a look at the air mass image of fig.7

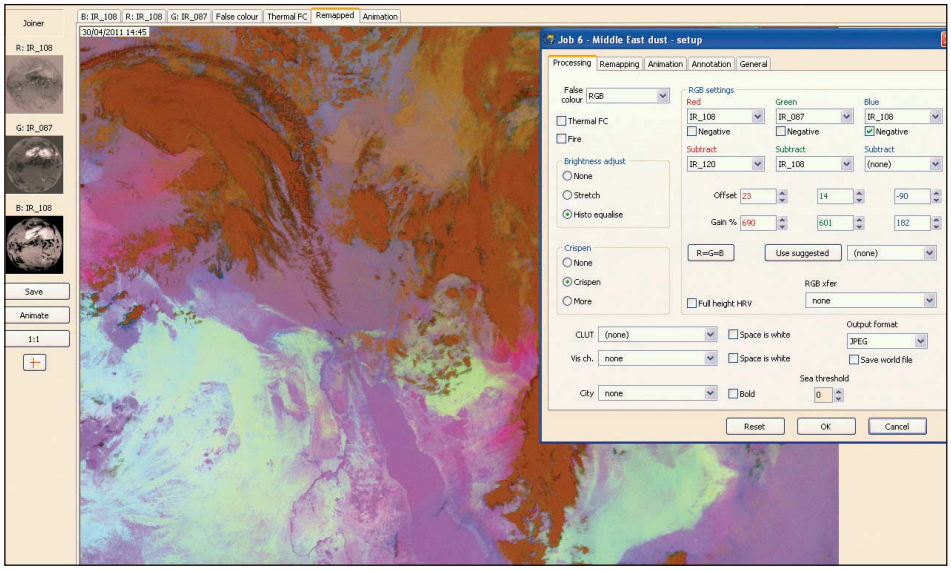


Fig 6

This takes us much deeper into those atmospheric processes which are at the heart of our weather. By careful use of the water vapour channels in particular, whole layers of the atmosphere can be studied. For example the bright orange detail is very dry air – here shown entrained into a depression centred east of Italy . Another dry slot is marking the boundary between warm moist Atlantic air and much colder Arctic air pushing down from Newfoundland, both areas of high potential vorticity. The green areas are warm ozone poor air, and the blue cold ozone rich air. By examining these features meteorologists both professional and amateur can see more clearly significant upper-level flow features including jet streams.

There is enough material under this subject to keep us viewing and interacting for a long time to come, and with David's software RGB settings are now there as text files that can be edited and shared with others. With all this delving comes an expansion of knowledge and a better understanding of what is happening in the air above us , the ground beneath us, and the oceans around us. I am hugely indebted to EUMETSAT and others for all the help that is so freely on offer.

References:

An introduction to the MSG SEVIRI instrument:

http://www.eumetsat.int/groups/ops/documents/document/pdf_ten_msg_seviri_instrument.pdf

Many more can be found from the main Eumetsat document web site and the ones below

Highly recommended Powerpoint primers:

http://oiswww.eumetsat.org/WEBOPS/msg_interpretation/PowerPoints/Channels/IntroRGB.ppt

http://oiswww.eumetsat.org/WEBOPS/msg_interpretation/PowerPoints/Channels/Channel_IR39.ppt

http://oiswww.eumetsat.int/~idds/html/doc/best_practices.pdf

http://oiswww.eumetsat.int/~idds/html/product_description.html

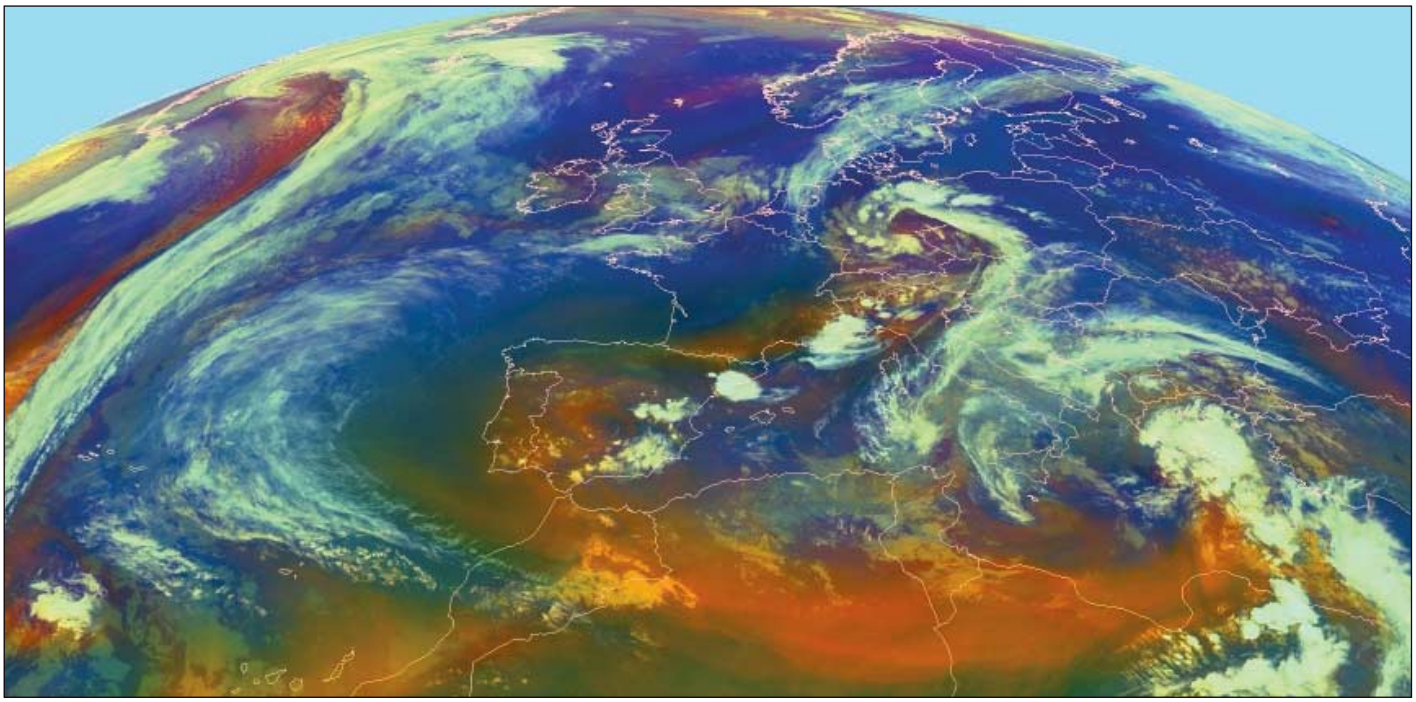


Fig 7

Quarterly Question 30

Francis Bell

Regular followers of the *Quarterly Question* will have recognised my interest in the area of the Indian Ocean containing the islands of Mauritius, Madagascar and the adjacent coast of east Africa. My interest in this area was because of my visit there in December 2010 / January 2011. Nadine and I had booked a cruise starting in Mauritius and finishing in Mombassa. As usual, I took my APT equipment with me and received some interesting NOAA 19 images, one of which was published in GEOQ 29.

Prior to the start of the cruise, we stayed for four days on the island of Mauritius, and for the most part we had hot sunny weather with clear skies. I noticed that each day at noon the sun was overhead. I became intrigued with the sun's elevation and recognised that, at our latitude of 22°south and just seven or eight days after the December solstice, the sun would be very close to overhead at noon each day with an elevation close to 90°.

To confirm this, I tied two of my long shoelaces together and attached a weight at one end. Hanging this in the sunshine allowed me to measure the length of the laces' shadow and hence, by calculation, the elevation of the sun. The shortest shadow I recorded was at 12.18 pm local time on January 2 when the shadow from my laces (which were one metre in length) was 14 mm long. For a solar elevation of 90°, this measurement would of course have been zero.

However, the calculation of

90 - sin (15/1000)

gave the sun's elevation as 89.2°, not quite vertical but near enough to shine sunlight down an open well! What has a well to do with my interest in the sun's elevation?

The Hellanistic Dimension

I remember reading some accounts of the classical scholar Eratosthenes (276 to 195 BC). Part of his work related to the sun and his calculation of the Earth's circumference. He observed that, on one day each year, at the summer solstice, the sun would shine directly down a well in Syene (now Aswan). But on that same day this did not happen in Alexandria, some distance to the north. Legend has it that Eratosthenes was so intrigued with these observations that he sponsored someone to measure the distance between Aswan and Alexandria. The result was a distance of 5,000 Hellenic stadia which is believed in today's units to equal about 925 km. You can check this distance on a suitable modern map.

