

The **GEO** Quarterly



Group for Earth Observation

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

**Number 22
June 2009**



Inside this issue . . .

Ed Murashie recently visited Cape Canaveral Air Force Station's Launch Complex 37B, from where the new GOES-O satellite is due for launch; he now shares his experiences with you.

After western Europe's longest, coldest winter for almost two decades, we have several snow and ice related topics this quarter.

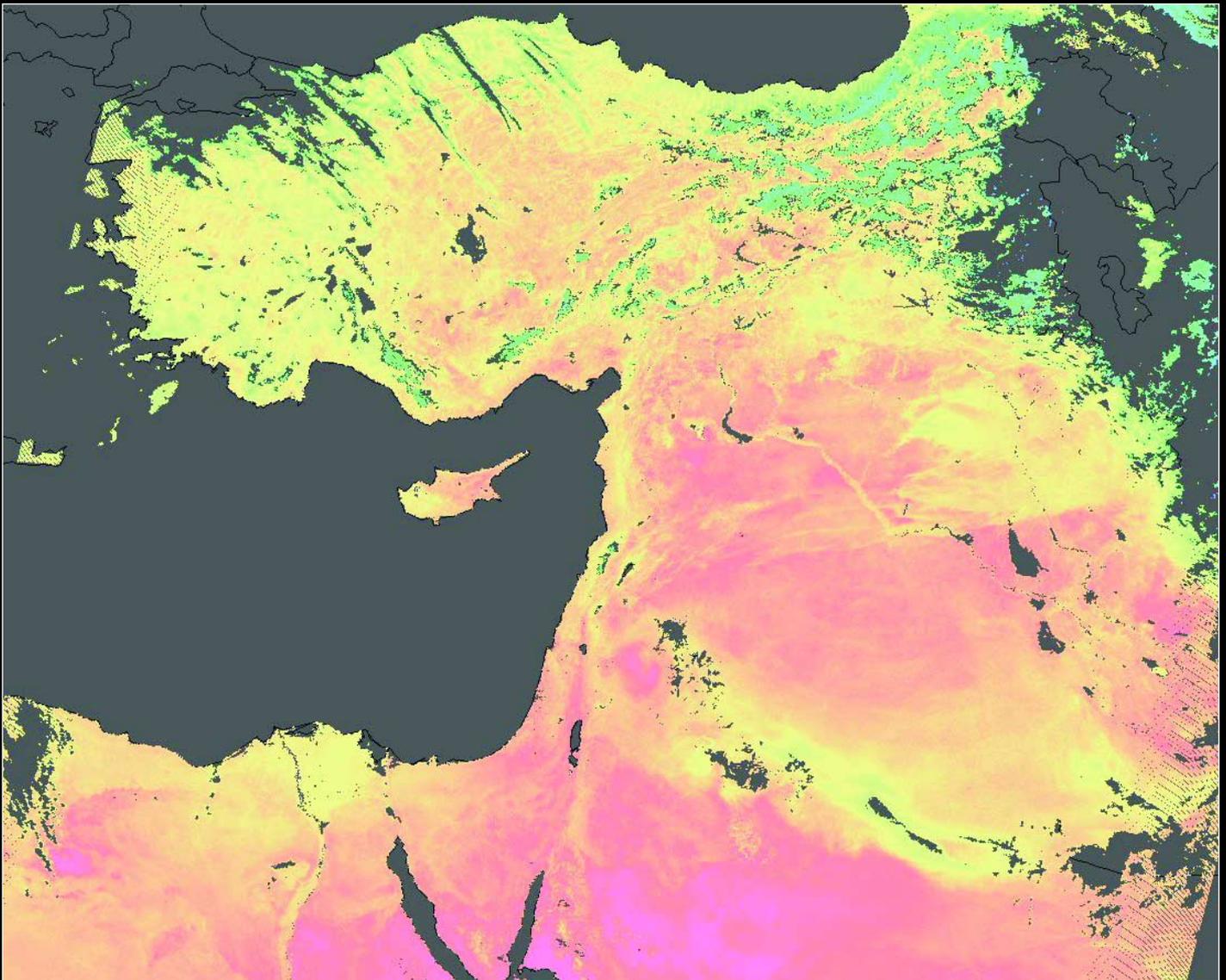
Rob Alblas describes the skating tours over frozen canals in the Netherlands while John Tellick describes how to monitor snow by means of colour composite AVHRR images created by special algorithms.

For the MSG enthusiast, Mike Stevens describes some of his latest experiments designed to streamline reception.

David Taylor outlines the new SAF data streams that are becoming available via EUMETCast and provides an illustrated overview of their usage.

*Following recent debate, Rob Alblas reveals his latest software, **WeView**, designed to make it easier for newcomers to access Meteosat imagery.*

Plus much more ...



An example of the new Land Surface Temperature data now available via EUMETCast
 Douglas Deans (page 42) and David Taylor (page 28) provide information on this new SAF data type

The Royal Meteorological Society



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

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

Some join the Royal Meteorological Society to discover more about meteorology, and the Society's monthly magazine, '*Weather*', which is free to members, appeals to all who have an interest in weather and climate. Its articles cover all aspects of meteorology, and its illustrations and correspondence columns present topical discussions and interesting facts.

As a member of the Royal Meteorological Society you will receive substantial discounts on Society journals, books, weather instruments and gifts, including the Society's calendar. Members are also eligible for grants, innovation funds, and awards. The Society runs a series of national and local meetings and as a member you would be

kept up-to-date with the Society's forthcoming events.

In the membership welcome pack you will receive a cloud identification guide, membership card and pin badge, notepad and pen.

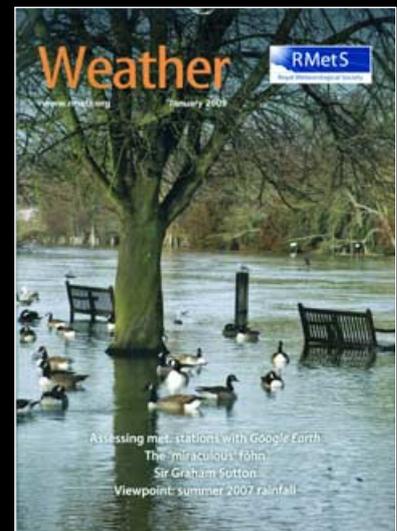
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If you would like to join the Royal Meteorological Society then you can join on-line at

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Email us at info@rmets.org

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The **GEO** Quarterly

June 2009

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Publisher

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

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

Printing

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

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the Editor.

I'm sure you were more than a little surprised when this copy of *GEO Quarterly* dropped through your letter box. Has GEO suddenly added Winter Sports to its portfolio? Not at all! But following the coldest and snowiest winter for a very long time, it is hardly surprising that several of our authors have chosen to write about it. The Netherlands experienced an extended spell of very cold weather that froze many canals and prompted skaters to take to the ice in their hundreds of thousands: Rob Alblas was one of them, and his photo diary starting on page 16 allows us to share his experiences. John Tellick spent the winter applying snow-detection software to some of his *EUMETCast* AVHRR images and illustrates what can be achieved with a page of false-colour images (page 37).

Completing this particular *GEO Quarterly* has been tough going, with a decided shortage of timeous articles from you, our readers. Indeed, it's only thanks to Ed Murashie that you have received your Quarterly as 'soon' as this. In early May, Ed paid visits to the *Astrotech* facility in Titusville Florida, where the GOES-O satellite is currently in storage and to Cape Canaveral from where it will be launched, and offered to rush up an account of his experiences to complete this issue.

Readers are the lifeblood of this publication. We want, indeed need, articles from you to keep the Quarterly alive. Check the 'Copy Deadline' panel on *centrefold-iii* for a list of topics on which you can contribute to your Quarterly.

About a year ago there was considerable discussion amongst several readers about the perceived complexity of the imaging software then available for decoding MSG and AVHRR *EUMETCast* data. Rob Alblas has now come to the 'rescue' with his latest software creation, *WeView*. This program, which is designed with the casual user in mind, is described in an illustrated article on page 34. If you try this program, please let Rob know what you think of it.

After five years at the National Space Centre, Leicester, this year's GEO Symposium will be held at a new venue, the Royal High School, Guildford, on Saturday, July 18. Although Leicester is a superb venue, GEO are mindful that a high proportion of its UK membership comes from the south of England; this new location will, hopefully, make it easier for members who have not been able to attend in the past to join us for the first time. GEO Symposia are always extremely social events, providing a blend of keynote speakers and workshops with the opportunity to chat to like-minded enthusiasts. If you have not been to a GEO Symposium before, do consider coming along to Guildford on July 18. Full details appear on page 4 and any updates to this information will appear on the GEO website at

<http://www.geo-web.org.uk/sym09.html>

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The GEO Report



Francis Bell

My usual and sincere welcome to any reader who is a new member of GEO and a thank you to those of you who have renewed your membership without an additional reminder. I often write for leaflets and display stand literature. On GEO's publicity leaflets, which we distribute at public events, I sometimes include in the text a renewal reminder letter. We often stress the importance of maintaining a large membership, not just for the sake of numbers, but because it enables experiences relating to technical skills—such as using different hardware and software for weather satellite reception—to be shared within the group.

With membership and influence in mind, GEO has been busy promoting our group at a number of events recently. Since the NOAA conference in Miami last December, we attended a Royal Meteorological Society meeting in London in January and the BROHP Godalming conference in February. There is a report relating to the BROHP conference on pages 10 and 11 of this issue.

Kempton

April saw GEO at the West London Radio and Electronics Show at Kempton. This show is usually intensely busy for just a few hours and we had to be well organised to provide a faultless display live satellite images to the public: there is little time to tinker about or adjust equipment once the doors are open. As usual, our stand was near the emergency doors allowing us cable access to an outside dish. We ran live *EUMETCast* signals and displayed recorded NOAA APT images. We had many visitors to the stand and much of the literature supplied by EUMETSAT, together with our own GEO materials, were taken by them.



Kempton: a young visitor pictured with a bundle of literature from the GEO stand

I overheard one visitor saying, of a EUMETSAT poster showing the whole Earth: *'That would look nice on my study wall.'* I hope it did. As usual, the standard question asked by visitors viewing the live displays was: *'Oh, how can I do that at home?'* I think we provided people with enough

advice and technical background information, both for APT and *EUMETCast*, to encourage newcomers to the hobby to experiment for themselves at home.

This Kempton show was particularly rewarding because of its geographical location in southwest London. This year's GEO symposium is planned for Guildford and some of the people I spoke to said they might come to it because Guildford is quite close to London and travel should not be a problem. Although I didn't try counting, I feel another feature of this Kempton show was the number of ladies, families and children attending. I have no idea why this should be but it was delightful to see them mixing with what I reluctantly perceive as a male dominated hobby.

QUARTERLY QUESTION

If you recall, the previous *Quarterly Question* related to the exact altitude above the Earth's surface of a geostationary satellite orbit. I took as the reference answer the figure quoted twice in a NOAA publication as 35790 km. Just to confirm that the orbit is not actually a 'stationary' one, the satellites in this orbit are actually moving around the Earth at a speed of 3.07 km/s. My thanks to Rob Denton, Ian Leitch and Andreas Lubnow who all submitted correct answers. Each of them, or their nominees, receive a free entry into our Guildford symposium this July.

The Quarterly Question this time is posed in the paragraph in bold type on page 40, and relates to how satellite receiving dishes are protected from snow. Answers directly to me at

francis@geo-web.org.uk

or, in anticipation of publishing the information respond, via our editor.

GB4FUN

Readers may remember my comments in our previous Quarterly about my disappointment on learning that the Radio Society of Great Britain's (RSGB) mobile exhibition vehicle, GB4FUN, no longer had weather satellite receiving equipment. The invitation / request was for any GEO member to donate a spare satellite radio receiver for this very high profile special event station, which travels the country and often promotes radio communication with schools. I am grateful to three members who donated receivers and a turnstile antenna. At this time of writing I don't know if anything has been installed in GB4FUN but I will keep the membership informed.

A Cautionary Note

Readers may have noticed my occasional reports relating to APT reception around the world when I'm away from home. I have reduced the size of one of my APT station to the point where it quite conveniently fits into a suitcase along with clothes and other items. Its weight is about 3 kg and most of that is the steel case of the receiver. I have recently

returned from Cuba where, over a period of two weeks, Nadine and I travelled most of the length of the island. Initially I thought I would take my APT station with me but listening to advice from others I thought it would avoid complications if I just left it at home. I think this was a good decision.

The tropical island of Cuba is delightful and during our travels I noted its history, geology, agriculture, its picturesque coast with coral reefs and the delightful people. However, in the background there was a sinister political system which would not have understood my innocent and casual reception of weather satellite images of their island. It was a good decision not to be provocative.

I guess weather forecasts and images can have strategic value. Unexpected weather storms defeated the Spanish Armada in 1588 (thank you weather) and importantly affected the timing of the *D Day* landings in June 1944, commencing the liberation of Europe; this operation was delayed on the basis of weather forecasts.

I know GEO has a member in an east Asian country where his satellite receiver has not been released to him by local customs. I will continue with my travels but will be circumspect about APT reception and potential local sensitivities. Turkey next—but I'm going to take my APT kit there! My ambition will be the live reception of NOAA satellite images covering the Red Sea, the Persian Gulf, the Caspian Sea and the Aral Sea, all assuming I can find a suitable location for the antenna. I will submit them to the editor if they look interesting.

Monitoring Monthly

Just before we went to press, I was most disappointed to receive a letter from Kevin Nice, editor of the magazine *Monitoring Monthly* (MM). The substance of his letter was that the production of MM has ended and 'all activities have ceased': so no further issues should be expected. Kevin quoted the 'current economic circumstances which, in 2009, have proved to be very disappointing'. He offered his apologies to regular subscribers.

Readers of *GEO Quarterly* will be aware that our magazine carried a regular advertisement for MM, who, on a reciprocal basis, carried an advertisement for GEO. There was an overlap of interest areas, with MM often carrying regular articles relating to weather satellite reception, until recently written by Lawrence Harris. More occasionally David Taylor and I have contributed material.

I will miss MM, having subscribed since its initial launch in 2005. Although I did not read every issue from cover to cover, there was always something of interest for me. I never discarded back issues but put them on the GEO stand at exhibitions and rallies for visitors to take if they wished. Quite by chance, there is a photograph on page 2 of a girl taking posters and a back issue of MM from our recent stand at Kempton.

I have no ideas relating to the economics of producing a publication like MM except that my jaw sags a little when I walk into a High Street newsagent and see the abundance of monthly publications for sale on almost any subject: the competition must be severe to say the least.

However, this experience has sensitised me to the precious nature of our own publication, which, I will risk reminding you, is the single biggest cost in GEO's budget, followed by postage: it is essential we maintain our membership numbers to guarantee continued production.

And just a final reminder that neither contributors to *GEO Quarterly* nor the Editor are paid for their time and skills. It's up to our *membership* to remain supportive of these efforts and contribute material where possible. I know the value I place in *GEO Quarterly* and I hope our general membership feel the same affection and respect for it.

Forthcoming Events

- July 25-26 The annual AMSAT-UK colloquium will be held in the *Holiday Inn*, Guildford, where GEO will be demonstrating live weather satellite images. Visit AMSAT-UK at www.uk.amsat.org for further details of this event.
- July 18 GEO Symposium at Guildford. Also see the advert in *RadCom* (May 2009 page 100) and our own web site.
- Sept 13 Telford Hamfest at the *Enginuity* Technology Centre, Coalbrookdale, Telford. Also, see their advert in *RadCom*. GEO may be giving presentations at this event in support of newcomers to direct weather satellite home reception.
- Sept 4-5 The Leicester radio rally (LARS) takes place at Donington and GEO hope to be there.
- Sept 21-5 EUMETSAT conference in Bath, England. This is EUMETSAT's annual international conference and GEO will do its best to be represented.

Cover and Full Page Images

Front Cover

This photograph was provided by Rob Alblas and shows skaters taking to the Dutch canals during last winter's freeze (see article on page 16).

Inside Front Cover

This Land Surface Temperature SAF image was provided by Douglas Deans, who describes this new *EUMETCast* product in Computer Corner (page 42).

Image © EUMETSAT 2009

Inside Back Cover

Angus Crawford downloads HRPT images via the DWDSAT *EUMETCast* stream and spotted this unusually clear image featuring Britain and much of western Europe. The image was acquired by NOAA-16 at 16:34 UT on March 9 this year, at which time a huge high pressure region was located over the North Sea. A number of aircraft contrails shoe clearly off the coasts of Norway and Denmark.

Image © EUMETSAT 2009

Back Cover

John Tellick received this MTSAT-1R image via *EUMETCast* on March 9, 2009 and processed it with David Taylor's *GeoSatSignal-7* software. For several days during early March, tropical cyclone Hamish had tracked down the coast of NE Australia, developing winds up to 240 kph. Fortunately, this storm never made landfall.

Image © EUMETSAT 2009

Page 20

An unusual set of spiral aircraft trails is evident off the coast of northeast England in this Metop-A channel-4 AVHRR image acquired during the satellite's morning overpass on March 20, 2009. Numerous contrails are visible over southeast England and the Aberdeen-Stavanger flight has left a prominent trail right across the North Sea.

Image © EUMETSAT 2009

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Frozen Netherlands, a channel-2 image from NOAA-17 on January 10, 2009.

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

Werkgroep Kunstmanen

Our friends in The Netherlands, Werkgroep Kunstmanen, have meetings in Utrecht on September 12 and November 16. Note the report in *RadCom* (May 2009, pages 76-7) relating to their constructional skills in satellite tracking.

GEO Symposium 2009

at the Royal Grammar School, High Street, Guildford GU1 3BB, England

Francis Bell

Plans for GEO's 2009 Symposium are progressing satisfactorily. The basic details were published in GEO Quarterly 21 (April 2009) but, for anybody who does not have this issue to hand currently, the plans are as follows.

The symposium will be a one day event on Saturday, July 18, 2009, from 9.00 am to 5.00 pm. The venue is the Royal Grammar School, High Street, Guildford.

The broad plan for the day is to have a number of speakers presenting brief papers but just as importantly, the opportunity for individuals to run workshops and to give personal demonstrations for beginners and experienced weather satellite users alike. It is hoped that there will be plenty of time for members to interact in an informal way. Facilities exist at the school which will allow satellite dishes to be placed on the paved surface just outside our meeting rooms. This will allow for live satellite reception and lots of experimentation.

The programme for the day has still has to be finalised but provisionally is shown below.

Friday July 17

In the afternoon there should be a chance to inspect the venue

and perhaps do some tests positioning dishes and checking cable routes. In the evening, there is a planned social evening for those staying in the Guildford area overnight.

Saturday July 18

If you wish to give a presentation at the symposium, please contact Francis Bell by email

francis@geo-web.org.uk

as soon as possible. It is hoped that time can still be made available for you.

The AGM

This should be straightforward with reports and accounts from the management team. As usual there will be time for 'any other business' and a general discussion. If you would like a topic placed on the agenda, or there is any matter you would like raised in discussion, please email details to

francis@geo-web.org.uk

This year, the audio proceedings of the day will be recorded by one of our members who is the director of 'Alton Community Radio'.

Domestic Arrangements

On the day we will try to have tea, coffee and soft drinks available but not food. Because the school will be on holiday, the school's kitchens will be

closed. However, the school is in the centre of Guildford and within a few minutes walk are many places to buy snacks, drinks and full meals; there are also 'fast food' outlets and nearby pubs. You will have to be resourceful or just bring a packed lunch with you.