Eratosthenes had also recorded the angle of the sun at noon in Alexandria on the same day as it was shining down a well in Aswan. With this small number of observation Eratosthenes was able to calculate the circumference of the Earth producing a figure very close to today's accepted value.

The Question

If the circumference of the earth is 40,000 km and the distance from Aswan to Alexandria is 900 km what would be the elevation of the sun at noon in Alexandria on the same day that the sun shone down a well in Aswan; that is, when the sun's elevation in Aswan was 90°?

Notes

Eratosthenes did this calculation the other way round, measuring the sun's angle and then calculating the circumference of the Earth.

Also, Alexandria is not exactly due north of Aswan but it is quite close; and Aswan is not exactly on the tropic of Cancer but again quite close. And for good measure the Earth is not a perfect sphere.

Answers to the nearest whole degree, please, to Francis Bell, by email to

francis@geoweb.org.uk

or by post.

Francis standing in the sun with his shadow directly beneath. Not necessarily an accurate measurement of sun angle because humans can lean several degrees from the vertical and still stay standing. A piece of string and a weight (plumb line) was judged more accurate.

Enhancing Weather Satellite Images with GeoSatSignal

Part 1 - Adding International Flight Position Data

Esko Petäjä

GeoSatSignal is an excellent tool for combining weather satellite data, and is widely used to create composite images from two or more Meteosat channels. But the program can also handle data from other sources. For example, it is possible to combine satellite images with other data like

- Backgrounds from Blue Marble [1]
- Bracknell charts
- *Blitzortung.org* Europe overlays [2]
- European rain radar from Ton Lindemann.

This article explains how weather satellite data can be combined with aircraft flight position data. This interests me because I am a Private light-aircraft pilot and need to know that planes will have a safe flight, and not hit bad weather. In the first part of my article, I will concentrate on international flights. My project has been developed together with David Taylor, who has extended *GeoSatSignal* [4] to provide a calibration point for the *Plane Plotter* software [3]. This was a great help and essential to the success of this project. I have noticed that there are several HAM-Radio operators within GEO and this article includes also, some HAM radio perspective.

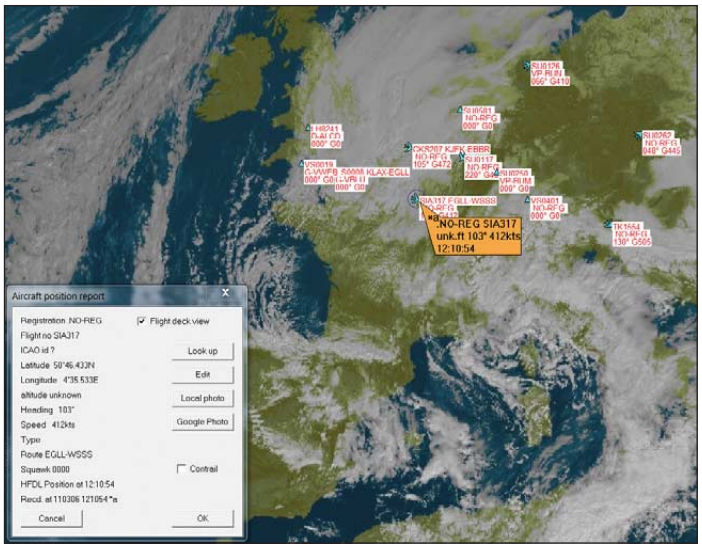


Figure 1 - International flight position data combined with a Meteosat-9 HRV (channel-12) image

Station Setup

My station consist of the following components.

- A *EUMETCast* receiving system
- *MSG DataManager*, *GeoSatSignal* and *MapToGeo*
- An HF Antenna.
- An HF Radio (SRD-14)
- SDR Radio software
- *PC HFDL* software from Charles Brain
- *Plane Plotter* software from NOAA.

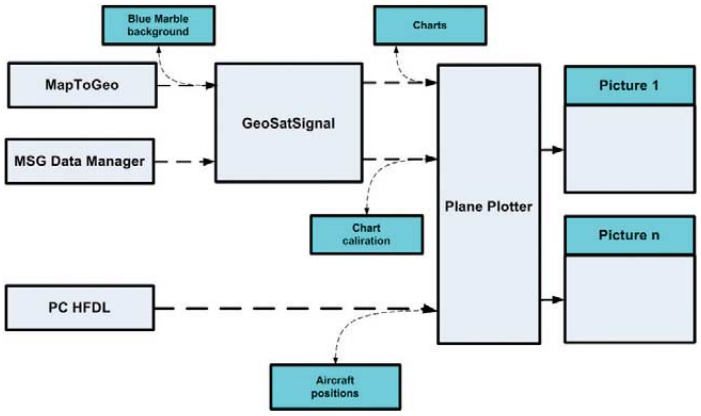


Figure 2 - System Data Flow

Data Flow

The data flow in my system is as follows (figure 2).

- *MSG DataManger* notification starts *GeoSatSignal* using command line parameters
- A *GeoSatSignal* Job provides update charts for *Plane Plotter* and Chart calibration files
- A background map is developed from 2-km *Blue Marble* data using *MapToGeo*
- *PC HFDL* provides aircraft positions to *Plane Plotter*
- *Plane Plotter* then saves a picture every 15 minutes.

Station Diagram

My station consists of the following, shown schematically in figure 3.

- A *EUMETCast* receiving system with *GeoSatSignal* providing the data for *Plane Plotter*
- An HF receiving system (I use the SDR-14 Radio)
- A decoder PC running *PC HFDL*
- A Station running *Plane Plotter.*

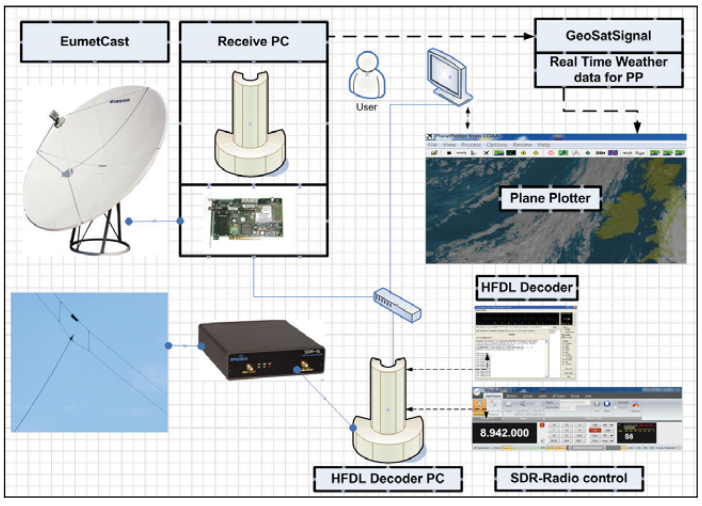


Figure 3 - The Station Diagram

Figure 4 - HFDL Ground Station Locations in Europe

Figure 5 - An HFDL Ground Station Antenna in Panama

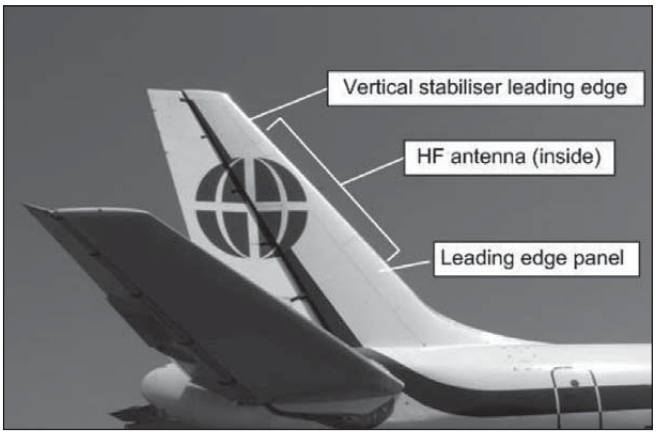


Figure 6 - The HFDL Antenna on an Aeroplane

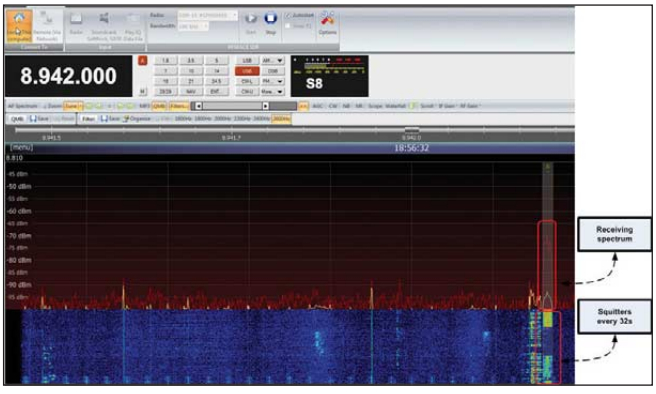


Figure 7 - The Spectrogram Display

Position Reporting System for International Flights

The position reporting system for international flights is based on SATCOM satellite communication or on HFDL (an HF data link protocol). These systems are operated by Aeronautical Radio Incorporated (ARINC). HFDL coverage provides a highly cost-effective data link capability for carriers on remote oceanic routes, as well as the high latitude polar routes, where SATCOM coverage is unavailable. HFDL is costs less than SATCOM, and many carriers are using HFDL instead of satellite services, or as a backup system.