Location

The school is close to Guildford town centre and within walking distance of the bus and train stations. A detailed map of Guildford showing the school may be found at the following URL (Guildford Tourist Information Centre)

www.guildford.gov.uk/

Click the link to 'Maps and Directions' in the left-hand panel, then click the link 'Click Maps on Line'. Click the link at the top of the following page 'Click to accept Terms and Conditions'. Finally, Click 'Guildford Guildhall' in the side panel.

This will give you a map of the town centre with the school shown in the right-hand upper corner. You can now scroll and zoom around at leisure and print whatever map you want. **Note:** the map is Crown Copyright hence your acceptance of terms and conditions. You could also try www.maps.google.com. There may well be other Internet sites providing maps of Guildford.

Access and Parking.

For those delegates bringing equipment and display materials there is car access to the school via 'Pannells Court', which has a one-way access from 'North Street'. There is very limited car parking on the school site so, for the majority of delegates, the use of a local multi-story car park in the town is recommended: York Road and Sydenham Road car parks are about 200 yards from the school but others are still within walking distance. There are also 'Park and Ride' systems which will bring you into the town centre.

Overnight Hotel

For those staying overnight at the local Travel Lodge Hotel, it has its own limited car parking and is within walking distance of the school. When their prices were last checked they were offering rooms for £39 a night but the Travel Lodge Group are in the middle of a promotion and it may be possible to secure a room at a reduced rate. The first half of a walk to the school is along a commercial/residential road but the second half of the walk takes you through the delightful town centre. There are other hotels in Guildford which may be equally suitable for a brief stay. A way of checking for these is via the Guildford Tourist Information web site

www.guildford.gov.uk

and go to 'Tourist Information'.

Registration

Although you can just turn up on the day, preregistration would be appreciated; it helps with planning and administration on the day. Please register your name(s) with Peter Green

international@geo-web.org.uk

The fee for registration is £5.00, payable on the day.

Social Evening

For those staying in Guildford on the Friday night (and weather permitting), a evening social event is being planned in a nearby village. This is planned as an alternative to many delegates going into town and finding a restaurant. If you think you will be interested in this social evening email

francis@geo-web.org.uk

and you will be sent details.

The Raffle

If you have something that can contribute as a prize for our raffle that will be appreciated.

Website

To keep up-to-date with the symposium's detailed programme keep visiting the geo web site.

Provisional Symposium Programme	
9.00 am	Arrive at the school and set up stands and equipment
9.00-10.30	Delegate registration, members workshops, demonstrations and experiments and time for personal interactions
10.30-11.15	A presentation from our guest speaker from EUMETSAT, who has been asked to bring us up-to-date with EUMETCast data streams
11.15-11.55	Ferdinand Valk presents a talk: 'Antarctica, a hot issue', a discussion of changes that become apparent both from space and on the ground, more related to climate than to weather. The talk will also incorporate some shots/footage of wildlife and breaking ice.
11.15-12.15	Cecilia and David Taylor will add their experiences on a recent trip to the Antarctic.
12.15-2.30	Lunch, plus time for workshops, demonstrations and experiments
2.30 pm	Further speakers to be confirmed
4.00 pm	GEO AGM
5.00 pm	We must be clear of the school by 5 pm

Experiments with MSG and Metop Reception

. . . the Final Result

Mike Stevens

I thought it was about time that I put finger to keyboard again as so much seems to have happened since my last article ^[1,2] on this subject.

One thing that particularly interested me was the article by Laurence Holderness on *Basic Satellite Decoding*. I think this struck a cord with many readers, and I do take his point on peoples' ability to understand the workings of the home computer, especially with the different skill levels that individuals possess; so I hope this article will not confuse anybody. It is a description of the experiments that I have carried out to improve my reception system without using a RAMdisk—so here goes.

It all started just after I wrote the article on how I was receiving all the satellite information without using a RAMdisk. This did cause some debate but it also set minds thinking—which has to be good for the hobby. However, there were some very constructive points made which I took on board, so the experimentation began. How could the reception of MSG and Metop be improved so that it was simple but effective? Should I use two PCs or three PCs? This is where it became interesting and more difficult.

My first experiment began using three PCs, two desktop models and one laptop. Connection to a network was not a problem as I had just obtained Broadband with a *Netgear* modem and router which has five connection points for incoming signals and one for outgoing signals. I connected the three PCs to the incoming points with the outgoing point connecting to the modem. This provided network connectivity between all the PCs as well as providing each with Broadband. This system used cable connections, not wireless, but it could be modified in the future, if required.

Having connected all the computers through this system, I then proceeded to divide up the satellite software so that no one computer was taking all the load. I decided to use the *Acer* laptop as my reception PC while the other two computers had the satellite programs divided between them. Big mistake! The poor old laptop buckled under the load of incoming data. It just could not keep up with it at all, so a rethink was required.

The next approach was to revert back to using the *Lacie* external hard drive to carry all the reception again and revert back to two computers, but dividing the programs equally around the system. At the same time I sent the laptop for a clean-up and was told to fit more memory. We live and learn!

So I was back where I had started in the previous article, which was fine but not perfect. Even I have to admit to that: so what next?

I then decided to look into various alternatives. Out came all the computer books and instruction manuals to see what options were available to me, and it was during this investigation that I discovered that my *E-Machine* computer was designed to accommodate a second hard drive. This looked interesting.

Upon further investigation it looked relatively easy to fit a second hard drive as all the fittings were contained within the PC. All that remained was to decide which size of drive I would require. I considered that an 80 Gb one would be quite enough especially as I could access the '*Compress drive to save disk space*' in the properties box. So off I went to my local computer shop and purchased a new 80Gb drive for around £35.

Let me stress one point here before going any further. If you have never worked on a computer, or been inside one, or perhaps never even tried to take the cover off, this is not for you. Any work of this kind should be entrusted to someone who has the knowledge and expertise to carry out tasks within your PC.

If any reader has tried repairing, or inserting replacement parts into a PC, there is one thing you know you have to be careful about—static electricity. This is deadly for some of the components within the system, and unless you have an anti-static wrist band that safely conducts your static charge to earth, be careful. Otherwise, the best advice is to touch the water main pipe as it enters the property, (check its not plastic) or a heating radiator before you touch any items in the PC. This will help to remove any body static as most water pipes are bonded to ground.

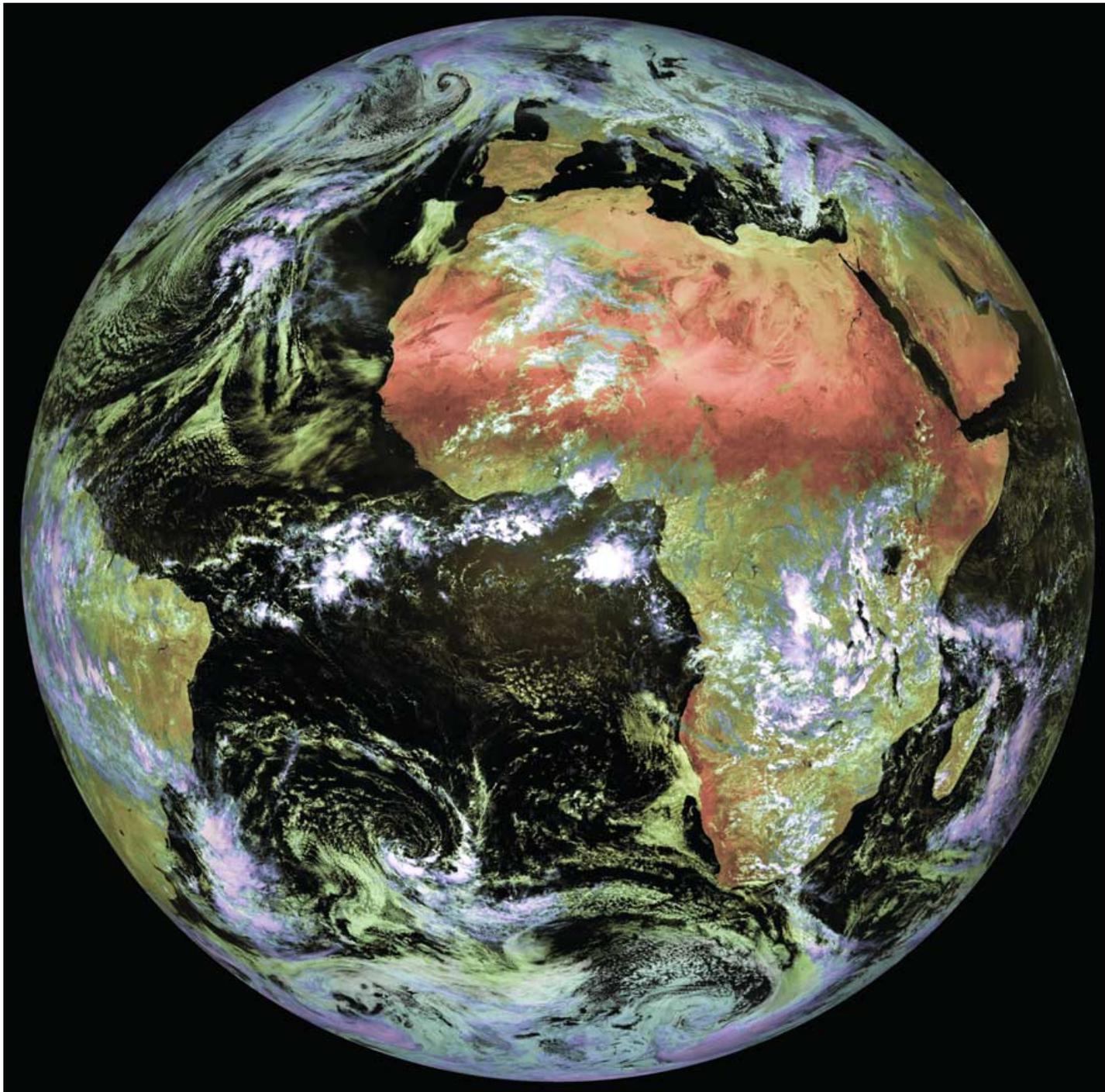
So having obtained the hard drive and fitted my anti-static wrist band, I set about fitting the new drive. The PC was disconnected from the network and its outer cover removed. The hard drive bay was located at the front of the PC and was easy to remove as only one screw secured it. After disconnecting the power and multi-braid connectors the whole assembly could be lifted out.

Before fitting a second drive ensure that you have checked with the manual which connection type you require; on the *E-Machine* it is 'cable select', so you have to check the jumper connector to see where it is and reset it accordingly. This is quite easy to spot: it is located on the end of the hard drive alongside the multi-braid connector and it is marked out with all the options. If this is not done the new hard drive may not be recognised by the operating system.

Having removed the drive bay and reset my jumper lead I proceeded to fit the new unit along side the existing hard drive. It fitted a treat. All the screw holes matched and I secured the new unit into the bay, then fitted the whole assembly back into the PC. All the multi-braid connections and power leads were connected, the holding screw replaced and outer cover fitted again. Job done! I now had two hard drives fitted into the one PC.

On booting up, everything behaved normally and when I opened up the system to *Start, Windows Explorer* etc. there was the new drive. There remains the option to rename the drive and I called mine drive F:.

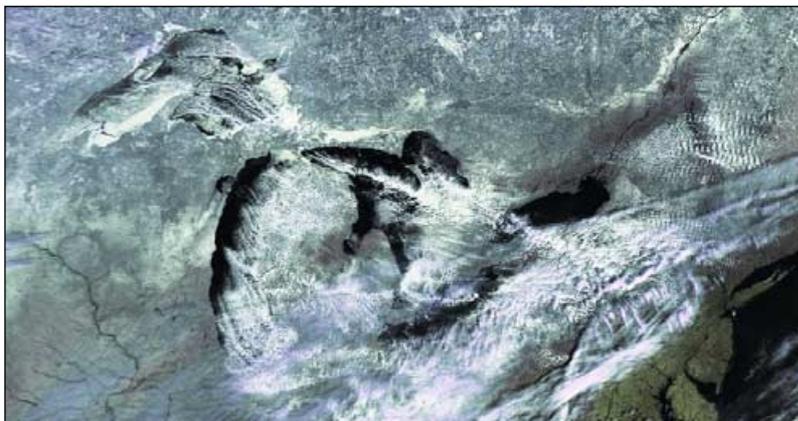
Now I had to place programs on the new drive and decided to load the latest *EUMETCast* software on it—EKU



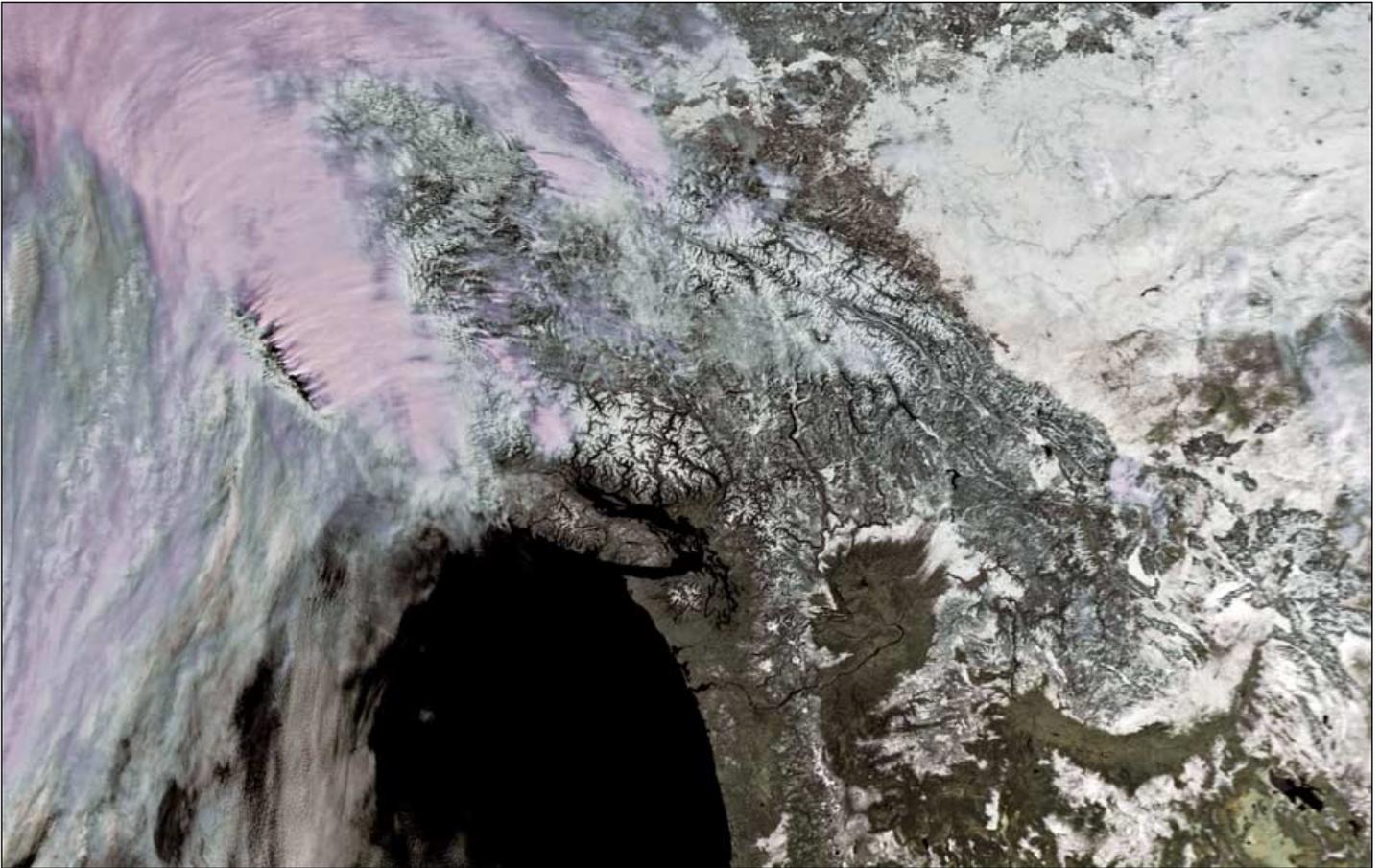
This full Earth Meteosat-9 image was downloaded via EUMETCast at 12:15 UT on March 13, 2009
Image © EUMETSAT 2009

software, *EUMETCast Client* and *Skystar*. Everything loaded perfectly with no problems at all so, once I had reset all the parameters and placed the PIDs into the system, it was time to start up. Immediately, information and data started to flow in, certainly faster than before. When I opened *MSG Data Manager*. I found that the pictures started building up immediately with no loss of segments.

On the second PC I started up *AVHRR Manager*, *MSG-RSS* and *Metop Manager* with *NOAA GAC* running as well. All these programs running together previously would have shown some segments missing; but not now—there was not one segment missing on any of the programs. It was amazing, and all without use of a RAMDisk.

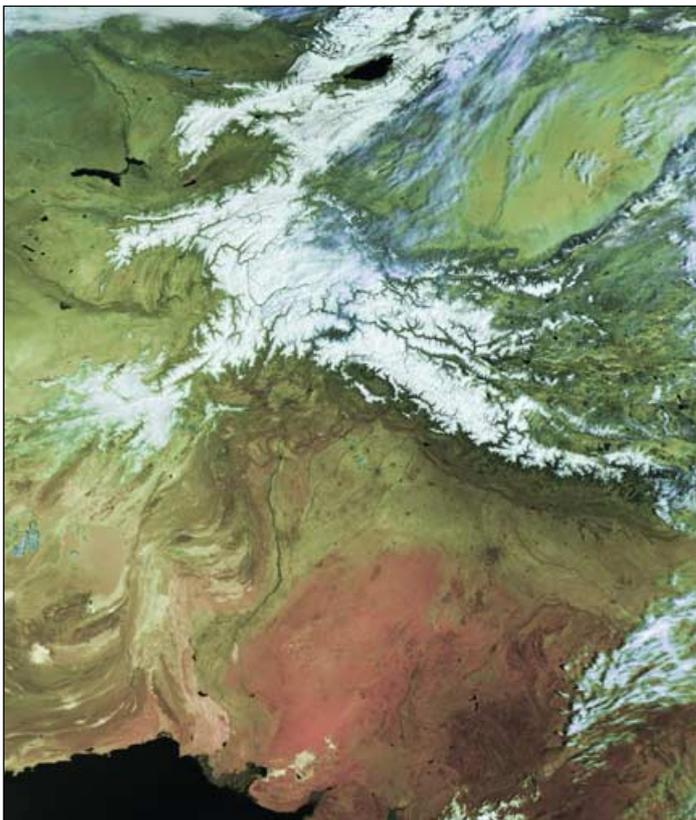


This image segment showing the **Great Lakes** comes from a Metop-A pass dating from 15:04 UT on March 12, 2009
Image © EUMETSAT 2009



Metop-A imaged this scene during its 18:25 pass on on March 12, 2009. Most of **Vancouver island** shows clearly as do the snow-clad mountains of the **Coast Range** to its north. At upper right in the image, the infant **Missouri** snakes across snow-covered **Montana**.

Image © EUMETSAT 2009



There are snow-covered mountains galore in this Metop-A segment dating from 04:34 UT on March 13, 2009. From **Kyrgyzan** in the far north, where **Issyk Kul**, the 9th largest lake in the world, occupies an amphitheatre in the **Tien Shan** mountains, the scene includes the **Pamirs**, **Hindu Kush**, **Karakoram** and **Himalaya** before the **Indus** valley takes centre stage, sweeping south through Pakistan towards the Arabian Sea.

Image © EUMETSAT 2009

Conclusions

I now have two PCs. The *E-Machine* with its second hard drive is running all the EUMETCast software on drive F: and *MSG Data Manager* on drive C: (the original drive). I have removed the external hard drive (which, incidentally was still working) from the system.