HFDL is still the only data link technology that works over the North Pole, and provides continuous, uninterrupted data link coverage on the popular polar routes between North America and eastern Europe and Asia. There are 16 HFDL ground stations covering the globe. In Europe (figure 4), there are stations in Iceland (Reykjavik), Ireland (Shannon) and the Canary Islands. Figures 5 and 6 illustrate a typical ground station antenna system and the receiving antenna on an aeroplane.

Receiving Aircraft Position Data

I use the *SDR-14* software-based radio to receive signals from ground stations. This radio has excellent software, including spectrum and spectrogram displays. Figure 7 shows the reception spectrum and the squitters sent every 32 seconds in spectrogram display.

Prediction of correct receiving frequency

HFDL uses a variety of different HF frequencies (all below 30 MHz) according to the time of day. The frequency selected depends upon the conditions within various atmospheric layers. Figure 8 illustrates the atmospheric layer effect on communication. The easiest way is to use a higher frequency during daytime and lower one at night. I use following procedure to check the availability and frequency of ground stations.

- I first use the *VOACAP HF* propagation program to select the correct frequency to be used (VOACAP is an HF frequency planning system used by *Voice of America* in their frequency planning)
- My friend Jari Perkiönmäki (OH6BG) developed for me special version of his web based program
- After finding the first available ground station, *PC HFDL* reports the frequencies used by other stations. Using this information, I can change to the frequency of different stations.

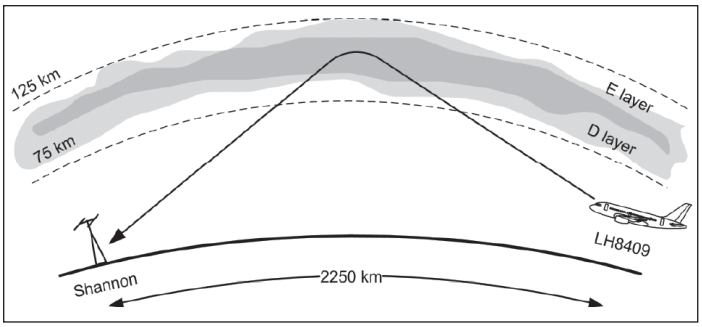


Figure 8 - How the atmosphere affects communications

Decoding HFDL

Decoding of HFDL is done using the *PC HFDL* program which runs on a dedicated PC and writes log files for *Plane Plotter*. HFDL uses phase shift keying (PSK) at data rates of 300, 600, 1200 and 1800 bps, the rate used being dependent on the prevailing propagation conditions. Connection between the radio and the software in made through a sound card or a virtual audio cable. Figure 10 shows the screen output as *PC HFDL* decodes flight positions, and shows the active ground stations and their frequencies.

Making Backgrounds for GeoSatSignal

I use the *MapToGeo* program to develop backgrounds for *GeoSatSignal*, based on 2-km/pixel Blue Marble images from NASA. I generate three different types of background, one for FSD, one for HRV and a third for HRV-north. Using *MapToGeo* is quite easy.

From the menu bar, load a 2-km/pixel Mercator *Blue Marble* image, then click on the **<Remap to>** option to display a drop-down menu of mapping options. Part of this list is illustrated in figure 9, where my three preferences are highlighted.

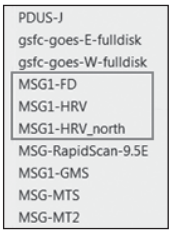


Figure 9

MapToGeo default file names could be used. Files are saved in same directory where *GeoSatSignal.exe* is located.

Scripting in MSG DataManager and GeoSatSignal

Automation and scripting requires the following actions:

- Activate 'Notify scan end' under 'Program controls' in *MSG DataManager*
- *MsgNotify.bat* will be called after each end of scan
- *MsgNotify.bat* will start the required *GeoSatSignal* Job in background mode.

Using Plane Plotter

There are multiple possibilities for using *Plane Plotter* but, until now, I have been working with three different user scenarios. There is easy chart selection in *Plane Plotter*.

- Automatic Chart calibration from *GeoSatSignal* to *Plane Plotter*
- Chart 1: Visible HRV Channel 12
- Chart 2: *Blue Marble* background
- Chart 3: Cloud top.

Chart Calibration

Chart calibration needs to be done so that *Plane Plotter* understands coordinate systems on weather data. Plane Plotter has manual calibration, but this is very time-consuming, and the 'automatic calibration points' feature of *GeoSatSignal* is great help. Calibration points are generated according to the selected projection and area in the *GeoSatSignal* Job.

Different Chart Types

Different chart are used for different scenarios: a visible chart show planes in standard Wefax presentation, a *Blue Marble* background is useful for showing planes during daytime, while the cloud top option shows if planes are hitting dangerous weather. There are also many other possibilities but I have not yet had time to work these other scenarios out. As soon as I have time, I plan to work for different cloud type and fog detection. Additionally, at present, I work using a fixed area defined by a *GeoSatSignal* Job. If I need more positional accuracy, I zoom in manually.

I have also tested the possibility of having a dynamic area, where remapping is done according the real-time plane position. *Plane Plotter* has an interface which gives the position for a selected plane and I can use this position as parameters for remapping. Figure 11 shows planes plotted on a *Visible* chart (HRV Channel 12), figure 12 on a *Blue Marble* chart, while figure 13 shows planes approaching the UK on a *Cloud Top* chart.

Time Based Output of Plane Plotter

Plane Plotter offers the possibility of generating an output file (GIF) or video (AVI) according to defined intervals, and including weather data and plane positions.

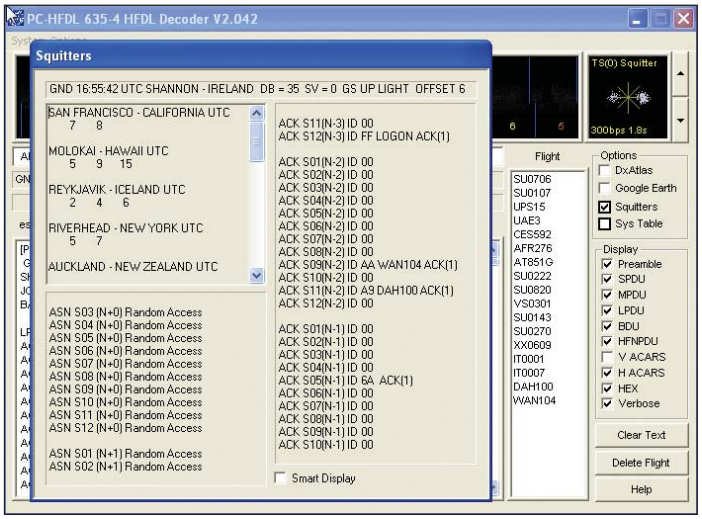


Figure 10 - The PC HFDL Screen Output

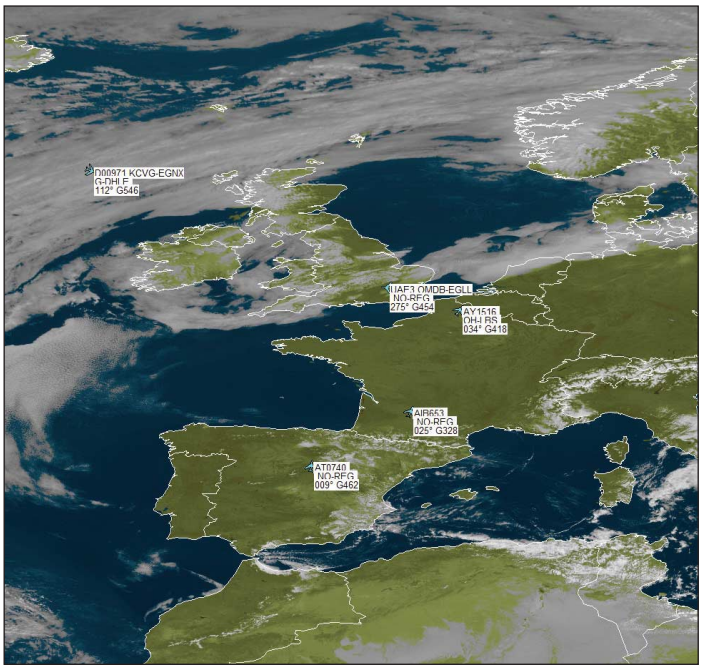


Figure 11 - Visible Chart (HRV Channel 12)

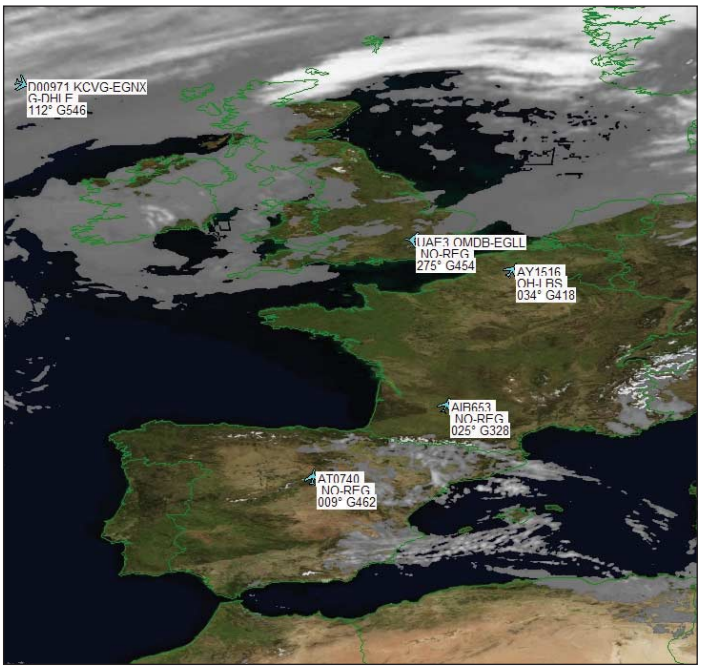


Figure 12 - Blue Marble Chart

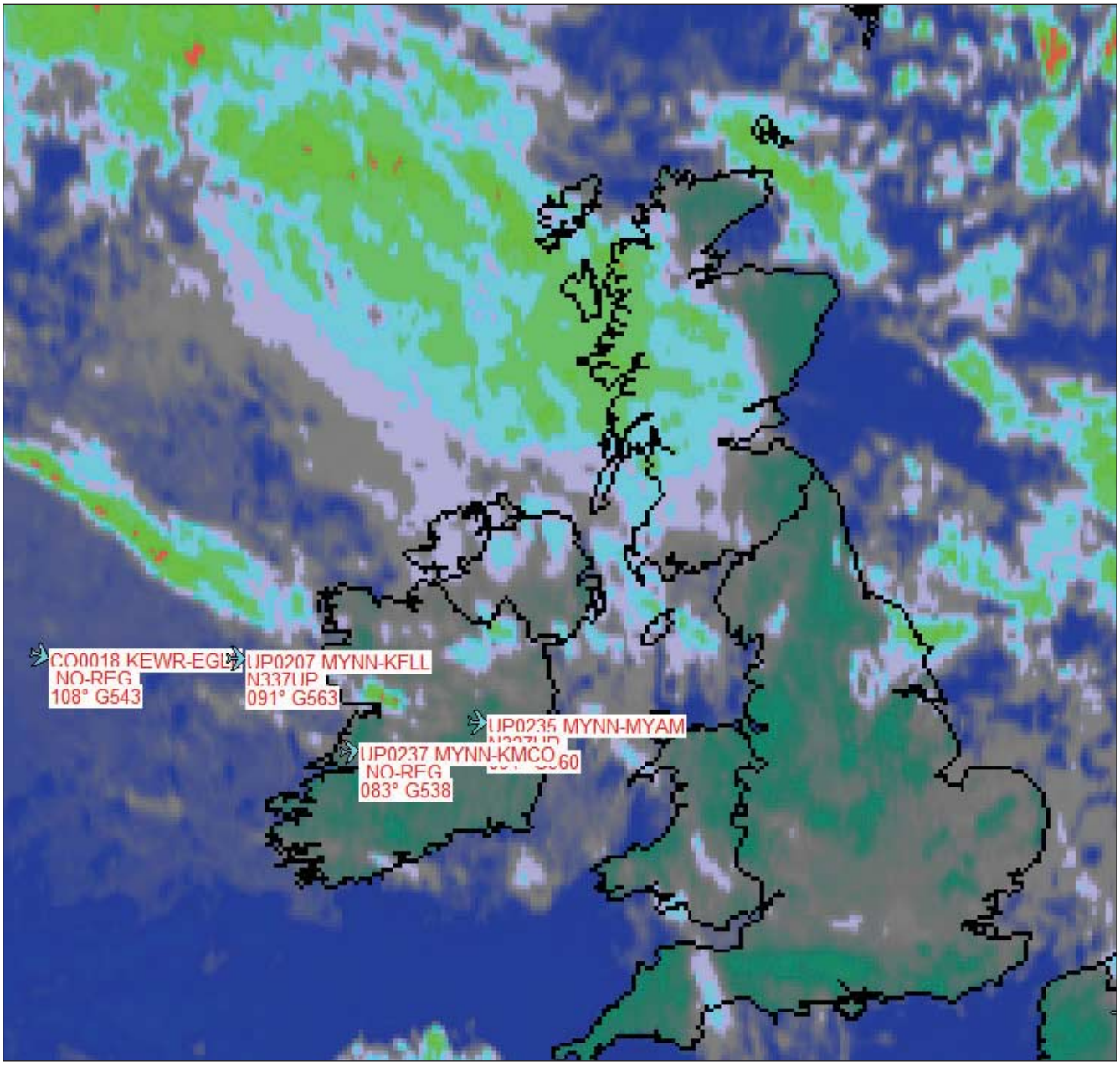


Figure 13 - Planes approaching the UK plotted on a Cloud Top Chart

By using such an animation, the progress of a flight can be generated.

Figure 14 shows *Finnair* flight AY 1516 bringing tourists back from the Canary Islands after a successful holiday.

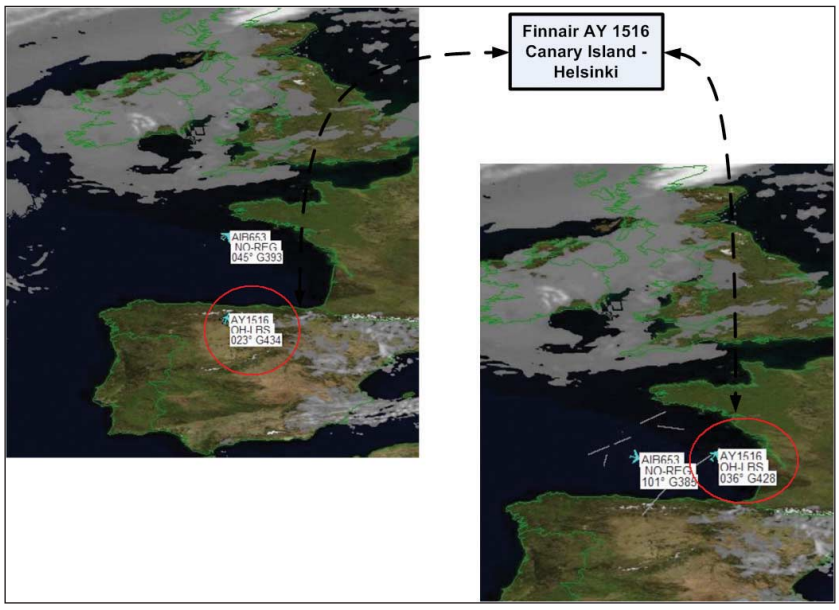


Figure 14 - Tracking a Finnair holiday flight

References

1 Blue Marble
http://earthobservatory.nasa.gov/Features/BlueMarble/

2 Blitzortung
http://www.blitzortung.org/Webpages/index.php

3 Plane Plotter
http://www.coaa.co.uk/planeplotter.htm

4 GeoSatSignal
http://www.satsignal.eu/software/geosatsignal.htm

Record loss of ozone over Arctic

John Tellick

ESA's Envisat satellite has measured record low levels of ozone over the Euro-Atlantic sector of the northern hemisphere during March.

This record low was caused by unusually strong winds, known as the polar vortex, which isolated the atmospheric mass over the North Pole and prevented it from mixing with air in the mid-latitudes.

This led to very low temperatures and created conditions similar to those that occur every southern hemisphere winter over the Antarctic.