On the second PC I am running *AVHRR Manager*, *MSG Rapid Scanning Service*, *Metop Manager* and *NOAA GAC* as well as collecting *DWDSAT* data.

I find that the transfer of data from one drive to the other is much faster because its now an internal link and not connected by a USB port and lead; also, keeping the two parts of the system separate allows drive F: to concentrate solely on data collection as the receiving part of the system.

This configuration is working very well for me and all the programs are providing excellent pictures. If I need to, I can add the laptop into the system to take in any other data. Incidentally the new drive runs at 7200 rpm, the same as both the original drive and the *Lacie* external drive.

I hope this has not been too complicated to follow, but I have an inquisitive mind and a determination to get perfect satellite weather pictures. I think I have now achieved just that. The accompanying picture shows you my results. Happy weather watch from Portland.

Acknowledgement

I would like to thank David Taylor for his help during this project by providing me with registration codes to enable me to move programs around my developing system.

Reference

- 1 EUMETCast without a RAM Disk - GEOQ 14, June 2007, page 11
- 2 EUMETCast without a RAM Disk - GEOQ 16, Dec 2007, page 30.

SYSTEM SCHEDULER

Fred van den Bosch

As I have written in earlier articles [1], my satellite reception is, as much as possible, automated. Every quarter of an hour, for example, I make, automatically with *GeoSatSignal*, a series of images of Europe and Africa. Also, every hour, I make a series of images of other parts of the world. For starting up all these jobs I used a task manager program that I had obtained from a colleague long ago. However, recently when this task manager was run it made some permanent changes to the tasks all by itself! Reinstalling didn't help, and because the program was in fact only written to run under Windows 98 and NT it was time to seek something else.

Windows built-in task manager does not offer sufficient possibilities. I started with the easiest option, the site for tested freeware programs [2]. There I found as best tested 'System Scheduler' [3]. I found this program to be available in two versions, freeware and professional (\$30).

Freeware Version

After downloading, *System Scheduler* was installed and started up. First, the program shows us an overview of all *events* (naturally empty at the first start-up) as in figure 1. Starting up a program is known as an *event*. An *event* consists of the name of the newly started program, a possible parameter and a schedule (stating at what time and how frequently the event must be executed).

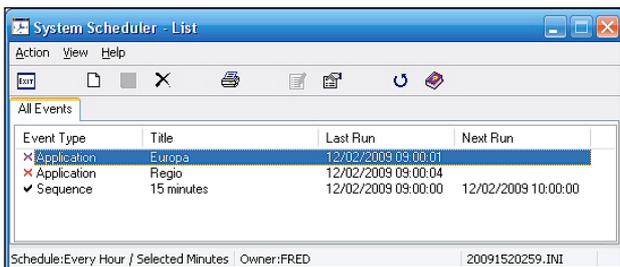


Figure 1 - Startup Screen

Figure 2 gives an example of an event: starting up *GeoSatSignal* and making an image of Europe. Figure 3 (schedule) shows that this event must run each quarter-hour and on which minute.

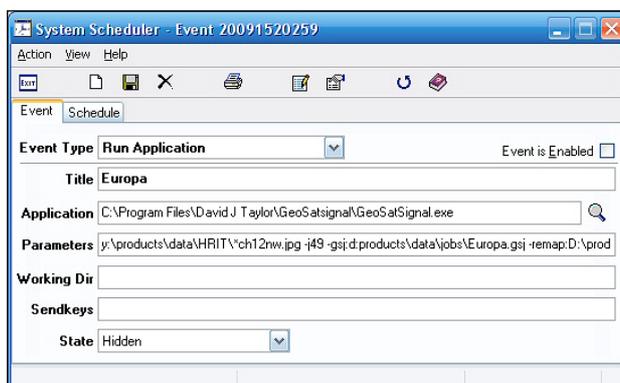


Figure 2 - Starting up *GeoSatSignal*

Very soon, the great disadvantage of the freeware version became apparent: you cannot start a series of programs one after the other. This can only be done by starting them all at different times, and on a whole minute. This proved a considerable waste of time as each program only ran for about 15 seconds. Therefore I tried out the professional version. This can be installed over the freeware version.

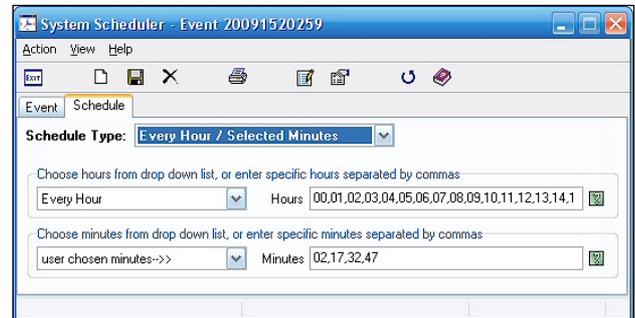


Figure 3 - Event Time Parameters

Professional Version

On starting up, all the events made in the freeware version appeared, fortunately, still to be present. The advantage of this version is that you can add events into a sequence and, as a result, output them all together. I have, for example, under the name 'Europe' images of Europe, Netherlands, France etc. Thus I made events for all these images, coupled them together, and then ran the sequence.

Unfortunately, this meant in practice that all 8 events of this sequence started at the same time and my system froze. After some questions on the forum [4] it became evident that this is what happens. An adjustment, where an event only starts when the previous event has ended, is on the 'to-do' list but without the planned data.

Solution

Because I did not want to wait, I invented another solution. I have made a number of batch-files. This batch file contains the 8 different commands for Europe. I now need only to start the batch-file each quarter-hour. An additional advantage is that this is very easily done with the freeware version. Also, you can again install this over the professional version.

Writing a batch-file is very easy. Open *Notepad* and type in the commands, one after the other: one line to each. Next, save the file as 'xxxxxxx.cmd', where 'xxxxxxx' is the name of the batch-file, e.g. 'Europe'. The complete address of this file is incorporated under 'Application' in the event. The field parameter can remain empty here.

Here is an example of a batch file with two command lines

```
"C:\Program Files\David J Taylor\GeoSatSignal\GeoSatSignal.exe"
D:\products\data\HRIT\*ch12ne.jpg -j49 -
gsj:d:\Products\Data\Jobs\Europa.gsj -
remap:D:\products\MSG\Europa\%%YY%%MM%%DD%%HH%%NN
.bmp -min
"C:\Program Files\David J Taylor\GeoSatSignal\GeoSatSignal.exe"
D:\products\data\HRIT\*ch12ne.jpg -j49 -
gsj:d:\Products\Data\Jobs\Nederland.gsj -
remap:D:\products\MSG\Nederland\%%YY%%MM%%DD%%HH%%
NN.bmp -min
```

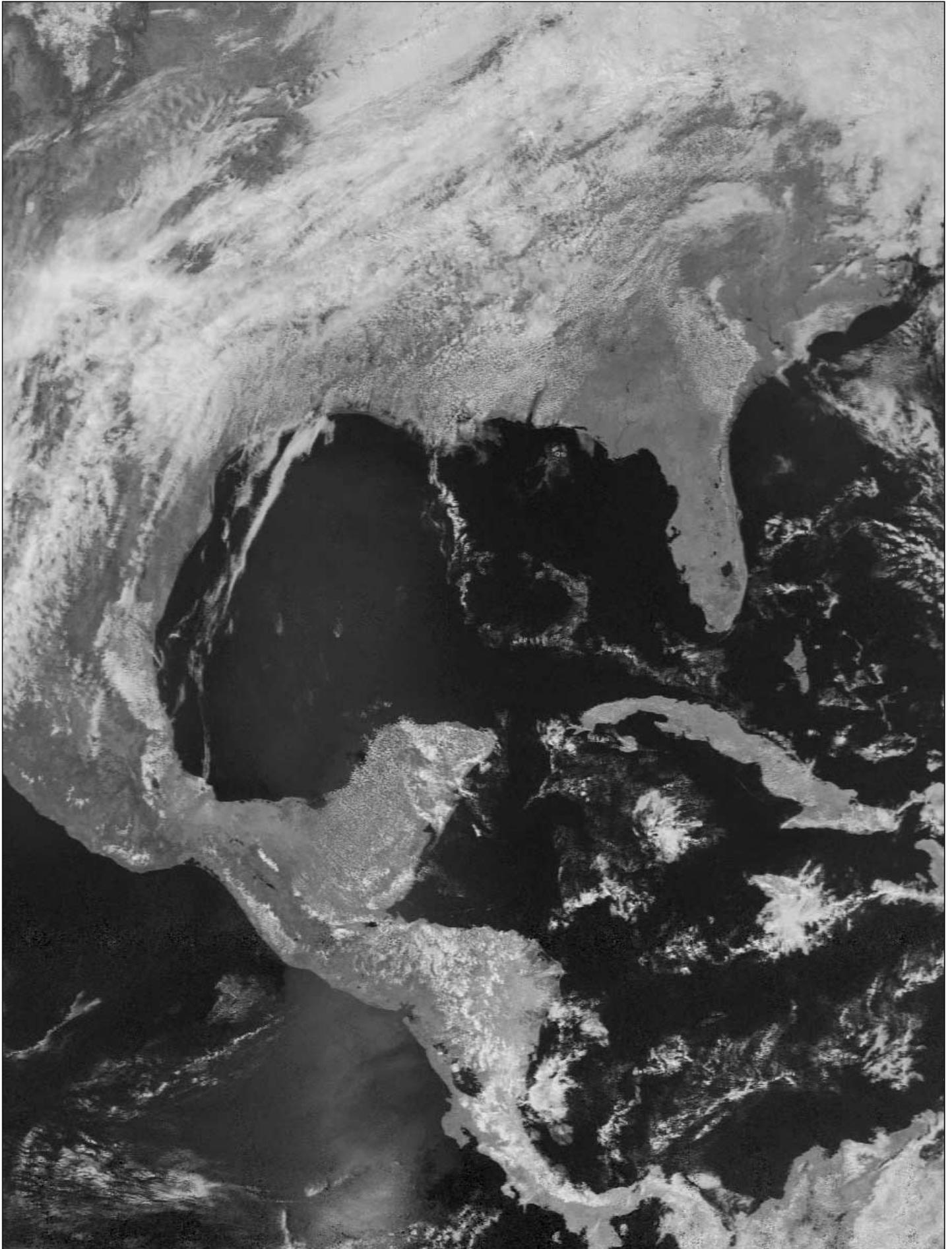
Please note

- These are two continuous lines without a blank line between!
- There is a space character following 'GeoSatSignal.exe'
- There is a space character before each '-'
- There is no space character following each '-'.

For details of all the commands, see the *GeoSatSignal* help file.

References

- 1 POVIM, Fred van den Bosch, GEO Quarterly, December 2005, page 38
- 2 <http://www.freewaremission.com/> 2008/12/72-programs-for-a-freeware-only-pc/
- 3 <http://www.splinterware.com/download/index.htm>
- 4 <http://www.splinterware.com/forum/>



Fred Piering sent in this NOAA-19 image acquired on March 10 this year, drawing attention to what appeared to be a weak front stretching south from New Orleans in the general direction of Cuba and terminating in an unusual 'cloud ring'.

GEO at the 2009 BROHP Conference

Francis Bell

This was the third year that GEO had been invited to the British Rocketry Oral History Programme (BROHP) annual conference in Godalming, Surrey. This year, the conference was spread over five days, from April 2-6. Our particular invitation was to be there for the first day, when many school children and their teachers were expected to attend. For the background to BROHP you should visit their web site

www.spaceconference.org.uk or www.space.co.uk

which now contains some of the conference proceedings.

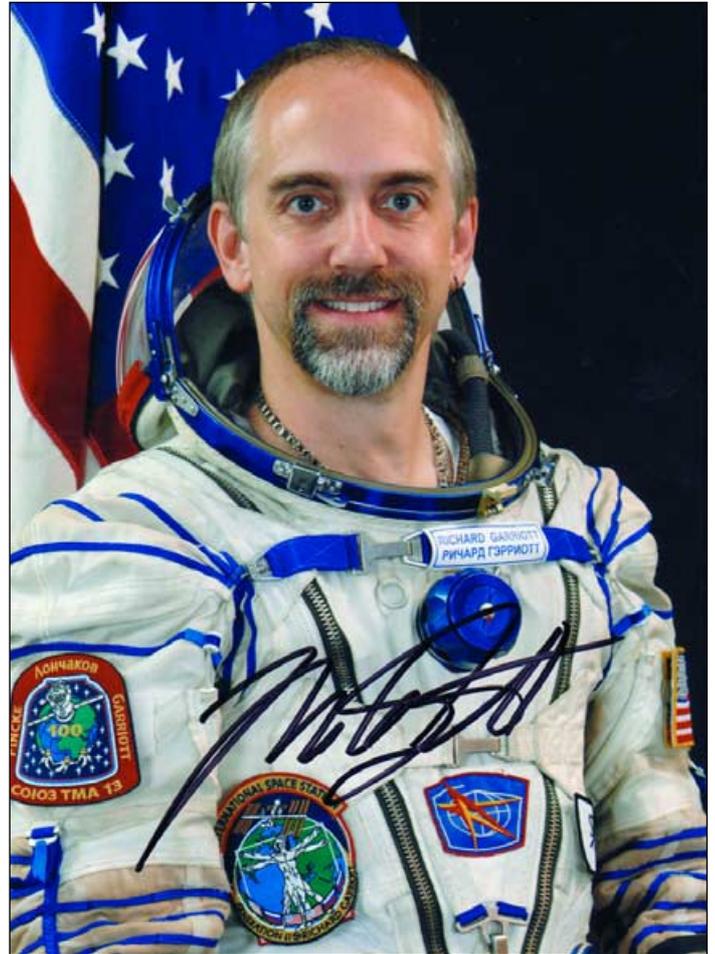
Our GEO stand was established in the main exhibition hall together with other national and international organisations such as *Serco*, the *Science and Technical Facilities Council*, *EADS Astrium* as well as others who had contributed to the sponsorship of the conference. The exhibition hall was also used for general presentations, with seating for about 180 people supported by the usual audio-visual technical hardware.

The GEO stand consisted of our 'stand up' display boards plus tables with our literature and materials supplied specially for the event by EUMETSAT. There were also two laptop computers running continuously, showing our group presentation with its background and history plus one showing examples of APT imaging.

On the first day I estimated that there were about 250 school children together with their teachers. They were split into groups of about 20 and during the day each group engaged in a number of space related workshops. I visited some of these and was impressed with the resources and preparation which had gone into each activity. As best I could judge the children were interested in what was presented to them and the opportunity to engage in practical activities related to space. For myself, I was most interested in the solar observations which were available via a number of telescopes outside the main building, viewing the sun directly using hydrogen alpha filters. With exquisite care, the sun could be viewed both directly or by using a camera and screen. The convective surface of the sun could be seen together with prominences, but unfortunately no sun spots.

During the day many of the children visited the GEO stand, some of them taking a genuine interest with others just 'doing the rounds'.

For me, the high spot of the day was the opportunity to meet Richard Garriott. Richard was an astronaut on board the International Space Station (ISS) last year. He gave two enthusiastic presentations to the visiting children about his experiences in preparation for his flight and then while on board the ISS. In between his presentations Richard visited GEO's stand. I think he was genuinely impressed with our group and within a few minutes he not only said he would like to join but that he would also like to write material for *GEO Quarterly*. Of course I accepted his offer on both counts. He took some of our literature and then enthusiastically gave me some of his own public relationship materials. He personally signed his official photograph which he then gave to me. All I could do in return was to take his photograph with the GEO stand in the background. A nearby student took a photograph of Richard and myself together. I told Richard about my own amateur radio



Astronaut Richard Garriott's signed photograph



Astronaut Richard Garriott at the GEO Stand



The Exhibition Hall at the BROHP Conference

experiences and radio contacts with Helen Sharman onboard *MIR* space station, and with the the NASA Shuttles *Discovery* and *Atlantis*. I also told him of the friendship which I developed with Helen Sharman. He was interested to learn that some of the SSTV images he sent from the ISS were recorded by a number of GEO members. I promised to try to have some of these images published in *GEO Quarterly*. We promised to keep in touch with each other and Richard signed our visitors book, leaving his personal contact details.



Another of Astronaut Richard Garriott's Mission Badges



One of Astronaut Richard Garriott's Mission Badges

During other days of the conference, Richard was away visiting local schools but did return to chair one of the technical sessions. The remaining days of the conference provided sessions on many aspects of space science including the study of Mars, black holes, cosmic background radiation, interstellar space flight among others.

From my perspective, the high spots of the conference were meeting enthusiastic school children and meeting Richard Garriott. I have promised to keep in touch with Richard and look forward to his potential contributions to our group.