As March sunlight hit this cold air mass it released chlorine and bromine atoms – ozone-destroying gases that originate from chlorofluorocarbons (CFCs) and break ozone down into individual oxygen molecules – predominantly in the lower stratosphere, around 20 km above the surface

Ozone is a protective atmospheric layer found at around 25 km altitude that acts as a sunlight filter shielding life on Earth from harmful ultraviolet rays, which can harm marine life and increase the risk of skin cancer and cataracts.

Stratospheric temperatures in the Arctic show strong variations from winter to winter. Last year, temperatures and ozone above the Arctic were very high. The last unusually low stratospheric temperatures over the North Pole were recorded in 1997.

Scientists are investigating why the 2011 and 1997 Arctic winters were so cold and whether these random events are statistically linked to global climate change.

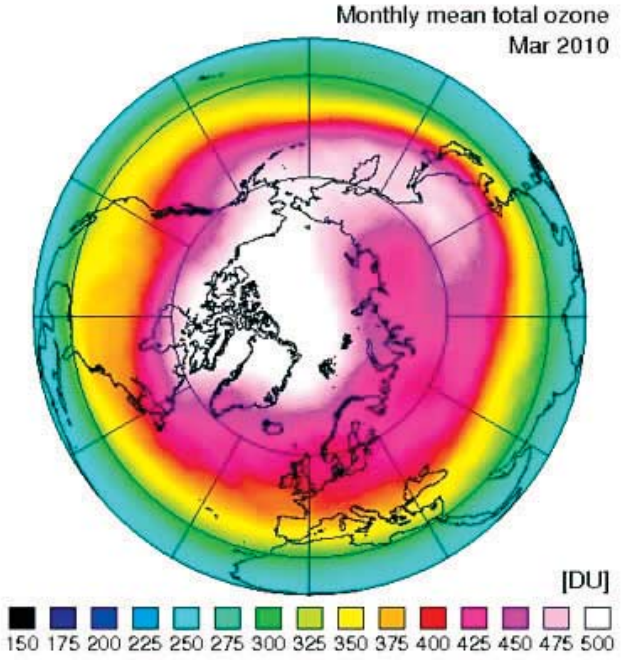
"In a changing climate, it is expected that on average stratospheric temperatures cool, which means more chemical ozone depletion will occur," said Mark Weber from the University of Bremen.

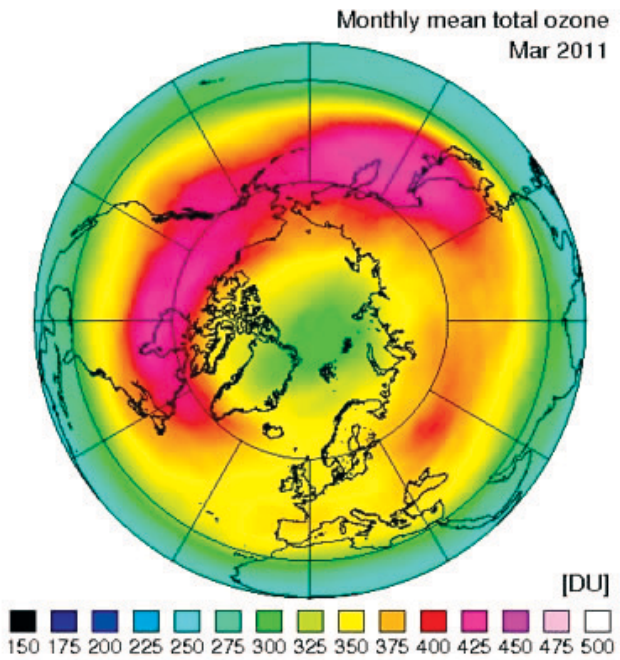
"On the other hand, many studies show that the stratospheric circulation in the northern hemisphere may be enhanced in the future and, consequently, more ozone will be transported from the tropics into high latitudes and reduce ozone depletion."

Answering this question requires more research on ozone modelling and ozone trend monitoring, which is only possible because of the historic satellite data on record. ESA's Climate Change Initiative Programme has a project dedicated to this research.

"Measurements from the Envisat's Sciamachy, MIPAS and GOMOS instruments are providing unique ozone information that is important in enabling scientists to separate chemical and dynamical changes and helping to identify the influence of climate change on the stratosphere. It is, therefore, essential to keep these instruments measuring for as long as possible," said Weber.

Banned under the Montreal Protocol, CFCs have still not vanished from the air but are on the decline. Nevertheless, strong chemical ozone depletion will continue to occur in the coming decades during unusually cold Arctic winters.





Now you See it Now you Don't

John Heath

Geo readers will know that sun angle makes a significant difference to the appearance of ground features. I had this illustrated perfectly on a field I can see from my home.

There is a difference in the appearance of the grass on the slope, rough and un-grazed, compared with the top where it is grazed but the recently erected post and wire fence is invisible at sun angles above about 30 degrees. At low sun angles it is very prominent.

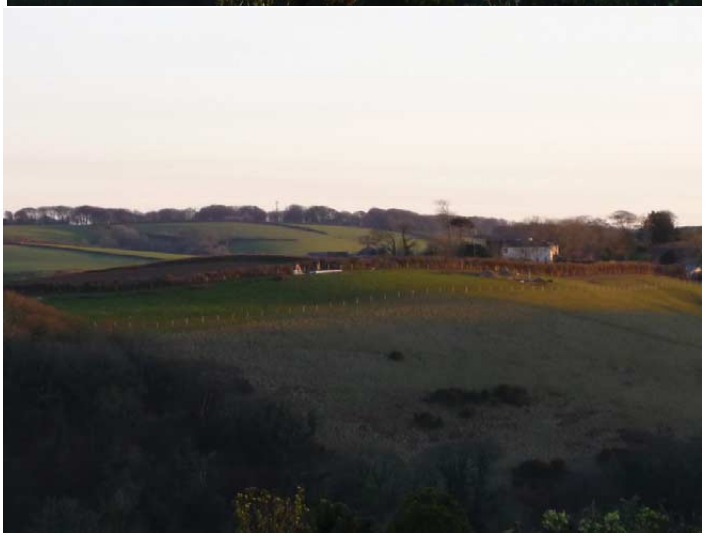
I decided to take a short set of images and co-relate them with the Suns position. (Taken from my satellite tracking software). The digital camera was set up and left in place and I took a shot from time to time. I might try another series at precise intervals then compare the images.

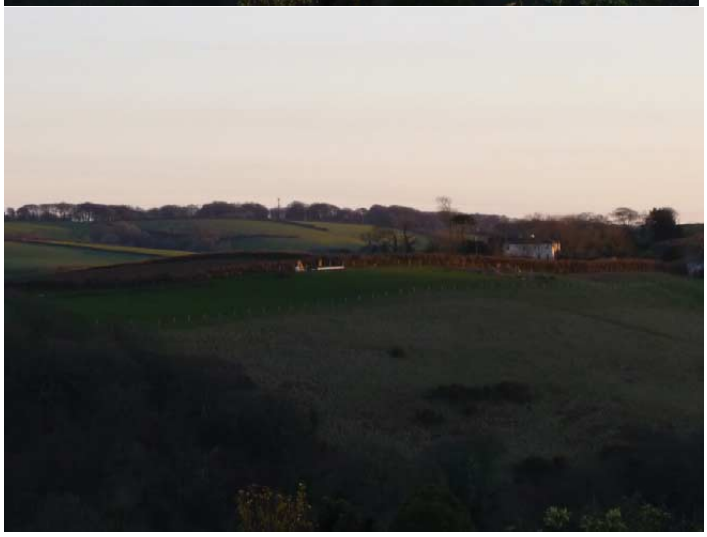
Date: March 21st 2011 Place: Cornworthy Devon

Time GMT	Sun Azimuth	Sun Elevation
1615	245	20.4
1715	258	11.2
1747	264	6.6
1759	266	4.5
1809	268	2.8
1815	269	1.8

Sun going behind nearby hills

You will notice quite a bit of haze in the first picture which is almost cleared an hour later. It's not the haze that obscures the fence in the first picture.





View from North Cyprus

Nigel Heasman - www.nigelheasman.com

Fig1 Maronite fields

Winter is now almost past and we have been enjoying some lovely spring-like days, with lots of flowers appearing over the last few weeks. As I write, in early March, we are in the 'yellow phase', with the gorse in bloom and scenting the air wonderfully.

Although we have not had a lot of rain over the last few months, there have been some quite dramatic thunderstorms. Sadly, the reservoirs are still only about two thirds full—in previous years they had been overflowing by this time. The problem is that it has been the 'wrong sort' of rain! Most of the rainstorms have been brief and heavy and a lot of the water has run off the surface and down to the sea instead of finding its way to the reservoirs either via the streams or the underground aquifers,. The sea then takes on a very muddy look for up to a mile off shore. The amount of rainfall so far this year has been well below average, as you can see from figure 2.