Arctic Comparisons

Keith Fraser



Figure 1 - Ice in Davis Strait - 2009 (NOAA 19)

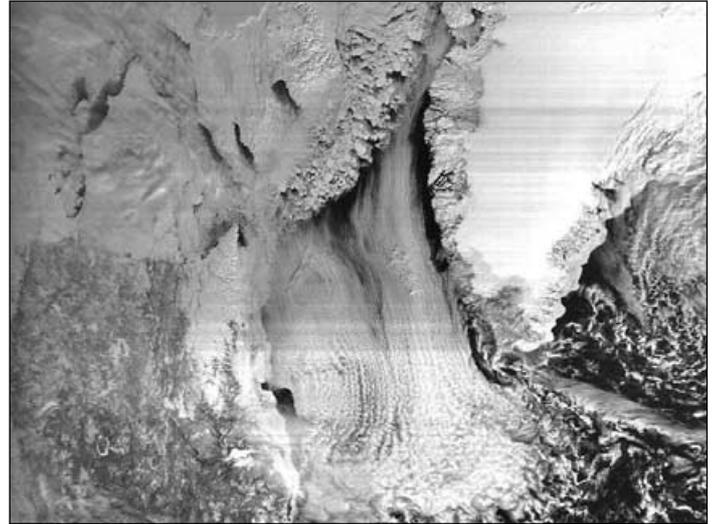


Figure 2 - Ice in Davis Strait - 2001 (Meteor 3-05)

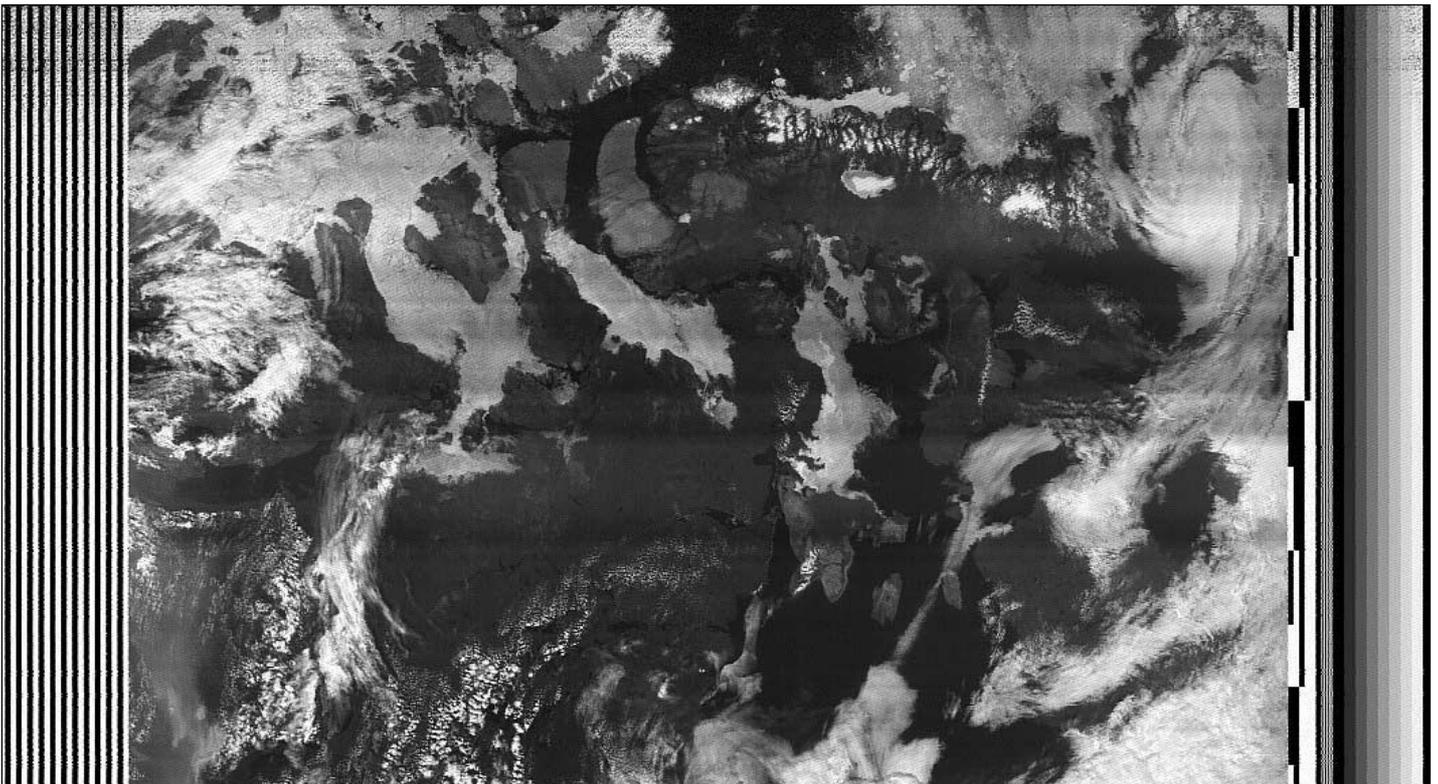


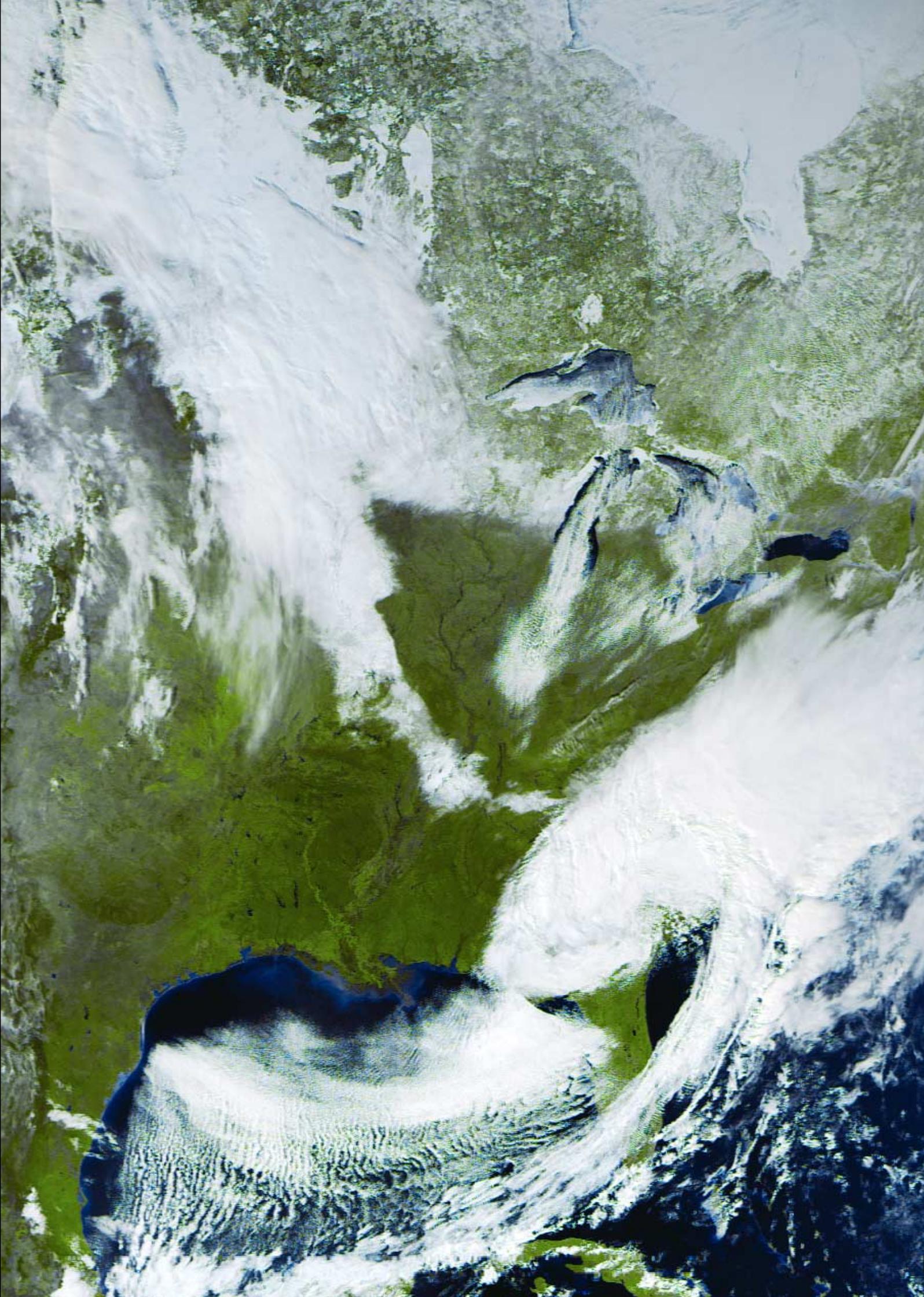
Figure 3 - Russia's Meteor 3-05 acquired this image on April 1, 2001, showing much of the Northwest Passage beset by ice. Victoria Island in particular is totally 'ice-locked'

I have just been re-reading the article *Arctic Meltdown* in GEO Quarterly 17'. Figure 1 is an image from NOAA-9, dating from March 6 this year, showing that the pack ice in the Davis Strait is already starting to break up. This is quite early. The Meteor 3-05 image from April 1, 2001, almost a month later, illustrates the difference well (figure 2).

Figure 3 is another Meteor 3-05 image, acquired in July 1998, which shows the Northwest Passage still quite blocked past Somerset Island. I expect that it will be wide open this year.

Figure 4 (opposite page) came from NOAA-19 on March 11 this year. Captured and processed with *WXtoImg*, using the program's 'vegetation' setting for channels 1 and 2, it includes an interesting view of lake effect snow from Lake Superior down the length of Lake Michigan, closing down Chicago and continuing south down to Kentucky.

I have been using *WXtoImg* with very good results recently. After I bought a new HP computer with 64-bit engine, *WXSat* and some of my other old programs no longer worked properly. I did like *WXSat*.



SPECTACULAR CLOUD STREETS

There have been a number of interesting occurrences of cloud streets over the Arctic this spring and two examples are shown here. On this page appears an APT image submitted by Anders Höök from Vallentuna, Sweden, who commented:

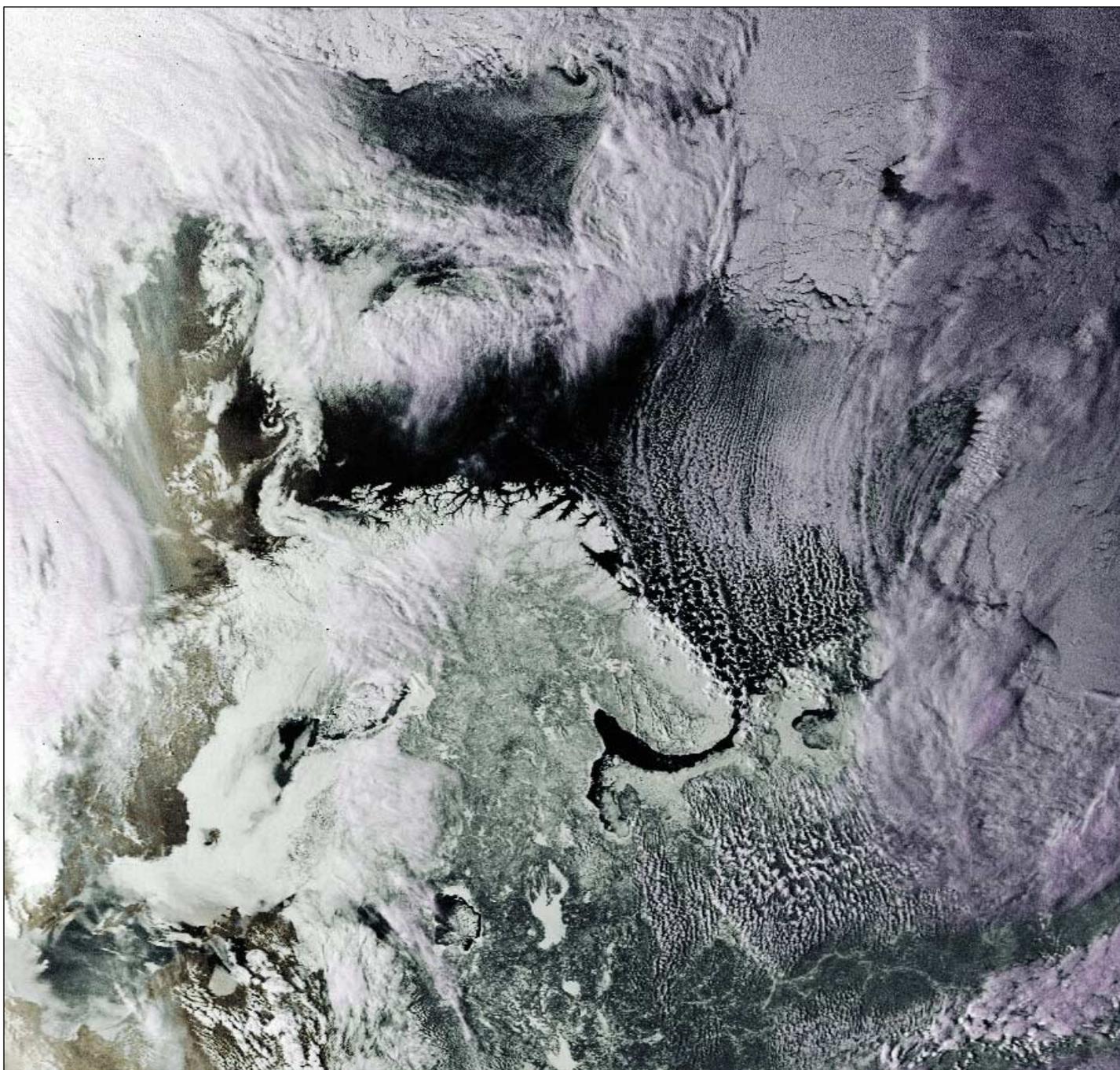
'Last April, I received this fine image, with cloud streets running from the ice masses between Svalbard and Frans Josef Land over the Barents Sea and stretching as far as the lowlands south of the Kanin peninsula. The Barents Sea is apparently open; it is only parts of the White Sea that are ice covered. The NOAA-15 image, captured with an R2FX receiver and a QFH antenna made after Paul Hayes design, was acquired at 13:22 UT on April 7, with maximum elevation 35 degrees. The image was decoded and processed with Patrik Tast's APTDecoder software.'

The channel-2 Metop-A image on the facing page, captured with *Metop Manager* software and processed using *HRPT Reader*, dates from April 5 and was submitted by David Taylor following comments on the Internet Forums about an unusual 'cloudburst' feature north of Norway in an *Envisat* image [1]. John Say provided the following explanation:

'Cloud streets are produced when a strong but shallow cold air current advecting from the ice becomes warmed from below by the sea. The airflow warms and loses its impetus as it moves farther south. Around the north of Norway, a pulse of warmer air has risen up over the arctic outflow, producing the unusually symmetrical cirrus pattern as moisture freezes out at the higher level. A similar effect can often be seen to the north of vigorous depressions, usually as a succession of cirrus arcs.'

Reference

1 http://www.esa.int/esaEO/SEMQRVQEH1TF_index_0.html



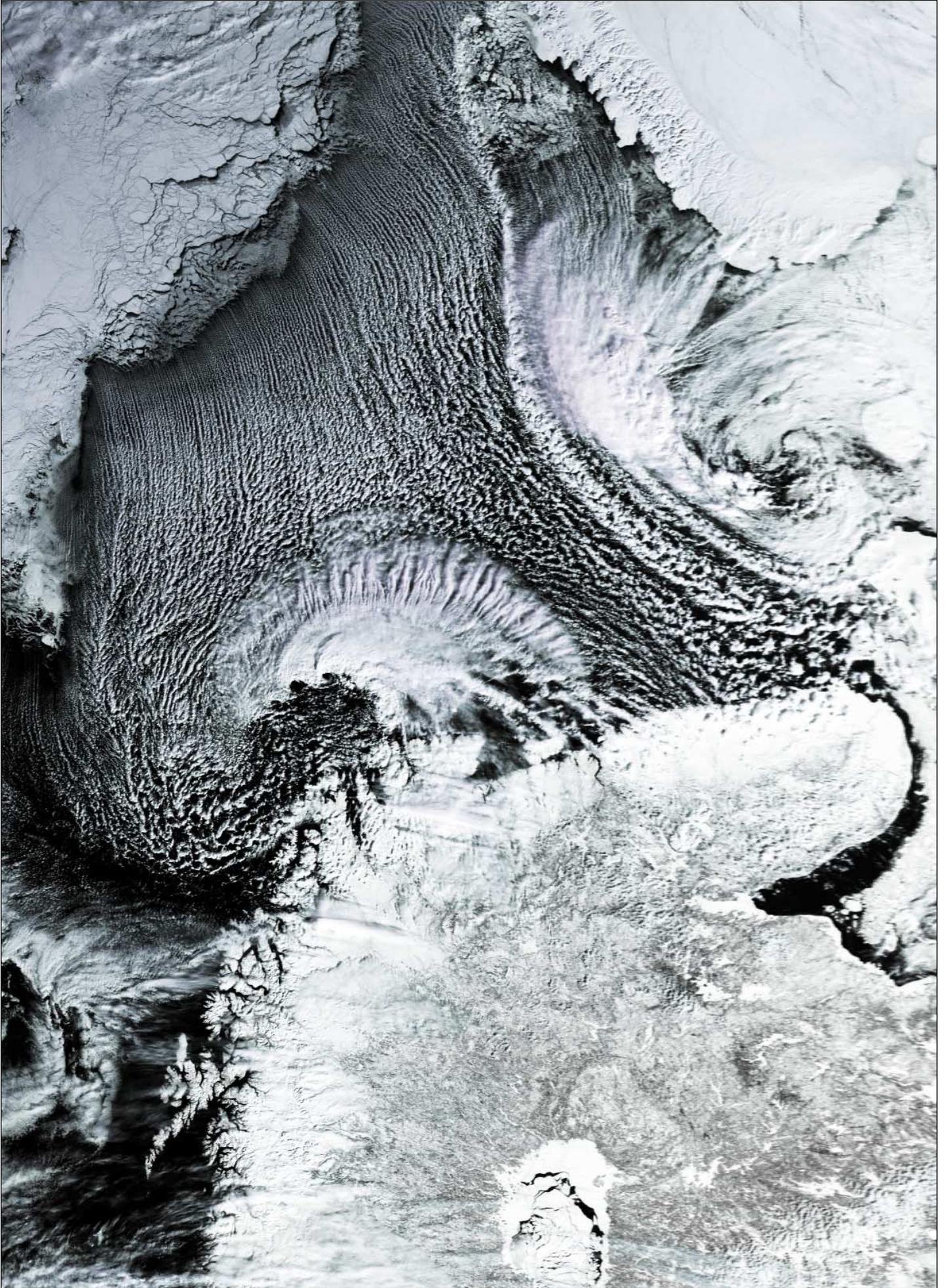




Photo 1 - The River Vlist, near Gouda



Photo 2 - Koek & zopie, near Giethoorn



Photo 3 - A local Ice Club



Photo 4 - On the frozen canal at Kinderdijk



Photo 5 - A low bridge at Kinderdijk



Photo 6 - Walking on skates



Photo 7 - The River Alblas in Oud Alblas village



Photo 8 - In the centre of Giethoorn



Photo 9 - Skaters form a queue on the ice



Photo 10 - Skating on a small lake near Hilversum



Photo 11 - Giethoorn



Photo 12 - An atmospheric scene as more skaters take to the frozen canal at Kinderdijk

Skating Tours on the Dutch Canals

Rob Alblas

Winters in the Netherlands are mostly not really cold, averaging around +5°C because of westerly winds and the warm Gulf Stream. Colder days do occur now and then if the wind heads northeast, but mostly this lasts for just a few days.

Longer periods of freezing weather have become more and more rare, but sometimes high pressure areas get 'locked-up' in the right places. If that happens, and the water gets frozen, a lot of people get excited and a little nervous: wanting to skate they have to choose between skating there and then and taking the risk of falling through the ice, or waiting and taking the risk that temperatures rise again.

There are places where grassland is deliberately flooded during winter so that you can skate safely after a only few days of freezing weather and there is now even a 5-kilometre artificial ice track in Flevoland; but nothing can beat going over lakes, canals and small rivers, through nature and from city to village.

A week of freezing weather is enough to go skating but the ice may still be too thin in places, e.g. under bridges and where two flows of water cross each other. That doesn't stop skaters though! The photograph on the front cover, taken at Ankeveen, 20 km east of Amsterdam, shows skaters out in force despite the presence of a warning banner on the railings stating: 'ice unreliable'. People come to 'local famous places', put on their skates and leave their shoes in a plastic bag at the waterside. Skating in this period is not without danger: drowning happens now and then.



'Unreliable Ice'

After a full week of frost, the ice becomes more or less reliable and local skating clubs get active. The ice gets prepared and places where it is too thin, or where there is no ice at all, are marked (photo 1). In places where a road needs to be crossed, carpets are laid down to protect your skates while walking from one stretch of ice to the other. And, of course, 'koek en zopie' (cake and something to drink) places pop up, both on the ice (photo 2) and in disused stables etc. (photo 3).

There is enough ice now to do real trips, such as a 40 km round trip through *Alblasserwaard*, an area south-east to Rotterdam which includes Kinderdijk with its numerous windmills (photos 6,12). Sometimes a barrier has to be overcome: passing a closed bridge (photo 5) or a short walk through a village (photo 6) in order to reach another canal (photo 7).

If the ice is thick enough to be really safe, official trips are organised. Lots of people buy a card to collect stamps along the route. This is to prove that the tour was really undertaken; after finishing, the reward is a medal.

Now, if the weather is nice, the weekends get really crowded (photos 8,9). On January 10 and 11 this year, 100,000 skaters were registered each day; and that's not counting another estimated 100,000 non-registered skaters like myself, who weren't worrying about getting a medal.



Figure 12 - Skating on a canal in Giethoorn
Giethoorn is a 'water village' with canals instead of roads

Unfortunately, there are not many winters cold enough to do skating tours like this. This year the period lasted just two weeks with really reliable ice, allowing tours to be organised, on only three days. Temperatures were not really low, mostly -5°C to -8°C at night and just below zero during the day. The previous occasion this happened was in the winter of 2002/2003, but no tours were organised then.