The coastline of North Cyprus is mostly rugged and rocky, with only a few sandy beaches. The caves at sea level are a favourite breeding ground for the monk seal

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

and, although their numbers are declining due to expanding human activity, there is still a small population living here (figure 3 and above).

A couple of miles westwards from my home there is a very fertile area where a Maronite community live and work.

http://www.maronitesofcyprus.com/cgibin/hweb?-A=841&-V=history

These are very hard-working people and the crops growing there are a tribute to their skill and industry. Almost every available patch of land has been cultivated (Fig.1). By the look of it, the crop will be ready to harvest in a couple of months (mid May) and then the area will slowly take on a brown and dried-up appearance for the long hot summer. The soil there becomes very sticky after a rain shower but soon dries up when the sun comes out. This is one of my favourite dog walking areas, with only the sound of the insects and the breeze in the crops to disturb the peace and quiet.

During early March, a deep low pressure area was centred over this part of the world and it brought a marked drop in temperature by drawing cold air down from Russia, the Black Sea and central Turkey. One night we had a dramatic thunderstorm along with over 8 mm of rain in an hour.

It shows up quite well on the picture (Fig.4) which is a MSG HRIT channel 9 image enhanced with false colour (using GeoSatSignal and LutLandSea-r2b) to show the cold cloud tops. The air temperature has dropped from a respectable 15C a couple of days ago to 4.3C last night! One advantage though is that the cooler air has cleared the haze and now the mountains in the south of Turkey (Fig.5), approx. 50 miles away, are clearly visible with their snow covered peaks.

Speaking of Turkey and water, I read in the local English language newspaper (Cyprus Today) that the pipeline project, to bring water from southern Turkey to North Cyprus, has at long last actually started. The Prime Ministers of Turkey and Northern Cyprus recently attended a ceremony to lay the foundation of the new dam at Alakopru, in Anamur, southern Turkey. The pipeline, 107 km long and suspended 250 metres under the sea, will be capable of transporting 75 million cubic metres of drinking and irrigation water annually. Another interesting fact to emerge is that the new dam will also be used to generate electricity which will be carried to the island.

The project completion date is anticipated to be in 2014.

A sure sign that spring is here is the arrival of migrating swallows, en route to northern Europe for the summer.

There must have been dozens flying around in their graceful fashion, catching insects on the wing. Normally arriving in early March, they were a little late this year, delayed no doubt by the cool weather.

New leaves are appearing on the grape vines and the orange tree blossom has started to show—a wonderful example of the ever changing seasons.

That's about all for now, from the Turkish Republic of Northern Cyprus— the sky has cleared, the temperature is slowly rising and, with the sun shining all and every day, the neighbours pool will soon be warm enough to swim in.

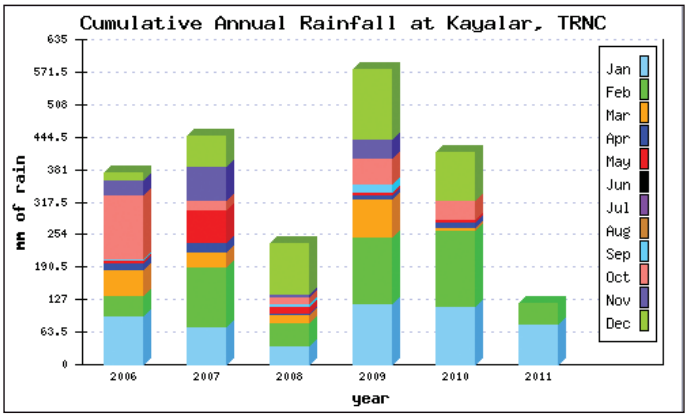


Fig 2 - Rainfall Graph

Fig 3 Coastal view of Monk Seal area

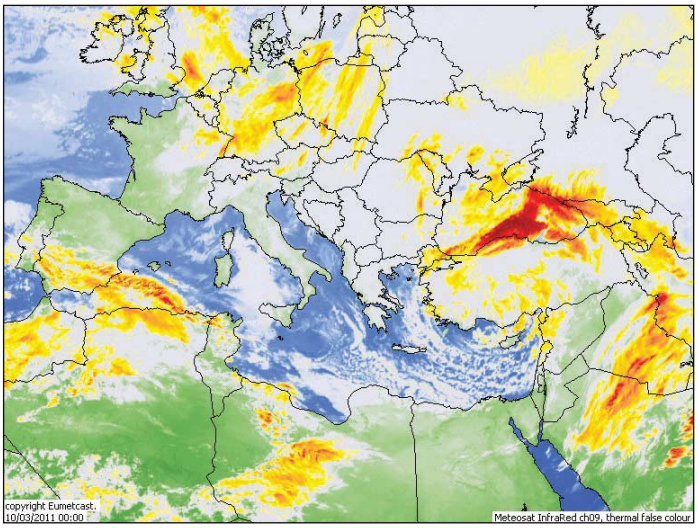


Fig 4 MSG HRIT channel 9 image enhanced with false colour (using GeoSatSignal and LutLandSea-r2b)

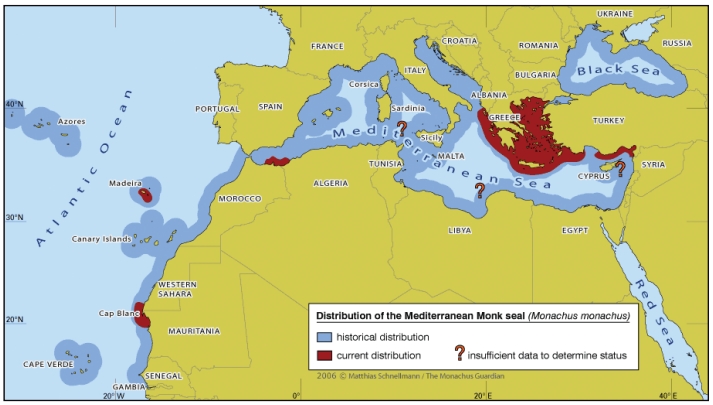
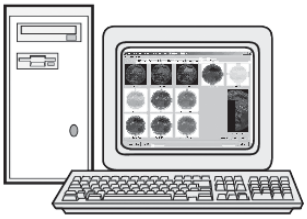


Fig 5 Map showing the distribution of the Mediterranean Monk Seal

Fig 5 Mountains in the south of Turkey

Figure 6 - Local mountain

Computer Corner



Douglas Deans – dsdeans@btinternet.com

When it comes to plans to upgrade our computers how often do we concentrate on improvements to the computer itself or indeed the keyboard or mouse. It surprises me how frequently the monitor is relegated to the bottom of our list despite the fact that it is our visual link to what is going on. It is very easy to make our eyes tired or indeed to damage them and yet many people are still using old CRT monitors with their distorted and aging screens which must make the whole computer experience a less enjoyable one. I changed to LCD technology many years ago and as is often the case, once done, I wished I had changed much earlier. The difference is unbelievable. Crisp clean images and every pixel perfect on the whole of the screen. No edge distortion to strain the eyes and the added bonus of much cheaper running costs. Old worries, back in the early days of LCD monitors, about refresh rates are long gone and even the issue of dead pixels has been greatly reduced. I have had 3 LCD monitors not because of any problems I hasten to add, but simply my desire to increase screen size to view those high resolution images and animations from my Eumetcast system. Incidentally I have never had a problem with dead pixels on any of my monitors.

The life expectancy of LCD far exceeds that of the CRT monitor although I accept that nowadays the pace of technology more dictates our updating habits.

So perhaps it is time to give your eyes a treat. LCD monitors are now relatively cheap even for larger screen sizes and good quality widescreen 22 inch monitors are available for well under £200 or just a couple of pairs of glasses !

I was asked sometime ago for an explanation of the term dead pixels. In fact there are two terms used to describe pixel problems. Dead and Stuck Pixels. This, of course, is only relevant to LCD monitors.

To understand how pixel problems develop in an LCD monitor, it is important to have a basic understanding of the underlying technology of the LCD monitor. Unlike CRTs that are actively generating the light through phosphors, an LCD actually takes white light and filters it to get the desired colours. To do this for each given pixel, three sub pixels are defined for red, green and blue light. When the sub-pixel is off, the filter will block the specified colour of light. When the sub-pixel is on, it will open the filter to let a desired amount of light through.

A dead pixel is defined as a pixel or set of sub-pixels that has failed and is permanently in the off position. This condition means that the pixel will not let any light through. This can be observed as a dark or black spot on a brightly coloured or white background (but obviously not seen when the screen is black). Dead pixels are quite rare and are less noticeable to the user.

A stuck pixel is defined as a pixel or sub-pixel that has failed and is permanently in the on position. This can be either with a single or multiple sub-pixels for a given pixel and is best observed on a dark or black background. A white pixel means all three sub-pixels have failed while a green, red or blue pixel means one of the sub-pixels has failed.

Some people do wonder why pixel defects are allowed but it is simply unreasonable not to expect occasional occurrences. Perhaps another way to look at it is that a guarantee of no dead or stuck pixels would make the cost prohibitive. We must remember that LCD panels are very complicated devices to put together. Each pixel in an LCD monitor is controlled by a number of transistors embedded into sheets of material. For example, a 15" LCD with a resolution of 1024x768 has 786,432 pixels comprised of 2,35,9296 sub-pixels, and that is a lot of transistors! Monitors with higher resolutions will have an even greater number of pixels. Even a small impurity in the layers that make up these pixels can result in a pixel defect.

If the manufacturers were to throw out every panel that even had a single defect, the cost to produce LCD monitors would be so high that no consumers would be willing to purchase them. To help them financially produce the panels, the manufacturers have defined a certain percentage of pixels that can be defective but still allow them to sell the panel. This percentage is extremely small, equating to under 1/100th of a percent of the total number of pixels. With improved technologies and techniques, the number of panels being produced with defects is dropping and as I mentioned earlier I have not experienced a single pixel issue on any of my three LCD monitors or indeed any of my LCD televisions.

Manufacturers have their own replacement policies for LCD monitors and those vary from one producer to another, so it is important to read their policy with regards to what number of stuck or dead pixels are allowed before the unit can be returned. There is a further complication because some manufacturers not only refer to the number of dead pixels but also their location and those parameters can vary with the size and model of the monitor. Clearly a cluster of dead pixels will look worse than a few scattered throughout the whole screen. By the way just be sure that it is a pixel issue and not a fleck of dust (or worse !) on the screen. It is amazing how similar the two can look and it would not be the first time that I have wiped away a dead pixel !

In addition to the manufacturer warranty, look at the replacement policy of the retailer that you are purchasing the monitor from. It is very likely that the policy of the retailer may be better than that of the manufacturer allowing another avenue if the newly purchased monitor has a number of defective pixels.

So to summarise it is very important to be a well informed consumer when purchasing an LCD monitor. Research the warranty and replacement policies from the manufacturer and retailer before making a purchase. Be sure to understand what the terms of the different types and locations of pixel defects mean. All of this can help alleviate frustration if the monitor that you purchase does not meet your standards of quality.

Regular readers will know that I have been detailing channel by channel, file and data types sent through the Eumetcast system. So far I have looked at Channels 1, 2, 3, 4 and 5. This quarter I want to look at one of the EPS channels, as I would

like to concentrate initially on channels most likely to be of interest to amateurs. In due course I do hope to eventually complete all channels but it is quite an undertaking and many of the channels have non image data only of interest to professionals and in particular those involved in Nowcasting. So this quarter I will look at channel EPS-10.

I have the usual list of latest programs from David Taylor and also a new program from the pen of Francis Breame specifically for those involved with the EnviSat project. So please read on.

EPS-10

Firstly some background information about the EPS system. The Eumetsat Polar System (EPS) is Europe's contribution to a joint European and US operational polar satellite system where Europe covers the mid-morning (AM) orbit and the US covers the afternoon (PM) orbit. Metop (although jointly developed) is the European satellite which delivers high resolution sounding and imagery products in global coverage.

The data provided by Metop (and some of the NOAA data) is distributed through Eumetcast in channels prefixed by EPS. There are currently 17 active EPS channels.

EPS-10 is one of the most fascinating channels and provides two data types. Probably the most interesting to amateurs is the full resolution, 5 channel global HRPT data which is quite stunning. As each orbit data is downloaded at the Svalbard receiving station this data is about 115minutes delayed. Do remember that this is global data. Of course as we have already dealt with in previous journals there are other Eumetcast services which provide the European subset of this data more timeously. By the way at the time of writing, Eumetsat have plans to carry out tests using another station at McMurdo in the Antarctica which should improve the timeliness of the global data to about 65 minutes.

Here is an example of the typical file type provided for the global AVHRR service on channel EPS 10.

AVHR_xxx_1B_M02_20110415194903Z_20110415195203Z_N_O_20110415211404Z

Each file is approximately 28MB in size.

One of the great advantages of global HRPT data is that we are able to see fabulous images and fascinating meteorology in parts of the world not normally available to us. I find some of the South Pole images just breathtaking and when the sun is low it provides the further advantage of fascinating topography. As an example of this GDS data, I have included an image of the South Pole taken on the 31st October last year as Antarctica's summer approached.

The Ross Ice shelf and Murdoch Sound predominate the image which is shown on the inside back cover.

The second data type on this channel is the Polar Winds from Metop providing winds at all heights below the tropopause in the polar regions (latitudes higher than 55º). This data is derived from the Metop AVHRR instrument IR 10.8 channel and each file is provided in bufr format. A typical file takes the following form.

a v h r r _ 2 0 1 1 0 4 1 5 _ 2 2 2 8 0 3 _ metopa_23289_eps_o_amv.l2_bufr

There are approximately 150 files per day.

Program Updates.

EnviHamBrowse Version 0.1.2110326 by Francis Breame.

Many folk will have heard of the EnviSat project which has been reviewed and discussed in a number of previous quarterlies. I have not, as yet, applied to be part of the project, so I am not able to properly test or review any software associated with receiving this data.

However I know that Francis Breame has recently written software specifically to speed up opening of coverage files (see page 24). It has been reported that VISAT which is the ESA supplied file viewer can be rather slow in opening files. To help alleviate that problem Francis has written a front-end browser (called EnviHamBrowse) to speed things up and allow a quicker selection of which files you wish to open and view in VISAT. Once again this is a free download from Francis' pen.

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

http://www.vf0123.btinternet.co.uk

David Taylor's programs (latest releases).

Just a reminder that the list below is for fully tested releases and does not include the latest beta (or alpha) versions currently on test. Those can also be downloaded from David's site.

http://www.satsignal.eu

ATOVS Reader	v 1.2.2
AVHRR Manager	v 2.0.6
BUFR Viewer	v 1.1.8
CMA Viewer	v 1.2.0
DWDSAT HRPT Viewer	v 1.2.4
GeoSatSignal	v 7.2.2
GRIB Viewer	v 2.3.10
GroundMap	v 2.1.6
HDF Viewer	v 1.4.4
HRPT Reader	v 2.10.0
Kepler Manager	v 1.4.2
MapToGeo	v 1.1.8
Metop Manager	v 1.4.8
MODIS L1 and Fire Viewer	v 1.0.4
MSG Animator	v 2.5.46
MSGData Manager	v 2.5.46
PassControl	v 3.2.4
SatSignal	v 5.2.2
Sea-Ice & SST Viewer	v 1.4.2
Wxtrack	v 3.8.12

Cover and Back Cover Images

Continued from page 24

In this image, plankton blooms are visible in the Atlantic as blue and green swirls. (The various shades of green and tan in the English Channel and around Wales are due to sediments being transported in the water.)

MERIS acquired this image on 8 April at a resolution of 300 m.

Credit ESA.

Back cover Image

New Zealand December 3rd 2010 from Metop A received via EUMETCast and using the vegetation tab of David Taylor's HRPT Reader

Envisat DDS with Windows XP

Mike Stevens

You might say: 'not again'. Yet another new system to sort out. But that's what our hobby is all about: trying to achieve results that only professionals can aspire to—and in most cases we can, and do.

On that basis, I felt that *Envisat DDS* just had to be looked at, so my journey began. It was the publication of the pictures in *GEO Quarterly* that caught my eye. They were stunning and I thought that was something most amateurs would love to achieve. So I am going to give it a try.

The first part of the process was to contact the *Envisat DDS* team and apply for a licence, which I did. The response by email was very quick indeed, enclosing several documents that need to be read carefully, as well as an application form to gather information on yourself and your station. Once that was completed, I returned a copy by email and posted the original by first class airmail. Again the response was very quick indeed.

What followed was an email with six PDF attachments which I would advise you to read immediately. One of the documents (APP-ADU–0102-029 Iss3-0 RXPC Rqmts) needs a reply about all the local details of your station and equipment, quoting IP addresses and MAC Codes for the receiver. These are required to enable the DDS Team to supply you with a *Site Key* and a *DDS Key*. My advice is to read and digest these documents to ensure that you give the correct information on the form, or it will delay the process.