During longer freezing periods, more than a hundred tours may be organised, with distances ranging between ten and a hundred kilometres, mainly in the west and north of the country. But for the 'real' thing, a period of about three weeks of freezing weather is necessary. Then, the biggest skating tour of all is organised, the *Elfstedentocht* (Eleven Cities Tour). This is a 200 km trip through eleven cities in Friesland in the north of the Netherlands. There are actually two events on one day: speed skaters racing to see who finishes first and 'normal' skaters just trying to finish any way they can.

This year is the 100th anniversary of this tour, but up till now it has been held only 15 times, most recently in 1997. This is where people get really 'crazy', with supporters on the waterside and 15 000 skaters trying to do the trip to get the 'smallest but also most sought-after skating medal ever'. The event takes place in a single day and finishing has to be done before midnight. For most skaters, a big part of the tour has to be done in the dark, which can be tricky; cracks in the ice are invisible and there is the danger of bumping against low bridges. This is where the lonely skater suffers: falling a thousand times, frozen eyes ... and then, after lots of suffering, to arrive at one minute past midnight and be told: 'Sorry, no medal, you are too late'. For some skaters the day ends in drama.



A skating medal from my first tour, in 1996

With it being the 100th anniversary, several skaters were interviewed, and their stories are quite impressive. It's a real adventure, doing this trip. A movie is now being produced about the memorable 11-city tour of 1963; that winter was exceptionally long and cold, and only a very few skaters were able to complete the course.

My skating skills are far too poor to do such a trip in one day, but if the occasion arises I'll try to do it in two or three days. Spring is in the air now and I am looking forward to a long and cold 2009/2010 winter!

Adding a GPS Receiver to my Weather Station

Fred van den Bosch

Enthused by the article from Rob Denton [1], I have also tried using my GPS. I have a *Garmin Etrex Vista HCx* model. I connected the unit to my laptop and then tried starting up *Wxtolmg*, *APTDecoder* and *Wxtrack*. Nothing!

Already somewhat discouraged, I asked for a solution on a couple of forums. And there I found the answer—all my programs operated under the NMEA protocol. The *Garmin* has its own—naturally different—protocol. It seems that some types are switchable but mine—again, naturally—did not fall into this category. The most often heard opinion about this is that this is true for all new USB types.

After more 'Googling' I came upon two solutions. There is a freeware program called *Spanner* [2] that you can download from the official *Garmin* website. This can be used to change the *Garmin* protocol to NMEA. I tested it, and did it work? Not a bit of it! My connected GPS unit was not detected, and now I hear, on various forums, that my GPS is not supported. This in itself is rather strange, that not all their own models are supported, but *Garmin* is not renowned for their excellent service and products. It seems that it is the USB products that give this problem.

The second option is *GPSSGate* [3]. You have to pay for this software but there is a free trial period of 14 days, so I tested it. The program is easy to install and searches for a connected GPS.

Next comes the selection of 'NMEA out' and the COM port to which the export must be made. After this, the two programs that I use myself (*WxTrack* and *Wxtolmg*) were both able to contact the GPS via the selected COM port. I couldn't get *APTDecoder* to talk with the GPS but I have not spent much time on this.

The price of a standard registration for a single PC is approximately 30 euros, not expensive. But because the GPS will mainly be used during my holiday (I do less with APT at home), I'm not going to buy it yet because you pay for a complete package but only make use of one of its options. Nevertheless, it is an excellent solution. While still during the trial period, I received an offer to buy the package at 20% discount. I don't know if this is a standard offer but anyone who wants to obtain the package is best to wait till the end of the trial period.

Arne van Belle gave the following suggestion on another matter which I had also been trying out. David Taylor uses a separate GPS mouse. On his website [4] is a comprehensive description, complete with connection instructions and tips on everything you need to know to synchronise the PC clock using a GPS receiver. Separate GPS mice (figure 1) are available for around 60 euros at, among others, the *PDashop* [5] and on *Marktplaats.nl*. I have already seen them second-hand for 30 euros. Because you can use these on several systems, they are in my opinion a better choice than *GPSSGate*.

To examine how direct export with NMEA works I have also tested with a GPS receiver lent by Arne with a free antenna.



Figure 1 - GPS mouse

The aforementioned programs worked immediately. Moreover, I have also tested this GPS with the program *VisualGPSXP* [6]. With this you can monitor the output from a GPS: things like elevation and azimuth of the satellites, altitude and signal quality, plus—not unimportant—the location of the receiver (figure 2).

The combination naturally works as well. Connect the GPS, then run *GPSSGate* followed by *VisualGPSXP*. Lastly, set the COM port to the value established by *GPSSGate*.

If you (still) have no GPS, you can stipulate time and place with reasonable accuracy. With the programme *DXAtlas* [7] you can stipulate the geographical location. If you require greater accuracy the easiest way is to use *Google Maps Dishpointer*, as described elsewhere by Arne for another purpose [8]. For synchronising the time there are countless programs to be found on the Internet. I myself have had good experiences with *Chronos* [9]. This synchronises the PC clock on the basis of the average of a large number of time servers.

Conclusions

Which GPS will you want to buy for navigation and for satellites? Check in advance if the GPS can be readjusted to NMEA. If you need it exclusively for satellites and for time-setting, the best choice is a GPS mouse.

- 1 GPS in weather satellite stations, Rob Denton, *Geo Quarterly*, June 2008, page 38
- 2 *Spanner* http://www8.garmin.com/support/download_details.jsp?id=1627
- 3 *GPSSGate* - <http://gpsgate.com/>
- 4 David Taylor - <http://www.satsignal.eu/nfp/FreeBSD-GPS-PPS.htm>
- 5 *PDashop* <http://www.pdashop.nl/product/25898/haicom-hi-204-iii-usb-gps-ontvanger.html>
- 6 *VisualGPSXP* - <http://www.visualgps.net/VisualGPSXP/>
- 7 *DXAtlas* - <http://www.dxatlas.com/>
- 8 *Google Maps Dishpointer*: 'Rotating the Eumetcast Dish' Arne van Belle, *De Kunstmaan*, September 2008, page 92.
- 9 *Chronos*: <http://chronos-atomic-clock-synchronizer.chronos-atomic.qarchive.org/>

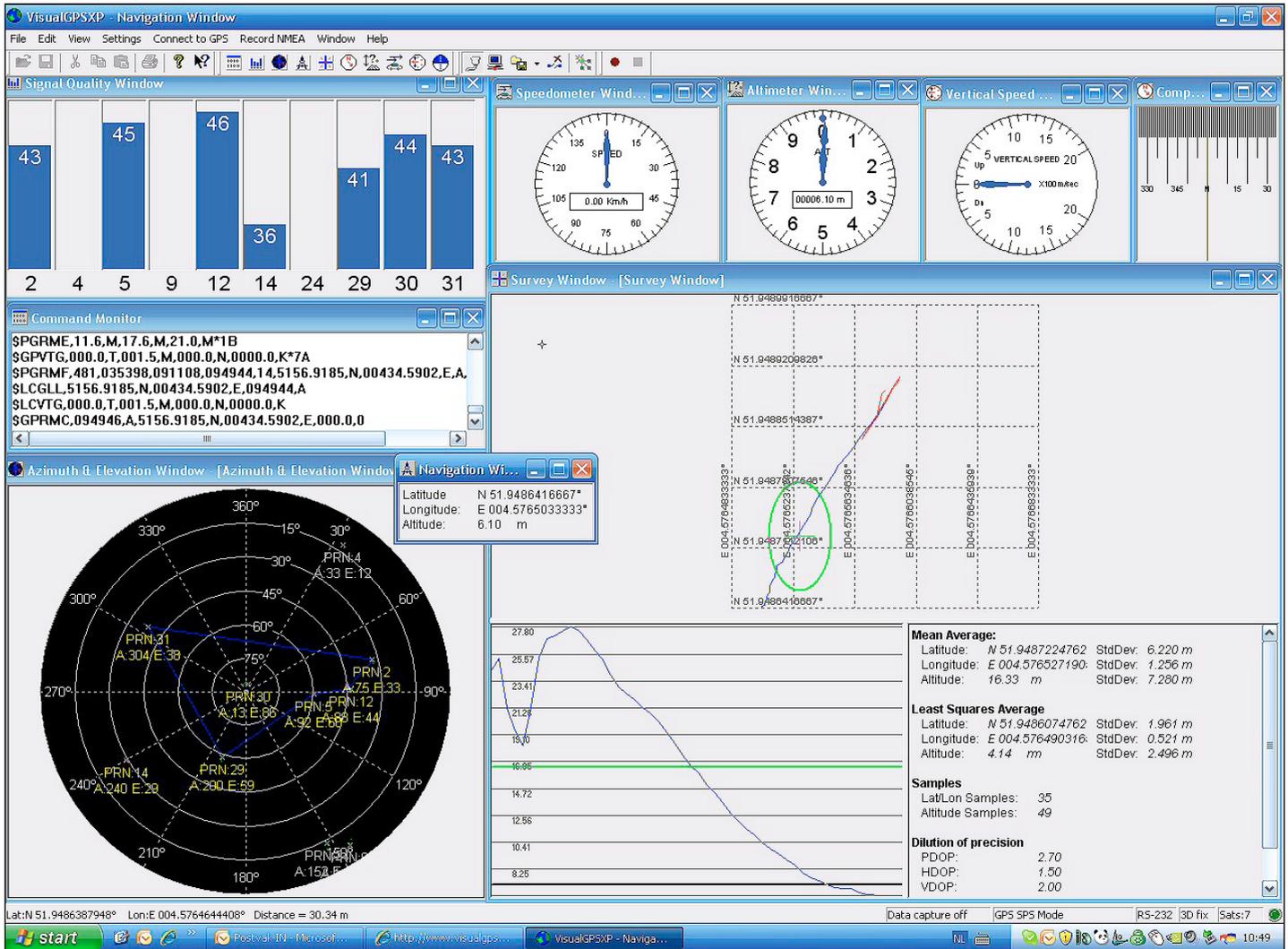


Figure 2 - The VisualGPSXP display

Unusual Contrails Spotted over the North Sea

Duncan McLean

I don't get much time to check many of the images processed by my EUMETCAST system so, encouraged by the clear weather over the UK on March 20, I quickly checked out the UK passes in *Metop Manager*. I was both surprised and pleased when I noticed a set of unusual contrails off the coast of northeast England after processing in *HRPT Reader*. The channel-4 image is reproduced on page 36.

As a comparative novice, the cause of these contrails was a mystery (to me at least), so I posted the image on my website and asked for advice from the Metop Group. Several replies suggested that they may well have been caused by an *Airborne Warning and Control System (AWACS)* aircraft or an in flight refuelling mission.

I was quite happy to leave it there, but I was quickly contacted by David Taylor, who suggested I submit this image to *GEO Quarterly* for publication and by Eric de Jong who offered to find out if the aircraft



that created the trails could be identified. It didn't take Eric long however, and I soon had an image of the actual aircraft in question. It is a *Boeing E3A Sentry* which had been spotted doing circuits, each of about 15 minutes in duration, and aircraft communications enthusiasts confirmed it as LX-N90453 by its tail number (above).

As a final touch, I thought it would be nice if I could also post the aircraft image to my website to complete the puzzle, so I quickly

scoured the web for the image supplied by Eric, and found it on the *Airnet* website. I contacted the author for his permission to post it, and the rest so they say, is history.

Acknowledgements

My thanks to David Taylor for suggesting I submit this article, Eric de Jong for his efforts in identifying the aircraft, and Andre Oferta for his permission to use his image of LX-N90453.

Metop-A image overleaf © EUMETSAT 2009



A New Twist on Antenna Rotors

Ed Murashie

I recently reassembled my HRPT station but, instead of using my original homebrew rotor system, I used a conventional *Yaesu G5400B* rotor obtained on *eBay*. Being amazed at how noisy the azimuth motor was, I dismantled, cleaned and lubricated it, but to no avail as it was still noisy. I took it to the *Yaesu* factory repair depot where they tested it and said it sounded better than most new ones. I needed a better rotor solution since I live in an apartment and I was sure the neighbours would complain.

I had seen commercial HRPT rotors that looked like security camera pan-tilt mechanisms. Again I turned to *eBay* and found a used *Pelco PT680-24P/PP* medium duty unit for under \$100. The *PT680-24P/PP* is a 24-volt ac unit that has feedback potentiometers and which can drive a fifty pound load; the larger *PT1250P-PP*, which runs on 120-volt ac can drive a hundred pound load. The benefit using *Pelco* is that the service manuals are on-line. I received the unit, cleaned and lubricated it, applied power and found it to be less than half as noisy as the *G5400B*.

Mounting the *Pelco* was simple. The *Yaesu* vertical pipe mounting clamps worked perfectly and matched the mounting holes in the base of the *PT680*. One big advantage of the pan-tilt mechanism is that the dish can be mounted to the camera plate with only screws. First a U-shaped metal plate was mounted on to the dish and matching holes drilled in the camera mounting plate. Cement paver counter-weights were secured to the ends of the metal plate and, while balancing the junction of the dish and metal plate on a broom handle, the weights were moved until the assembly was balanced. Holes were drilled through the pavers and metal plate.



The PT680

The dish and metal plate were then secured to the top of the pan-tilt camera plate with stainless screws. Next, the pavers were attached to the ends of the metal plate with galvanised hardware. A PVC cap was sanded flat and mounted, with a single screw, through the dish, metal plate and camera plate. The feed was

mounted on one end of a PVC pipe and the other end glued to the cap. The total weight for the 40-inch mesh antenna, feed and pavers was thirty eight pounds.



The HRPT Antenna

Wiring the *Pelco* was also thought to be simple since the *Yaesu* drives 24-volt ac motors. The *PT680* leads were connected to the *G5400B* controller unit and C34, the 100 μ F azimuth motor phase-shift capacitor in the controller, was removed. The pan-and-tilt motor phase-shift capacitors for both axes are installed inside the *PT680* unlike the *G5400B* which has the elevation capacitor in the rotator and the azimuth capacitor in the controller. The *G5400* manual can be found at

<http://home.comcast.net/~aa4df02/radiotr.htm>

and the *Pelco* manuals at

<http://www.pelco.com/products/default.aspx?id=44>.

My first attempt showed that the position feedback was not linear with azimuth position. The problem turned out to be the 5 kilo-ohm potentiometers in the *PT680*. The *G5400B* uses 500 ohm potentiometers, which are low enough in resistance not to cause linearity issues when connected to 15 k controller input impedances, but this is not the case with the 5 k *Pelco* potentiometers. I decided to add an external unity gain rail-to-rail input and output operational amplifiers to buffer the controller inputs. I could have changed the *Pelco* 10 turn 5 k precision potentiometers for 500 ohm versions instead

For an antenna controller to computer interface I use the *Fox Delta ST3* board, designed by Goetz Romahn, and David Taylor's *WXTrack* program. Had I not had the *Yaesu* controller, I would have bought a *Pelco* controller on *eBay* and modified it. As for survivability, it has been through a few 40 mph *Santa Ana* wind storms without any damage or adjustments. So if you want an inexpensive rotor that's as easy to mount as a dish, consider a pan tilt mechanism.

In the next article I will show how I use an amateur radio EME feed to receive both right-hand circular and left-hand circular HRPT signals.

It's Fine to Fail

Ben Ramsden

Your correspondent has been a follower of weather satellite activity for well over ten years now, but during that time has failed to achieve the quality of imaging results routinely published in *GEO Quarterly*. In this article he discusses the practical challenges of this hobby.

Sad I know, but I have probably read every *RIG Journal* and *GEO Quarterly*, and Lawrence Harris' *Shortwave Magazine* and *Monitoring Monthly* columns for the last decade or more. As a result, I am very familiar with the theory of remote imaging: unfortunately, I have not been able to translate this depth of knowledge into quality results. Of late I have started to find *GEO Quarterly* quite intimidating because it contains page after page of quality material from masters of their craft. This has motivated me to put finger to keyboard to promote my belief that it's fine to fail with weather satellite reception—so long as you have plenty of fun on the way!

First a bit of history. As a student, I could afford to read about remote imaging but not invest in the necessary hardware. Upon starting work and finding permanent accommodation, I purchased a second-hand framestore and antenna. I am sure most readers will remember the thrill of receiving their first images—it really works! The novelty soon wore off as the practicalities of being at home at precisely the right time to 'capture a pass' became real.

As a result of periodic house moves and frequent travelling I began to experiment with portable reception systems both in the UK and overseas, initially by capturing the audio on standard cassette tapes, and latterly on minidisc, then decoding on a computer. Some results were very pleasing, but once again the practicalities of being in the right place at the right time restricted activity. After a lull and a few house moves later I established a WEFAX system with near continuous imagery. The signal strength from my loft-mounted yagi was rarely strong enough to provide noise free images and external mounting never happened before another housemove to an overseas apartment curtailed activity for another few years.

Upon return to the UK, WEFAX was being decommissioned and my APT receiver wasn't programmed for the new NOAA-18 frequency, so my

remote imaging equipment was destined to stay in the box. I was on the brink of investigating the new *EUMETCast* system via *Hot Bird* when an opportunity arose to receive HRPT—the ultimate in quality imagery. I temporarily mounted and aligned a steerable dish in the garden one weekend and managed to receive an HRPT pass without too many signal drop-outs. This bench test was sufficient to get me planning a proper concrete base and cable runs, but alas another house move intervened!

Upon arrival at the new home in Australia, I tried another garden bench test, but discovered that the critical 1.6 GHz feedpoint connection had been damaged in transit. All attempts to repair have, so far, introduced too much attenuation into the signal and resulted in very poor quality imagery. Undeterred, I dusted down the APT system but the extensive local high voltage distribution network in the neighbourhood seems to introduce too much noise to produce clean images. I've also been unable to get the EPROM with the new NOAA-18 frequencies to work in my Dartcom APT receiver, although workarounds and occasional changes in the NOAA-18 frequency mean that this hasn't been a show stopper.

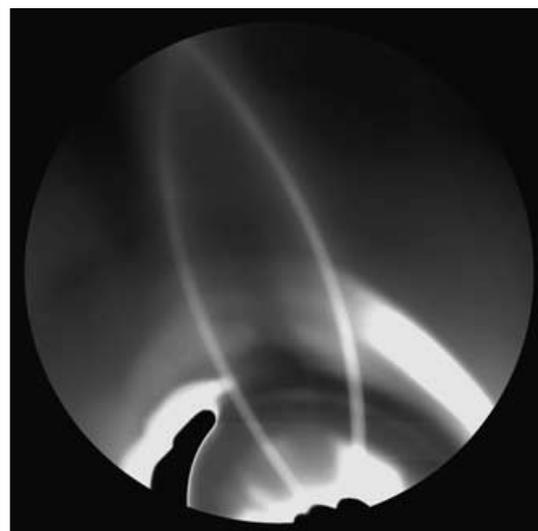
When I started my quest for remote imagery, direct reception was the only method. Since then *Google Earth*, *EUMETCast* and a plethora of Internet sources allow me to access imagery far superior to anything that I could expect to receive from home. These alternatives don't really interest me though; it's doing it myself that counts. And if other projects are anything to go by, once I've been successful I lose interest. So perhaps my lack of complete success to date is actually maintaining my interest! Regardless of results, this endless tinkering with weather satellites has been highly enjoyable. I understand that NOAA-19 is the last of the TIROS satellites. I had better make the most of my APT and HRPT hardware before it becomes obsolete.

Feng Yun 2C Image Flare

David Taylor

The unusual image shown here came from Feng Yun-2C on February 20, 2009, just prior to it being closed down for the eclipse season.

When this 17:00 UT visible channel image was acquired, at local midnight, the sun was just starting to become visible to the satellite.