The receiver I was originally going to use was the *Technisat Skystar USB 2.0*, but on initial tests the signal strength was very poor, so I switched immediately to the *DVB World* receiver. What a difference that made.

The *DDS Receiver* software you require will be sent to you via email, with instructions on installation. Once *DDS Receiver* has been installed on your PC there comes an important part of the process where you have to give the correct MAC Code for your receiver. The best way to do that in Windows XP is to click <Start - Run> and enter 'CMD' followed by the '*Enter*' key to bring up the Command Box. When you see the flashing icon, type 'ipconfig/all', followed by '*Enter*'. All the hardware attached to your PC will be listed, so look down until you find your receiver's name. What you are looking for is the *Physical Address* of the receiver, and mine was '00-18-BD-00-00-00', so this was the MAC Code that I sent to the DDS Team.

There is also another way to find your MAC Code. If you have *DVB World* installed, open up the program and go to the *IP Config* tab. Open that and, at the lower left hand corner of that box you will see 'MAC Address Information'. This is the code required by the DDS Team. If you are unsure use both methods to get the right code.

A further email will be received containing the DDS Key that has to be entered into the DDS Receiver software to enable it to start. To do this, copy the file from the email and paste it into the DDS Receiver file. Once that is done the receiver will start.

So, having installed the DDS Receiver software and connected your receiver hardware (DVB World model in my case), the next task is to locate the satellite, a very critical part of the operation.

I am using a 1m satellite dish, ground mounted on a stand. I am located on the south coast of England at 70 metres above sea level, with a clear takeoff to all horizons except north, providing a clear field of vision towards the Eutelsat satellite at 10°E. You might think this sounds easy, but not so! With everything that is up there, its like trying to find a needle in a haystack. What you must do is to first locate Eurobird 9 with EUMETCast which, with a 1m dish gives a thumping great signal: mine was 100%.

Having located Eurobird 9 and tested the signal, it is necessary to reprogramme the *DVB World* receiver for Eutelsat W1. Page 7 of the Envisat DDS Receiver manual lists the parameters to set in order to receive Envisat DDS Data. They are:

- Eutelsat W1 at 10 degrees East.
- Satellite Frequency 12621 Mh/z
- Symbolrate 5732 kSymb/sec
- FEC 5/6
- Polarization horizontal
- PID's 230 and 231 (Decimal).

It is particularly important to check that the polarization setting is correct. To do this, go into the *DVB World* settings and open the 'IP Config box'. This displays two panels: on the left 'Satellite Configuration' and on the right (below the Stop/Start IP box) it tells you which settings you have on Eutelsat W1. Make sure you have the correct polarization, i.e. horizontal. If it is vertical, change it or the system will not work.

You may be thinking I have chosen the wrong satellite: shouldn't it be Eutelsat W2A?. This depends on your receiver software. In my case the software listed the W2A satellite at 16°E and the 10°E satellite as W1. Needing a satellite at 10°E, I went for Eutelsat W1. Moreover, it was the *DDS Receiver Manual* that I had taken my settings from so it had to be right. And it was!

This next part is not easy and has to be done carefully. Having located Eurobird 9, I immediately marked a line on the concrete slab in line with the LNB bracket to ensure I could always return to that position and start again. Now determine 10°E using a compass. As described by Arne van Belle's in *GEOQ 29*, the optimal distance between 9°E and 10°E LNBs would be 17mm for a 1m standard offset dish.

I measured 17mm out from my original line, directly below the LNB, and drew a line from that point back to the centre line of the dish's vertical pole. When I checked with my compass it was one degree. When I now moved the dish (using the LNB bracket) to line up with my new 17mm line, my satellite meter read full scale. I then opened up my *DVB World* program to '*Sat Config*' and clicked on 'Lock TP'. This gave really good Signal Strength meter (72%) and Quality (60%) readings. I was now set up and minor adjustments made very little difference to the readings so I locked everything at that.

If you have any problem locating the Eutelsat satellite you can do a scan which will bring in all the stations on that satellite and also confirm you are on the correct Eutelsat W1. Tune to a station called *ANB Arabic News Broadcast*, which has a much stronger signal (89% with me).

I have also gained a bonus from this as I can now receive Eurobird 9 with the dish in that position, at 95% Strength and 60% quality—one dish two satellites. And as I already had two cable feeds to that system, I am purchasing a twin output LNB to run both systems together from the same dish, using a second *DVB World* for EUMETCast.

I had to enter my PIDs, 230 and 231(decimal). Pressing the Scan PID button should enable you to find them: if not, enter them manually.

There is one other very important point, the Envisat *DDS Receiver* comes set with an IP Address of 10.2.0.1, so you have to go into 'Network Places' on your PC, right click on <Properties-Locate DVB Adaptor>, right click 'Go to properties', then highlight 'Internet Protocol (TCP/IP)' then click 'Properties'. Highlight 'Use Following IP'. Enter the IP 10.2.0.1 and make sure the subnet mask is set at 255.255.255.0. Click 'OK' and come out of that system.

Just a note you do not have to use the above IP Address. If you decide on a different one, the file to edit is: dds-recv-cfg.ini. in the [transmission] section and use *Notepad* when editing the file.

A look on David Taylor's excellent website will also give you more information on editing and software changes.

It's a good idea to stop all systems and restart again. This I did and all started working immediately. Envisat data started to come in, success that I did not believe possible. I felt a great sense of achievement.

My thanks to David Taylor and Arne van Belle, for their excellent articles on Envisat DDS. The information from them was very helpful.

Happy weather watch from Portland.

Continued from page 22

http://www.kickstarter.com/projects/dannypier/astdroid-lets-send-a-smartphone-into-space

Many images are "unusable" as "scientific" users would point out, but Sputnik was the start of a small trend that has given us MSG and ENVISAT/METOP.

Problems would be stabilisation, longevity,cost,weight etc BUT, if successful APT transmissions could continue with a suitable vehicle?

Perhaps we could really be THE group that does observe the earth from space with out own payload!

http://www.sstl.co.uk/
http://www.sstl.co.uk/divisions/earth-observation-science/science-missions/strand-nanosatellite

There are "basic" satellites for earth observation in space already, is it possible to receive them directly?, if so how?

http://www.sstl.co.uk/Downloads/Datasheets/SSTL_100Feb-09

David Painter

Storm Dunlop

A free app, tested on an iPod touch.

This application is primarily designed to show when satellites are above the horizon from any given location, and thus when radio signals may be received. It could, however, be used to provide information when certain satellites (such as the International Space Station, ISS) are visible.

There is a large range of satellites available by default, and it is easy to chose which should be displayed. The choice is vast, including categories for amateur radio, earth resources, GPS, geostationary (an enormous list), Iridium, ISS, science, and weather. A lot of the satellites and spaceprobes are only of interest to those who, like bird-watching twitchers, want the satisfaction of ticking them off on a list. I can't see that anyone can otherwise really want to listen to the XMM-Newton astronomy satellite, for example.

The only slight inconvenience, as far as weather satellites are concerned, is that all the NOAA series, for example, and METOPS-A, are listed under their SARSAT numbers. The Satellite Selection function does display the more familiar designations, and by selecting a particular satellite, going to the tracking display (of which more in a moment) and then selecting 'Details' one can enter the NOAA or METOPS-A designation in a 'Comments' field, and this will then be shown on the actual tracking display.

Various options are available under 'Preferences', including setting the default location, the minimum elevation above the horizon, the number of days for which future passes are shown, and the number of days before you are prompted for Kepler updates (which happens when you open the application).

Once set for location, and for a subset of satellites, pressing 'Satellites' shows the selected satellites, with their next AOS or LOS with its predicted time in UTC, and the time (in hours and minutes) until the event. Selecting a specific satellite then shows a black-and-white 'radar-type' plot centred on the zenith, circles indicating elevations of 30° and 60°, the predicted path, and times along the path at 2- or 3-minute intervals. If the satellite in question is above the horizon, it will be shown as a solid black symbol, the position of which seems to be revised every minute. Other data shown are: range, azimuth, elevation (all updated every second), satellite altitude (in km) and velocity (in km/s). Pressing 'Details' from the tracking screen shows a list of future passes, with AOS, LOS, and maximum elevation. Selecting one of these will show a tracking plot, and here the only real fault that I find is that it does not show the date, only the time of the pass.

There is a comprehensive set of information and instructions which are easy to follow and implement.

Satellite Tracker Plus (£1.19 from the App Store), which I have not tried, apparently adds graphical displays of a satellite's ground track and footprint.

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Image of the South Pole taken on the 31st October 2010 as Antarctica's summer approached.
The Ross Ice shelf and Murdoch Sound predominate