Flare from the sun in an FY-2C visible image

As the sun's path across the heavens moves northwards during the northern hemisphere spring, and crosses the equator, there comes a period during which the satellite is looking directly towards the sun at local midnight, when the Earth is directly between the satellite and the sun.

The FY-2C satellite has a slightly wider field of view than the Earth's disc alone, so will 'see' the sun directly behind the south pole of the Earth its apparent orbit moves north. FY-2C is located at 105 degrees east where local midnight is seven hours ahead of GMT, and therefore at 17:00 UT.

Normally, the satellite will have one or more of its sensor channels closed down around this time to avoid damage or overheating, but it is possible for some of the sun's radiation to leak around the optics (much as your camera lens may show flare). The image above is the result of that leakage.

Within a couple of days of this image being received, the imager had been shut down at 17:00 for the eclipse period, which typically lasts about six weeks—until the sun had passed sufficiently north of the North Pole as seen from the satellite. In the autumn, as the sun progresses south past the equator, similar effects will occur.

GEO Shop

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The 'Pager-Hardened' R2ZX APT Weather Satellite Receiver

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

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

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

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

R2FX Accessory Pack

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

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

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

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



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

UK members price - £20.00
 UK non-members price - £24.00



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

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

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

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

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



DVB World DVB-S USB2102

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

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

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

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



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

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

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

NOAA Satellite Predictions

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

NOAA 15 137.50 MHz				NOAA 17 137.62 MHz				NOAA 18 137.10 MHz				NOAA 19 137.9125 MHz																					
May 01	05:33	07:13	15:21	17:01	08:49	10:29	20:17	21:57	01:29	03:10	11:23	13:03	02:27	04:08	12:21	14:02	Jul 01	04:32	06:12	14:21	15:59	10:11	11:51	19:59	21:39	02:30	04:11	12:24	14:05	02:07	03:48	12:01	13:41
May 02	05:09	06:49	14:57	16:36	10:06	11:46	19:54	21:34	01:19	02:59	11:13	12:52	02:17	03:58	12:11	13:51	Jul 02	04:08	05:48	15:35	17:16	09:47	11:28	19:36	21:15	02:20	04:01	12:13	13:54	01:57	03:38	11:51	13:31
May 03	04:45	06:25	14:34	16:12	09:42	11:22	19:31	21:10	01:08	02:49	12:42	14:24	02:07	03:48	12:01	13:41	Jul 03	05:24	07:04	15:12	16:52	09:24	11:04	19:13	20:52	02:09	03:50	12:03	13:43	01:46	03:27	11:41	13:20
May 04	04:21	06:01	15:48	17:30	09:19	10:59	19:08	20:47	02:38	04:19	12:31	14:13	01:56	03:37	11:51	13:31	Jul 04	05:00	06:40	14:48	16:27	09:01	10:41	20:29	22:10	01:59	03:40	11:52	13:33	01:36	03:17	11:31	13:10
May 05	05:37	07:17	15:25	17:05	08:56	10:36	20:24	22:05	02:28	04:09	12:21	14:02	01:46	03:27	11:41	13:20	Jul 05	04:36	06:16	14:25	16:03	10:18	11:58	20:06	21:46	01:48	03:29	11:42	13:22	01:26	03:07	13:00	14:42
May 06	05:13	06:53	15:01	16:41	10:13	11:53	20:01	21:41	02:17	03:58	12:11	13:52	01:36	03:17	11:31	13:10	Jul 06	04:12	05:52	15:39	17:20	09:54	11:35	19:43	21:22	01:37	03:18	11:32	13:11	01:16	02:56	12:49	14:32
May 07	04:49	06:29	14:38	16:17	09:49	11:29	19:38	21:17	02:07	03:48	12:00	13:41	01:26	03:07	13:00	14:42	Jul 07	05:28	07:08	15:16	16:56	09:31	11:11	19:20	20:59	01:27	03:08	11:21	13:01	02:46	04:27	12:39	14:21
May 08	04:25	06:05	15:53	17:34	09:26	11:06	19:15	20:54	01:56	03:37	11:50	13:30	01:16	02:56	12:50	14:32	Jul 08	05:04	06:44	14:52	16:32	09:08	10:48	18:57	20:36	01:16	02:57	12:50	14:33	02:36	04:17	12:29	14:10
May 09	05:41	07:22	15:29	17:09	09:03	10:43	20:31	22:12	01:45	03:26	11:39	13:19	02:46	04:27	12:39	14:21	Jul 09	04:40	06:20	14:29	16:07	08:45	10:25	20:12	21:53	01:06	02:46	12:40	14:22	02:26	04:07	12:19	14:00
May 10	05:17	06:57	15:05	16:45	10:20	12:00	20:08	21:48	01:35	03:16	11:29	13:09	02:36	04:17	12:29	14:10	Jul 10	04:16	05:56	15:44	17:25	10:01	11:42	19:50	21:29	02:36	04:17	12:29	14:11	02:15	03:56	12:09	13:50
May 11	04:53	06:33	14:42	16:21	09:56	11:37	19:45	21:24	01:24	03:05	11:19	12:58	02:25	04:07	12:19	14:00	Jul 11	05:32	07:12	15:20	17:00	09:38	11:18	19:27	21:06	02:25	04:06	12:19	14:00	02:05	03:46	11:59	13:39
May 12	04:30	06:09	15:57	17:38	09:33	11:13	19:22	21:01	01:14	02:55	12:48	14:30	02:15	03:56	12:09	13:50	Jul 12	05:08	06:48	14:56	16:36	09:15	10:55	19:04	20:43	02:15	03:56	12:08	13:49	01:55	03:36	11:49	13:29
May 13	04:06	05:45	15:33	17:14	09:10	10:50	20:38	22:19	01:03	02:44	12:37	14:19	02:05	03:46	11:59	13:39	Jul 13	04:44	06:24	14:33	16:12	08:52	10:32	20:19	22:00	02:04	03:45	11:58	13:38	01:45	03:25	11:39	13:19
May 14	05:22	07:02	15:09	16:49	08:47	10:27	20:14	21:55	02:33	04:15	12:27	14:08	01:55	03:36	11:49	13:29	Jul 14	04:20	06:00	15:48	17:29	10:08	11:49	19:56	21:37	01:54	03:35	11:47	13:28	01:34	03:15	11:29	13:08
May 15	04:58	06:38	14:46	16:25	10:03	11:44	19:52	21:31	02:23	04:04	12:16	13:57	01:45	03:25	11:39	13:19	Jul 15	05:36	07:16	15:24	17:04	09:45	11:25	19:34	21:13	01:43	03:24	11:37	13:17	01:24	03:05	12:58	14:40
May 16	04:34	06:14	14:23	16:01	09:40	11:20	19:29	21:08	02:12	03:53	12:06	13:47	01:34	03:15	11:29	13:08	Jul 16	05:12	06:52	15:00	16:40	09:22	11:02	19:11	20:50	01:33	03:13	11:27	13:06	01:14	02:55	12:48	14:30
May 17	04:10	05:50	15:37	17:18	09:17	10:57	19:06	20:45	02:02	03:43	11:55	13:36	01:24	03:05	12:58	14:40	Jul 17	04:48	06:28	14:37	16:16	08:59	10:39	20:26	22:08	01:22	03:03	11:17	12:56	02:44	04:26	12:38	14:19
May 18	05:26	07:06	15:14	16:54	08:54	10:34	20:21	22:02	01:51	03:32	11:45	13:25	01:14	02:55	12:48	14:30	Jul 18	04:24	06:04	15:52	17:33	10:15	11:56	20:03	21:44	01:11	02:52	12:45	14:27	02:34	04:15	12:27	14:09
May 19	05:02	06:42	14:50	16:29	10:10	11:51	19:58	21:39	01:41	03:22	11:35	13:15	02:44	04:25	12:38	14:19	Jul 19	05:40	07:21	15:28	17:09	09:52	11:32	19:40	21:20	02:42	04:23	12:35	14:16	02:24	04:05	12:17	13:58
May 20	04:38	06:18	14:27	16:05	09:47	11:27	19:36	21:15	01:30	03:11	11:25	13:04	02:34	04:15	12:28	14:09	Jul 20	05:16	06:57	15:04	16:44	09:29	11:09	19:18	20:57	02:31	04:12	12:24	14:06	02:14	03:55	12:07	13:48
May 21	04:14	05:54	15:41	17:22	09:24	11:04	19:13	20:52	01:20	03:00	11:14	12:53	02:24	04:05	12:17	13:58	Jul 21	04:52	06:33	14:41	16:20	09:06	10:46	20:33	22:15	02:20	04:01	12:14	13:55	02:03	03:44	11:57	13:37
May 22	05:30	07:10	15:18	16:58	09:01	10:41	20:28	22:10	01:09	02:50	12:43	14:25	02:14	03:55	12:07	13:48	Jul 22	04:29	06:09	14:18	15:56	08:42	10:22	20:10	21:51	02:10	03:51	12:03	13:44	01:53	03:34	11:47	13:27
May 23	05:06	06:46	14:54	16:34	10:17	11:58	20:05	21:46	02:39	04:20	12:32	14:14	02:03	03:44	11:57	13:37	Jul 23	04:05	05:45	15:32	17:13	09:59	11:39	19:47	21:27	01:59	03:40	11:53	13:33	01:43	03:24	11:37	13:17
May 24	04:42	06:22	14:31	16:09	09:54	11:34	19:42	21:22	02:29	04:10	12:22	14:03	01:53	03:34	11:47	13:27	Jul 24	05:21	07:01	15:09	16:48	09:36	11:16	19:24	21:04	01:49	03:30	11:43	13:23	01:33	03:13	11:27	13:07
May 25	04:18	05:58	15:46	17:27	09:31	11:11	19:20	20:59	02:18	03:59	12:12	13:53	01:43	03:24	11:37	13:17	Jul 25	04:57	06:37	14:45	16:24	09:13	10:53	19:02	20:40	01:38	03:19	11:32	13:12	01:22	03:03	12:56	14:39
May 26	05:34	07:14	15:22	17:02	09:08	10:48	20:35	22:17	02:08	03:49	12:01	13:42	01:33	03:13	11:27	13:07	Jul 26	04:33	06:13	14:22	16:00	08:49	10:29	20:17	21:58	01:28	03:08	11:22	13:01	01:12	02:53	12:46	14:28
May 27	05:10	06:50	14:58	16:38	08:45	10:24	20:12	21:53	01:57	03:38	11:51	13:31	01:22	03:03	12:56	14:39	Jul 27	04:09	05:49	15:36	17:17	10:06	11:46	19:54	21:34	01:17	02:58	11:12	12:51	02:43	04:24	12:36	14:17
May 28	04:46	06:26	14:35	16:14	10:01	11:41	19:49	21:29	01:46	03:27	11:40	13:20	01:12	02:53	12:46	14:28	Jul 28	05:25	07:05	15:13	16:53	09:43	11:23	19:31	21:11	01:07	02:47	12:40	14:22	02:32	04:13	12:26	14:07
May 29	04:22	06:02	15:50	17:31	09:38	11:18	19:27	21:06	01:36	03:17	11:30	13:10	02:43	04:24	12:36	14:17	Jul 29	05:01	06:41	14:49	16:28	09:20	11:00	19:09	20:47	02:37	04:18	12:30	14:11	02:22	04:03	12:16	13:56
May 30	05:38	07:19	15:26	17:06	09:15	10:55	19:04	20:42	01:25	03:06	11:20	12:59	02:32	04:13	12:26	14:07	Jul 30	04:37	06:17	14:26	16:04	08:56	10:36	20:24	22:05	02:26	04:07	12:19	14:00	02:12	03:53	12:06	13:46
May 31	05:14	06:55	15:02	16:42	08:52	10:31	20:19	22:00	01:15	02:56	12:49	14:31	02:22	04:03	12:16	13:57	Jul 31	04:13	05:53	15:40	17:21	10:13	11:53	20:01	21:41	02:15	03:56	12:09	13:50	02:02	03:43	11:55	13:36
Jun 01	04:50	06:30	14:39	16:18	10:08	11:48	19:56	21:36	01:04	02:45	12:38	14:20	02:12	03:53	12:06	13:46	Aug 01	05:29	07:09	15:17	16:57	09:50	11:30	19:38	21:18	02:05	03:46	11:58	13:39	01:51	03:32	11:45	13:25
Jun 02	04:27	06:06	15:54	17:35	09:45	11:25	19:33	21:13	02:34	04:16	12:28	14:09	02:02	03:43	11:56	13:36	Aug 02	05:05	06:45	14:53	16:32	09:26	11:07	19:15	20:54	01:54	03:35	11:48	13:28	01:41	03:22	11:35	13:15
Jun 03	05:42	07:23	15:30	17:11	09:22	11:02	19:11	20:49	02:24	04:05	12:17	13:58	01:51	03:32	11:46	13:25	Aug 03	04:41	06:21	14:30	16:08	09:03	10:43	20:31	22:13	01:44	03:25	11:38	13:18	01:31	03:12	11:26	13:05
Jun 04	05:19	06:59	15:07	16:46	08:59	10:38	20:26	22:07	02:13	03:54	12:07	13:48	01:41	03:22	11:36	13:15	Aug 04	04:17	05:57	15:44	17:26	08:40	10:20	20:08	21:49	01:33	03:14	11:27	13:07	01:21	03:01	12:55	14:37
Jun 0																																	

GEO Helplines

Douglas Deans

Dunblane, Perthshire, SCOTLAND

All aspects of weather satellites from APT, HRPT to Meteosat-8 DVB/EUMETCast systems.

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

John Tellick

Surbiton, Surrey, ENGLAND

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

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

Geoff Morris GW3ATZ

Shotton, Flintshire, NE WALES

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

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

Mike Stevens

Portland, Dorset, England.

Advice offered on EUMETCast (MSG and Metop) and APT.

- email: mikeg4cfz@mypostoffice.co.uk

Guy Martin G8NFU

Biggin Hill NW Kent, ENGLAND

Guy is prepared to advise anyone who wishing to receive MSG/Metop using Windows 2000 or XP. Can also help with networking and ADSL router setup..

- gmartin@electroweb.co.uk

Hector Cintron

San Juan, Puerto Rico, USA

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

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

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

Internet News/Discussion Groups

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

APT Decoder

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

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

GEO-Subscribers

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

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

Satsignal

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

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

MSG-1

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

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

METOP

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

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

AVHRR

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

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

ATOVS

A Group for discussions about using ATVOVS 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/>

Useful Websites

ESA Earth Observation Handbook

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

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

MODIS 'Image of the Day'

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

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

NOAA National Weather Service

Current weather conditions prevailing at locations within a country of choice from

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

The Copy Deadline for GEO Quarterly No 23 is Saturday, August 1, 2009

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

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

Contributions should of course be original and, where possible, should be submitted to the editor in electronic format (floppy disc, e-mail attachment, CD, 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,

Les Hamilton
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Scotland.

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.

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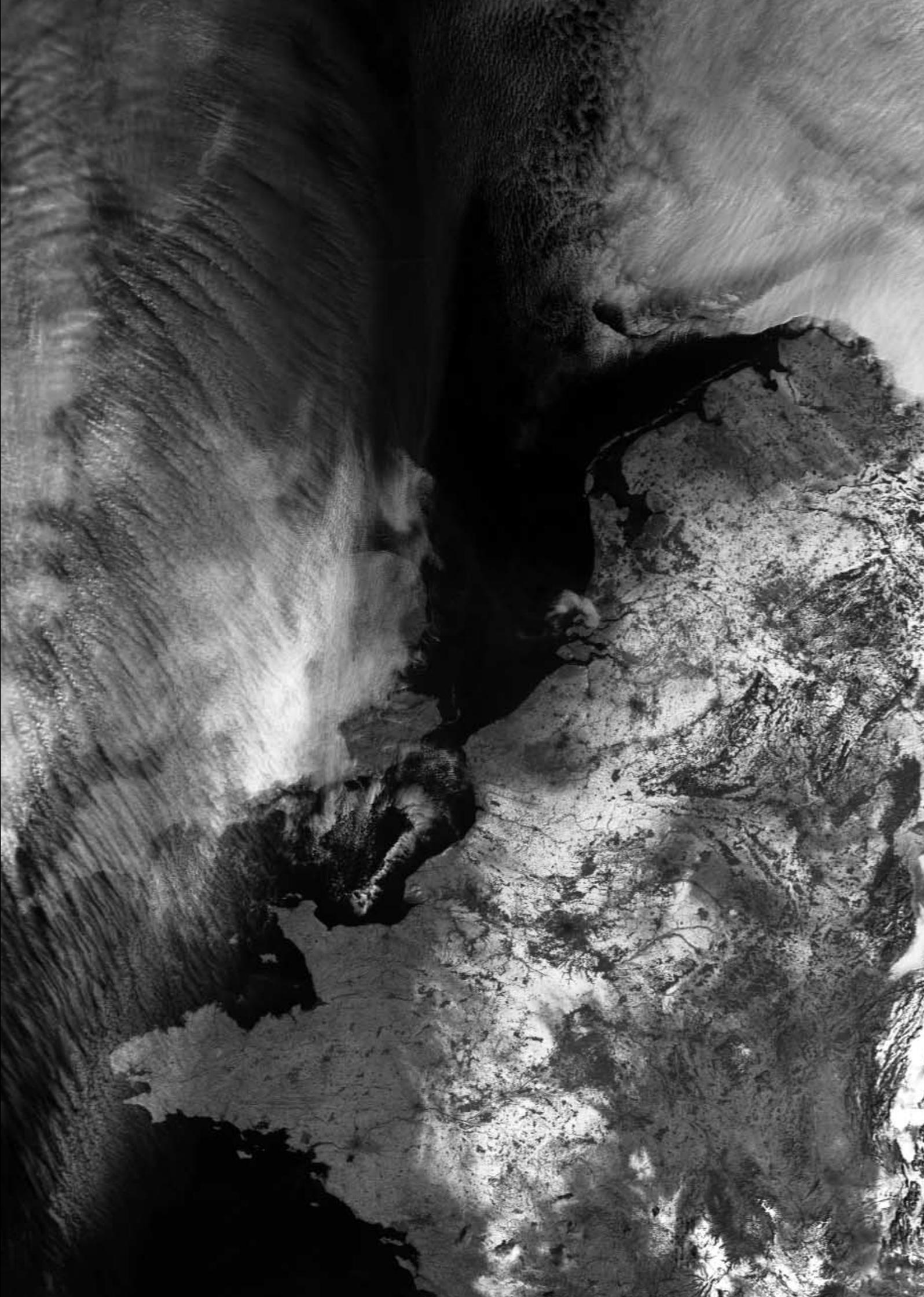
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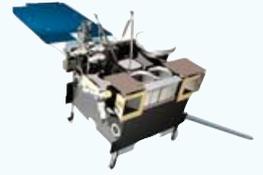
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A Close-up Look at Launching GOES-O

... our next weather satellite



Ed Murashie

Do you ever wonder what it takes to get those nightly television weather pictures? What it takes is a satellite in an orbit 22,000 miles away, where it moves at the same speed as the Earth's rotation so it appears stationary. This special orbit is called a geostationary orbit. That orbit lets the satellite take a steady picture of the earth every 15 minutes. The weatherman then animates or shows each picture in sequence so the clouds move but the Earth does not. But wait—we are getting ahead of ourselves! How does the satellite reach orbit? Seeing the rockets and satellites up close is more fascinating than the pictures they transmit.

Let's walk through the process as Brian Bauerlin takes us on a tour of Cape Canaveral Air Force Station's Launch Complex 37B (LC37B) in Florida, where the United Launch Alliance (ULA) *Delta-IV* rocket is launched. The tour will also include the *Astrotech* facility in nearby Titusville Florida, where the GOES-O satellite resides before being placed on top of its *Delta-IV* rocket. Brian is highly qualified in explaining the launch process, from planning stages through lift-off; he is the Mission Integration Manager for GOES-O. Brian led this tour, giving behind-the-scene facts and humorous stories. He is very passionate about his job and for him, every launch is a thrill.

The tour begins at the Horizontal Integration Facility (HIF) which is just south of LC37B. GOES-O will be launched using a ULA *Delta-IV* Medium Plus (4,2). A ULA what? And who is ULA?

United Launch Alliance [1] is a joint venture, formed in December 2006, between *Lockheed Martin* and *Boeing*. In order to compete with Russia, Europe, China and others in the world satellite launch market, Lockheed Martin (with their *Atlas* rockets) and Boeing (with their *Delta* rockets) combined their Space Divisions to form ULA. Since the capabilities of the *Delta* and *Atlas* overlap, what determines which rocket is used? Heavy payloads are launched on *Delta-IV*s and the rest are decided by customer requirements and preferences.

Boeing developed the *Delta-II*, *Delta-III* and *Delta-IV* rockets, each one more capable than its predecessor in lifting heavier loads into higher orbits. The *Delta-II* is used to launch the polar orbiting NOAA weather satellites into lower orbits. The *Delta III* was discontinued in favour of the *Delta-IV*, which comes in *Medium*, *Medium-Plus* and *Heavy* versions. The *Delta-II* and *Delta-IV* rockets will be around for the foreseeable future.

All *Delta-IV*s [2] start with a Common Booster Core (CBC) first stage. The *Medium-Plus* adds two or four solid fuel strap-on rockets—like the Space Shuttle—and either a 4 meter or 5 meter second stage and fairing. So a *Delta IV Medium-Plus (4,2)* has one CBC first stage, a 4 meter diameter second stage and fairing plus two solid rocket strap-on motors. Simple!

All ULA rockets, including the *Delta IV*, are manufactured at the Decatur, Alabama factory, in a building so large that 'you can fit approximately 18 *Wal-Mart* stores' into the factory; and 'if you stretched all of the runs end-to-end you would be looking along about 22 miles', explains Brian. The factory can process five complete rockets at one time, up to



The GOES-O Delta-IV on its Launchpad

40 CBCs per year and employs approximately 700 people. It starts the build process for a launch five or six years in advance. When complete, It takes 14 days to float the CBC, payload attach fitting, and fairing down the Tennessee River, through the Gulf of Mexico, around the Florida peninsula to Cape Canaveral. A one-of-a-kind ship named the *Delta Mariner* [3,4] is up to the task. It has a draft of only eight feet to navigate the waterways and then fills it ballast tanks with water, increasing its draft to fourteen feet for stability in the ocean. It has the capacity to carry three CBCs and a crew of fourteen (including one outstanding chef). It takes from 24-28 days to go through the Panama Canal and reach Vandenberg Air Force Base in California where *Deltas* are also launched.

Once the rocket and other components arrive at the dock they are moved to the *Horizontal Integration Facility* (HIF). Some rockets are stacked vertically, one stage after another, at the launch pad, like the *Delta-II*. Not so the *Delta-IV*. It is assembled horizontally in the HIF building, trucked to the launch pad then rotated into place. 'The floor you are standing on is North America's levellest floor', explains Brian. It requires this level of precision to join and laser-align the stages. Without the second stage being perfectly aligned to the interstage and the interstage being perfectly aligned to the first stage, the second stage would oscillate too much during separation. An excellent video onboard a *Delta-IV Heavy*, showing the staging, can be found on *YouTube* [5].

The HIF building contains offices and three bays for processing the rockets. It is temperature-controlled and has been designed to withstand hurricane strength winds of 140 mph. The doors are made of strong durable fabric so that they give with the wind better than metal doors and can be replaced easier. At the time of this tour, GPS rocket GPS2F1 and the WGS3 rocket are being processed. These rockets are huge, from the RS68 single engine, the engine compartment, up through the orange long hydrogen tank, the white interstage with the equipment shelf and avionics and past the orange oxygen tank, the interstage and second stage. The CBC alone is 5 metres in diameter and 40.8 meters long. It takes the team up to 60 days to complete the mating and testing. Part of the launch pad, the Launch Mate Unit, LMU, is also attached using bolts and frangible nuts in the HIF building. NASA images inside the HIF are available [6].

A frangible nut is a nut that has two explosive charges on each side. When the rocket is up to 100% thrust and all readings are good, the computer gives the command and the explosives split the nut in two: the bolt slips down and the rocket is released. The nuts and bolts are in heavy metal boxes so that none of the flying metal pieces penetrate the rocket. A video and pictures of a Space Shuttle frangible nut are available [7].



Mating the GOES-O Delta-IV 2nd stage to CBC
Image: NASA

The elevating platform transporter (EPT), built by the German company Kamag, carries the Delta rocket to the launch pad. This is the same vehicle that transported the CBC from the dock to the HIF and will also convey the payload from Astrotech to the launch pad. The EPT has a push pull cab, independent wheel axial control, sensors and hydraulics. The hydraulics keep the rocket aligned vertically, horizontally and axially. Brian pointed out how all of the road signs between the HIF and the launch pad are short. 'When you run a *Heavy* up there it hangs over the road and you can't have any signs there. It was a design item', jokes Brian, 'We had to stop, pick up the signs, and take them down'.

The rocket is moved into place where the LMU engages the *Launch Table* and *Fixed Pad Erector* and then two hydraulic cylinders rotate the rocket into place in twenty minutes. Next, two 60-inch solid rocket GEM-60 motors, manufactured by *Alliant Techsystems*, are delivered to the launch pad. They are hoisted on the side opposite the rocket, moved over the second stage, lowered into place and secured. Pictures of GOES-O's *Delta-IV* being transported to the pad and the *Fixed Pad Erector* can be viewed [8].



The author (left), pictured with Brian Bauerlin in front of the Astrotech Building

The launch pad's two largest components are the stationary gray *Fixed Umbilical Tower (FUT)* with its three swing arms and the moveable white *Mobile Service Tower (MST)*. The MST is over 330 feet high and weighs over 4000 tonnes just before launch. 160 mph hurricane rated locks release, the tower lifts up 3 to 4 inches and then rolls back 300 yards on rails. 'This is one of the largest moveable structure in the world!', exclaims Brian. Next to the launch pad are two lightning towers to protect the pad and workers. Before lightning towers were installed, everyone had to stop working during a Phase-1 alert, which is when lightning is expected within 5 nautical miles in approximately 30 minutes. Today they can work through a Phase-1 alert and only have to stop lifting and ordinance operations during a Phase-2, when lightning is imminent or occurring within 5 nm, saving time.

Riding the elevator to the 8th floor and stepping out, puts you at eye level with the top of the second stage and a removable protective dome. This is where the satellite payload will be mated to the second stage. The view is incredible with plenty of room around the rocket to work. There is so much work-space that a temporary clean room can be installed next to the payload to allow the access panels to be removed and work on the satellite to be performed. Each level has platforms that drop down allowing technicians to work around the entire rocket and satellite. Just before launch

these platforms lift, allowing the tower to roll back. Floors 8, 9 and 10 are air temperature controlled. Brian points out the tape running down the second stage and explains that there are shaped charges on the rocket that are part of the range protection system. If the rocket veers off course, a command is sent to detonate the charges causing the rocket to explode. NASA won't settle for less than a high reliability factor when it comes to range safety, especially since this *Delta-IV* is more powerful than the *Saturn-1B* rockets formerly launched from the previous launch pad at this same site. That is why even the *Saturn-1B* blockhouse next to the pad is no longer manned during a launch—in case of an explosion.

When the satellite is brought to the launch pad, it will be raised by a 50 tonne crane from the side of the MST tower opposite the rocket. It is raised above the 8th level and lowered on to the second stage, leaving the top of the GOES rocket at the 11th floor. Brian takes us to the best view on the entire cape. Down one floor and through a red door marked 'NOT AN EXIT', is a 15 foot long 6 foot wide observation gantry with nothing but the floor grating between you and the ground seven floors down. From there we see the beach, the *Atlas V* launch pad, the two space shuttle pads, *Vertical Assembly Building* and surrounding area for miles around. Looking down we see remnants of the original *Saturn-1B* launch pad, the hydrogen and oxygen spheres used to fuel the rockets and the theodolite building. What's a theodolite you might ask? It is an instrument to precisely measure the rocket's location on the Earth and is used in the rocket's trajectory calculations.

Not only does this tour take us from the top of the second stage, to beneath the first stage engine, it takes us below



Lifting the GOES-O Delta-IV onto the launch pad
Image: NASA

the launch pad. Below the launch pad is the flame duct, which is flooded with fresh water during the launch for pad protection. Another layer of protection is the ablative material which coats the concrete walls of the flame duct and is repaired after each launch. The flame duct is so large that, if the middle supporting wall were removed, a 767 airplane could be parked in it. It would make for a great skateboard area' remarks Brian. During the *Titan* years there was a ritual where workers would line up Barney, Teletubby and other stuffed dolls at the edge of the flame duct and try to find them after the launch. You can view an outstanding movie of the launch pad and photos of the GOES-O and *Delta-IV* [9] as well as photos of the launch pad [10].

As we leave the pad we're looking for a non-official member of the launch team, Henry. Henry is the nine-foot alligator that sometimes roams the area. To keep Henry out of certain areas, the chain-link fences are curved at the top because alligators can climb regular chain link fences.

It takes as few as thirteen days on the launch pad to prepare the rocket and satellite for a launch. It can then stay on the pad with little support. If limited life items that have calibration or use-by dates are close to expiring, ULA will try to get a waiver. If a waiver is not granted, then the component must be replaced.



The 8th level on PAD37 with the solid rocket and the top of the 2nd stage visible
Credit: NASA

Approximately six hours before launch, the pad is cleared and no one is allowed closer than the Delta Operations Centre (DOC) where our tour takes us next. The DOC is where the second stage is processed before moving it to the HIF building. On the 4th floor is the Mission Directors Centre (MDC). The back row of the MDC is where the broadcast commentator sits. ULA, the launch director, flight director, flight operations director and chief engineer sit in the next row, closer to the large



Encapsulating GOES-O
Image: NASA

screen monitors and clocks; the satellite customer and NASA sit in the front row. This is the room where all main milestones and events are observed. Off to the right is a large window with a view of the launch pad. Not only is this room used during launch day, but also during wet dress rehearsals. This room is also used during inter-crew exercises (ICE). The full crew is brought in and run through simulated launches with anomalous events. One of Brian's former jobs as a Rehearsal Director, was to create those anomalies and gauge the customer's response. This could even be the customer's first



Brian inspecting the temperature and humidity readings inside the fairing.

launch, yet they need to know how to respond to the anomaly.

The Launch Conductor and all of the propellant, hydraulic, electrical, mechanical, and other engineers and technicians sit in the Launch Control Centre (LCC) located on the 3rd floor. It's the Launch Conductor you hear calling out the entire launch steps. The engineers who show up 10-12 hours prior to launch are looking at large DLPS computer monitors displaying all of the rocket and satellite sensor readings, which are colour coded to quickly point out the out-of-limit readings. As the countdown progresses, the computer takes over at T-1.5 seconds. So at T-10 seconds you might as well look out the LCC room window because there is nothing you can do; only the computer is quick enough to review all sensor readings and either launch or scrub.

What will Brian be doing during the launch? He will be acting as the



The author in the Astrotech Encapsulation Bay next to the encapsulated GOES-O satellite.

Spacecraft Coordinator and will be monitoring the temperature and humidity readings in the payload fairing. He needs to ensure the temperature is 18-19°C, optimal for batteries and other components, and the relative humidity lies between 35-55%, optimal to prevent static electricity and dew point issues. Brian is also the coordinator between ULA and the customer. If any issues arise it is his job to communicate between the two. The next room contained the computers to monitor and launch the rocket. 'The old Saturn had four such rooms', mentions Brian. The next room was for the customer, ECS and HVAC engineers.

The final stop of the tour is at the *Astrotech Corporation* in Titusville Florida, just outside the Kennedy Spaceflight Centre which is just north of the Air Force Station. *Astrotech* [11] is a commercial space company founded in 1984 with a history dating back to *Northrop Grumman*. *Astrotech* is the first private company formed to meet the growing demand for commercial satellite processing; they provide the facilities commodities,

processing support and safety officers to oversee the hazardous operations. Operations like final assembly, testing, fuelling and encapsulation are performed by the contracting customer at *Astrotech's* facility. There are four satellite processing buildings on the 62 acres with Building 9 currently storing GOES-O. It also housed *Kepler* (the recently launched NASA Space Telescope mission to discover Earth-like planets) before it was launched. *Astrotech* is also currently processing or storing LCROSS, WGS3 and GPS2F1.

After getting through several levels of security, we enter the changing room, clean our shoes and don our clean-room attire. We pass through the air scrubber which cleans and removes static electricity and can finally enter the encapsulation bay where GOES-O is stored. The first two things we notice are that the satellite is surrounded by a scaffold, and the completely white room with black ruler markings, in feet, on the walling.

The GOES-O satellite is encapsulated in the fairing and sitting on the Payload Adapter Fitting (PAF) which is supported on an air bearing platform that can be moved easily. Around the fairing are two eight-level scaffolds, pushed together to allow access to the 47 foot tall fairing in a room large enough to accommodate an 86 foot fairing. There is a line exit through the bottom of the platform for battery charging; an access cover with ports which connect to nitrogen purge lines, relative humidity and temperature probes; and a dedicated nitrogen fly-away purge line attached to the internal spatial orientation navigation unit. The current temperature inside the fairing is 18°C at 3% relative humidity. A cross-hair with the letters 'RF' on the fairing marks an RF window which allows communications through an external loop Yagi.

Emergency breathing bottles remind you that the satellite is fuelled with station-keeping gas.

Brian points out the light gray tape running from the top to the bottom on two side of the fairing. Under this tape are rivets and a linear explosive assembly that, at approximately 2 minutes and 42 seconds into flight, will detonate, separating the fairing instantaneously.

Every four days the satellite gets a health check and *Boeing Space and Intelligence Systems*, the satellite manufacturer, has stated that the satellite can stay in the



The fairing, showing tape running down its side. Explosive charges to release the fairing lie beneath this tape.

fairing, with periodic charging of the GOES-O flight batteries, until August. As we leave the encapsulation room, we notice a mascot, Wall-E, a security camera on a roll-around stand.

The next room is the air-lock separating the outside world from the East and West Processing Bays. GOES-O arrived from the Boeing manufacturing plant in El Segundo California on a C-17 military transport plane on March 3, 2009 and passed through this air lock. It was in the East Processing Bay where GOES-O was processed, fuelled and had the PAF attached before being moved into the Encapsulation Bay. The Processing Bays are large clean-rooms, capable of 10,000 class—which means that there can be no more than 10,000 air particles per cubic foot (compared with room air, which contains about a million air particles per cubic foot). The adjacent room is the Payload Faring Processing Bay where the fairings are first cleaned and have the logos applied before being moved into the Encapsulation Bay.

After the *Delta-IV* rocket is ready and passes all tests, and approximately thirteen days prior to launch, the payload will be moved from the *Astrotech* facility on the EPT transporter. The EPT maintains a level environment during its 5 mph, 8 hour drive to the launch pad. The drive starts around 8 pm, to prevent a traffic jam, and arrives at the pad between 5 am and 6 am. When the new shift arrives at 7 am, the payload is loaded on top of the *Delta-IV* second stage, similar to the solid rocket motors.

GOES-O is the second in the new generation of Geostationary



Wall-E, the security camera/mascot

Timeline	
T-5 hr 15 min	Terminal count starts
T-5 hr	Start loading 1 st stage oxygen
T-4 hr	Start loading 1 st stage hydrogen
T-3 hr 20 min	Start loading 2 nd stage oxygen
T-3 hr 10 min	Start loading 2 nd stage hydrogen
T-1 hr 40 min	All fuel loading complete
T-1 hr	Engine slewing test started
T-15 min	Switch satellite to internal batteries
T-4 min	Switch <i>Delta-IV</i> to internal batteries
T-5.5 sec	1 st stage solid engine start
T-0	Launch!
T+1 min 40 sec	Jettison the solid engines
T+4 min 27 sec	Main engine cutoff and jettison
T+4 min 47 sec	2 nd stage engine ignition
T+4 min 57 sec	Fairing jettison
T+23 min 05 sec	2 nd stage engine cutoff
T+27 min 08 sec	2 nd stage engine ignition
T+4 hr 10 min 01 sec	2 nd stage engine ignition
T+4 hr 10 min 57 sec	2 nd stage engine cutoff
T+4 hr 21 min 27 sec	Satellite separation into a 41 555 km x 13 000 km orbit
Apogee motor burns	Five more burns to insert into a 42 175 km geostationary orbit

Operational Environmental Satellites.

The first, GOES-N as it was called prior to a successful on-orbit checkout, is now called GOES-13 and is in standby mode at 105° west longitude. It may soon replace GOES-12 (which has a leaking thruster), or a major failure of GOES-11. GOES-11 is the active satellite covering the western portion of the United States at 134° west longitude and GOES-12 is the active satellite covering the eastern portion of the United States at 75° west longitude. GOES-O will probably be checked out at 90°W and, if successful, will be renamed GOES-14 and become an on-orbit spare. GOES-P has been manufactured and is in storage at at the *Boeing Space and Intelligence Systems* facility in California.

Acknowledgements

I want to thank Brian Bauerlin for the outstanding tour, Tom Coussens, GOES OP Launch IPT Lead and Raymond McGlynn, NASA GOES-O/P Launch Services Manager, for both making the tour possible, and the Cape Canaveral Air Force Station.

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- 4 <http://www.flickr.com/photos/toastforbrekkie/sets/72157600216259987/>
- 5 <http://www.youtube.com/watch?v=wzggLOeDf8U>
- 6 <http://www.nasaimages.org/luna/servlet/view/search?q=GOES-O>
- 7 http://www.collectspace.com/collection/artifacts_sts_sts31fnut.html
- 8 <http://spaceflightnow.com/news/n0902/27goes/>
- 9 http://www.osd.noaa.gov/GOES/goes_o.htm
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- 11 <http://www.astrotech.com/>

Data from the EUMETSAT Land Surface Analysis Satellite Applications Facility (SAF)

David Taylor

Introducing the Satellite Applications Facilities (SAFs)

Apart from pretty pictures, what use can be made of all the data coming down from weather satellites? Who understands all the possibilities, and knows the best algorithms for extracting information about the environment from the raw radiance data provided by instruments such as those on board the polar orbiting and geostationary satellites operated by EUMETSAT; and what about validating those algorithms against actual measurements on the ground or in the oceans?

Fortunately, EUMETSAT has anticipated these issues and set up a number of SAFs, each of which comprises a group of experts who provide the knowledge and algorithms to extract the data, the resources to check this data on the ground and software to provide data which users can download. EUMETSAT also broadcasts these data to users of the EUMETCast system. The research, data and services provided by the SAFs complement the meteorological products delivered by EUMETSAT.

Currently, operational data are provided by six SAFs:

- SAF on Support to Nowcasting and Very Short Range Forecasting
- Ocean and Sea Ice SAF
- Climate Monitoring SAF
- Numerical Weather Prediction SAF
- Land Surface Analysis SAF
- Ozone and Atmospheric Chemistry Monitoring SAF.

The GRAS Meteorology SAF is just starting to provide data, and an Operational Hydrology and Water management SAF is currently under development.

EUMETSAT's *Land Surface Analysis Satellite Applications Facility* (LSA SAF) consists of a number of facilities, each with a team of experts dedicated to extracting useful information from the raw data provided by their geostationary and polar orbiting satellites. Important facets of this activity includes the calibration of satellite sensors in terms of physical sources (converting measured radiances into temperatures, for example) and the validation of data derived from these physical measurements. A typical example would be understanding what a vegetation index—derived from albedo data at two or more different wavelengths—means in terms of ground data.

Overview

Perhaps the best overview is this summary extracted from the LSA-SAF Web site:

Although directly designed to improve the observation of weather systems, the spectral characteristics, time resolution and global coverage offered by MSG (Meteosat Second Generation geostationary satellites) and EPS (the polar orbiting satellites) allow for their use in a broad spectrum of other applications, namely within the scope of land biophysical applications.

The *Land SAF* aims to develop techniques, products and algorithms which will allow a more effective use of data from both the geostationary and the polar orbiting satellites run by EUMETSAT. Hence the benefits of the data can be increased in relation to land, land-atmosphere interactions and biophysical applications.

Activities performed within the framework of the Land SAF involve the development of products that are especially relevant in the following fields of application:

- Weather forecasting and climate modelling, which require detailed information on the nature and properties of land. Highest Land SAF priority should be towards the meteorological community and, within that community, Numerical Weather Prediction (NWP) has been already identified as the one that has the greatest potential of fully exploit the products
- Environmental management and land use, which require information on land cover type and land cover changes (e.g. provided by biophysical parameters or thermal characteristics)
- Natural hazards management, which requires frequent observations of terrestrial surfaces in both the solar and thermal bands
- Climatological applications and climate change detection

What does all this mean in terms of the data available to us? The table below illustrates how data from the geostationary MSG satellites have been processed by the LSA SAF into a quite remarkable list of products, all of which have abbreviations to make it more easy (or more difficult!) to refer to them.

LST	Land Surface Temperature
DSSF	Downwelling Surface Shortwave Radiation Flux
DSLFL	Downwelling Surface Longwave Radiation Flux
ALBEDO	Surface Albedo
SC	Snow Cover
ET	Evapotranspiration
FVC	Fraction of Vegetation Cover
LAI	Leaf Area Index
fAPAR	Fraction of Absorbed Photosynthetic Active Radiation
FRPPIXEL	Fire Radiative Power (PIXEL)
FRPGRID	Fire Radiative Power (GRID)
MTAL	MSG Ten Day Surface Albedo

As of early April 2009, the LST, DSSF and DSLFL are listed as operational products; all the rest are preoperational with the exception of FRPGRID which is shown as 'Development'.

More recently, data from the Metop-A satellite have started to be processed, and although these data are only available once or twice a day for a given location, they do have the advantage of a much higher spatial resolution.

The following two products as shown as preoperational.

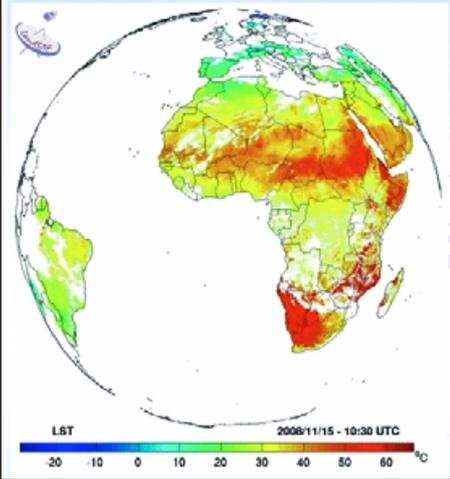
EPS_LST EPS - Land Surface Temperature
EPS_DSLFL Downwelling Surface Longwave Radiation Flux

Summary of Products

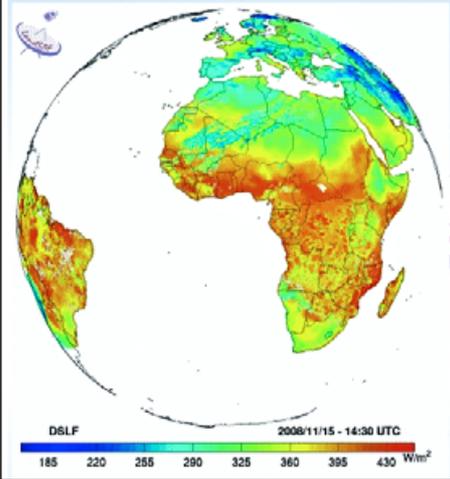
The following is a run-through of the various products, derived from the LSA SAF website.

LST: *Land Surface Temperature* is the radiative skin temperature over land and is determined from the long wavelength 10.8 μm and 12.0 μm channel IR sensors on the MSG satellites. Where cloud is blocking the view of the land, no LST can be generated. By using two channels rather than

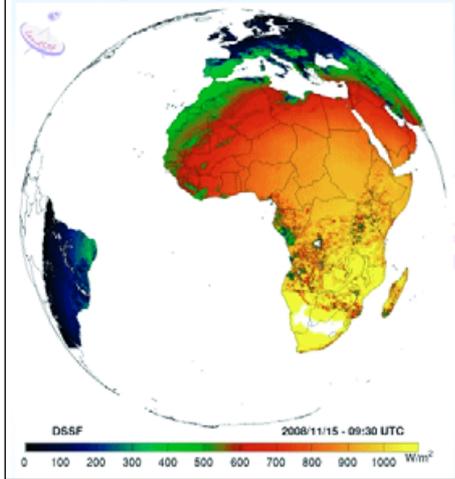
Land Surface Temperature



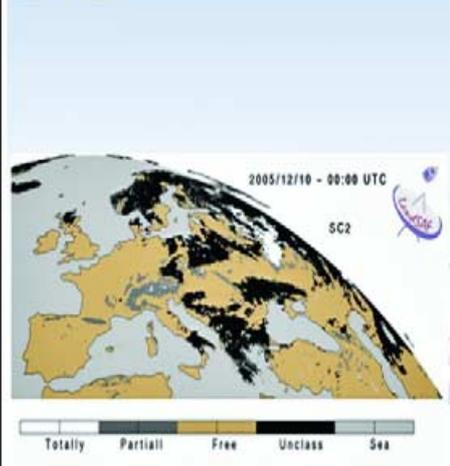
Down-welling Surface Long-wave Radiation Flux



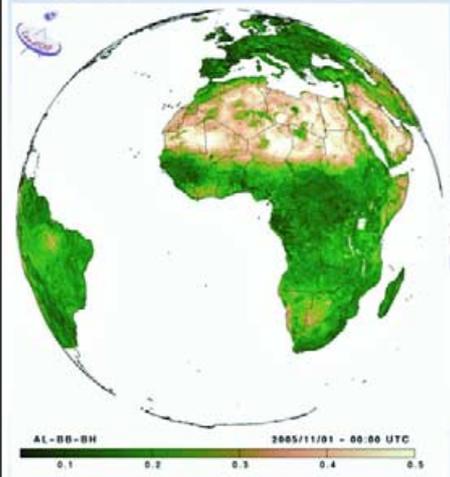
Down-welling Surface Short-wave Radiation Flux



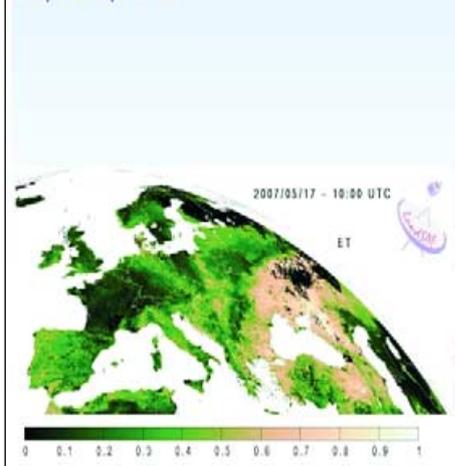
Snow Cover



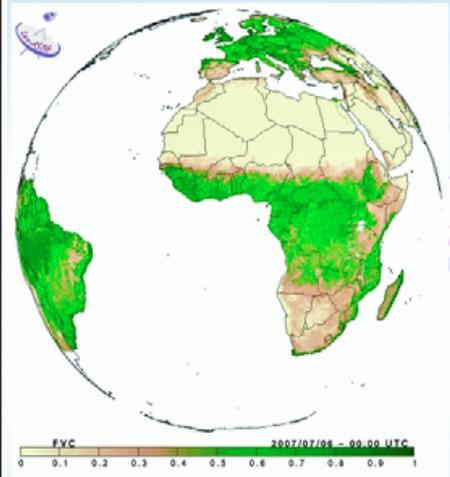
Surface Albedo



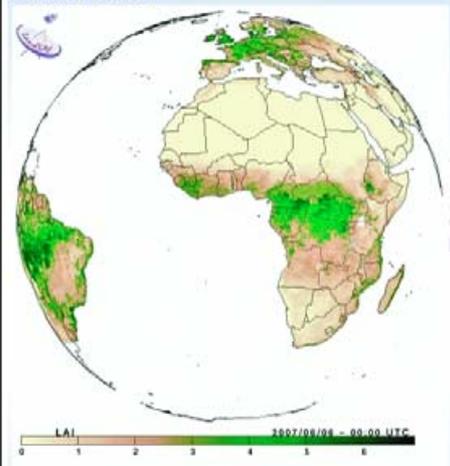
Evapotranspiration



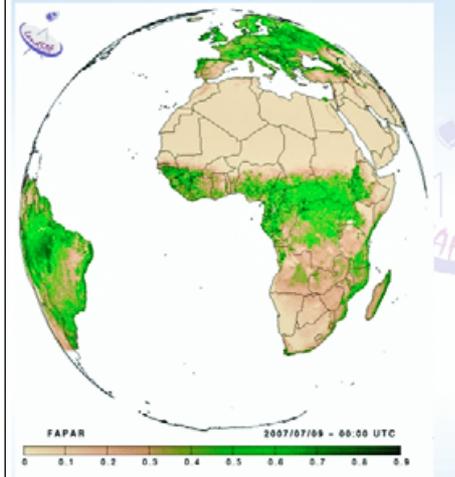
Fraction of Vegetation Cover



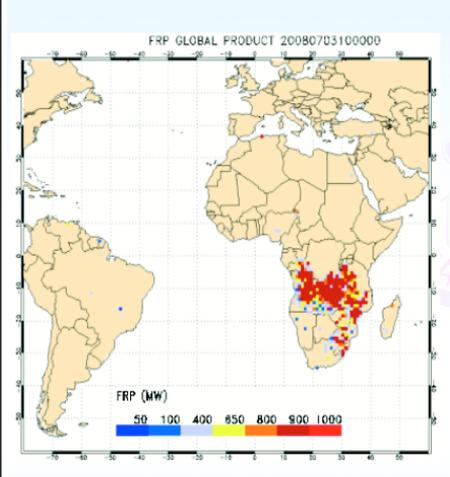
Leaf Area Index



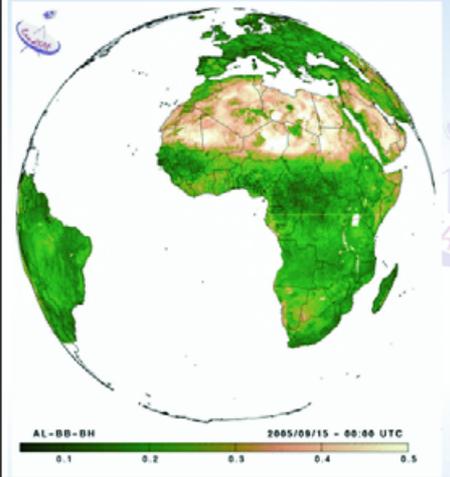
Fraction of Absorbed Photosynthetic Active Radiation



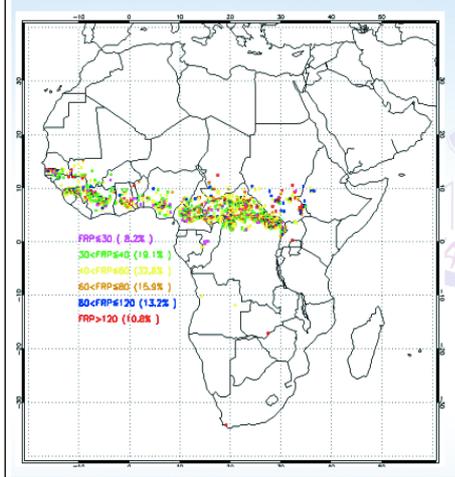
Fire Radiative Power - GRID



MSG Ten Day Surface Albedo



Fire Radiative Power - PIXEL



one, certain effects can be compensated for. An algorithm like this is known as a split-window algorithm. The best LST values are accurate to about 1K (equivalent to 1 Celsius degree).

DSSF: The *Downwelling Surface Shortwave radiation Flux* refers to the radiative energy in the wavelength interval between 0.3 μm and 4.0 μm that reaches the Earth's surface per time and surface unit. This flux depends on the solar radiation at the top of the atmosphere, the solar zenith angle and the fraction of radiation absorbed by clouds etc.

DSLFL: The *Downwelling Surface Longwave radiation Flux* is the result of atmospheric absorption, emission and scattering within the entire atmospheric column and may be defined as the thermal irradiance reaching the surface in the thermal infrared spectrum (4-100 μm). In clear-sky situations, DSLFL depends on the vertical profiles of temperature and gaseous absorbers, primarily water vapour and CO₂, along with others of lesser importance like ozone, methane, nitrous oxide and CFCs.

However, DSLFL is determined by the radiation that originates from a shallow layer close to the surface (about one third being emitted by the lowest 10 meters of the atmosphere and 80% by the 500-metre layer). The cloud contribution mainly occurs in the atmospheric window between 8 μm and 13 μm and depends primarily on cloud base properties (altitude, temperature and emissivity). DSLFL is directly related to the greenhouse effect and its monitoring has an important role in climate change studies. Other applications include meteorology (land applications) and hydrology. The nominal accuracy is 5-10%.

Albedo: *Land surface albedo* is a key variable for characterising the energy balance in the coupled soil-vegetation-atmosphere system. The albedo quantifies the part of the energy that is absorbed and transformed into heat and latent fluxes. Owing to strong feedback effects, the knowledge of albedo is important for determining weather conditions at the atmospheric boundary layer.

The *Albedo* product is generated each day at the full spatial resolution of the MSG/SEVIRI instrument. An iterative scheme allows the composition of the information with a characteristic time scale of five days. The product is based on the three short-wave channels, 0.6 μm (VIS), 0.8 μm (NIR) and 1.6 μm (SWIR).

Albedos come in both 'white sky' and 'black sky' variants, where the 'black sky' refers to reflectance under direct illumination with no diffuse component, and 'white sky' is the reflectance of a surface under pure diffuse illumination, with no direct component.

SC: *Snow Cover* is the presence of snow over land. SC plays an important role in the physics of land surface as it is involved in the processes of energy and water exchange with the atmosphere. SC is useful for the scientific community, namely for those dealing with meteorological and climate models. Accurate detection of snow in a pixel is also important for a wide range of areas related to land surface processes, including meteorology, hydrology, climatology and environmental studies. The retrieval of SC is based on detection of cloudy, snow free and snow covered pixels in the cloud mask generated by the nowcasting and Very Short Range Forecasting Satellite Application Facility (NWC SAF) software.

ET: *Evapotranspiration* accounts for the flux of water evaporated at the Earth-atmosphere interface (from soil, water bodies and interception) and transpired by vegetation through photosynthesis. ET is an important component of the water cycle and is associated with the latent heat flux

(LE), a key link between the energy and water cycles. In other words, LE represents the energy needed for the ET process. Evaluating energy fluxes at the Earth surface is of great importance in many disciplines like weather forecasting, global climate monitoring, water management, agriculture and ecology.

FVC: *Fractional Vegetation Cover* defines an important structural property of a plant canopy, which corresponds to the complement to unity of the gap fraction at nadir direction, counting for the amount of vegetation distributed in a horizontal perspective. FVC is related with the partition between soil and vegetation contribution for emissivity and temperature. The FVC product is currently generated daily at the full spatial resolution of the MSG/SEVIRI instrument, and will be later provided on a 10-day and monthly basis. This product is also based on the three short-wave channels, 0.6 μm (VIS), 0.8 μm (NIR) and 1.6 μm (SWIR). Accuracy is about 10%.

LAI: *Leaf Area Index* is a dimensionless variable which defines an important structural property of a plant canopy. LAI is defined as one half of the total leaf area per unit ground area. It provides complementary information to the FVC, accounting for the surface of leaves contained in a vertical column normalised by its cross-sectional area. It defines thus the area of green vegetation that interacts with solar radiation to determine the remote sensing signal, and represents the size of the interface between the vegetation canopy and the atmosphere for energy and mass exchanges.

fAPAR: *Fraction of Absorbed Photosynthetically Active Radiation* defines the fraction of PAR (400-700 nm) absorbed by the green parts of the canopy, and thus expresses the canopy's energy absorption capacity. fAPAR depends both on canopy structure, leaf and soil optical properties and irradiance conditions. fAPAR is generally well correlated with the LAI, the more for healthy fully developed vegetation canopies.

FRP: The *Fire Radiative Power* product (in MW) provides information on the measured radiant heat output of detected fires. Therefore, measuring this FRP and integrating it over the lifetime of the fire provides an estimate of the total *Fire Radiative Energy* (FRE) which, for wildfires, should be proportional to the total mass of fuel biomass combusted.

FRPGRID: The *FRPGRID* product contains an hourly estimation of the FRP at one degree resolution and includes several correction factors.

MTAL: As Albedo (above). In addition to the corresponding narrowband estimates, broadband albedo is derived for the visible, near-infrared and total shortwave wavelength ranges. Information on cloud cover is obtained from the output of the Nowcasting and Very Short Range Forecasting Satellite Application Facility (NWC SAF) software.

Many of the products are split into regions to make them easier to download and use. The regions are: Europe, North Africa, South Africa, and South America.

There is a display of some much-reduced illustrations of the data types, taken from the LSA-SAF Web site, on page 29. Full sized versions can be accessed from the LSA-SAF website (address in the 'References' section at the end of this article).

Accessing the SAF Data

Now that your appetite has been whetted, you will doubtless be anxious to get your hands on one or more products from this splendid choice! Most of the data described above are available to users of EUMETCast—you simply need to ask for the data on your EUMETCast registration form. Please note that special

arrangements were made for existing users. You may also be able to get access to the data by joining the LSA SAF on their Web site, and downloading the data by FTP, and you could probably automate such downloads with Francis Breame's *getCharts* software.

Here is the EUMETSAT notice:

'On 31 March 2009 EUMETSAT introduced a registration requirement for EUMETCast access to all level 2 satellite products generated by EUMETSAT and the Satellite Application Facilities (SAFs). After this date, only registered users will continue to receive level 2 products through EUMETCast. The registration requirement is being introduced to allow EUMETSAT and its SAFs greater visibility of product usage.

'New EUMETCast users will be able to select their choice of level 2 product sets (Meteosat, Metop/NOAA, Ocean Sea Ice, Land Analysis and Ozone & Atmospheric Chemistry) via the on-line registration form. Existing EUMETCast user may request a continuation of access to these products by sending an email to the User Helpdesk via ops@eumetsat.int.

You should really have already e-mailed EUMETSAT as an existing user of the data by the time this article is published, so please be patient if EUMETSAT ask you to update your user registration form instead.

If you have the *MSG Data Manager*, you will already be capable of managing this data by automating the copying of the data into the **Images\SAF** directories, using the standard **year\month\day** structure.

Viewing the data

Most of the data from the LSA SAF is in HDF5 format, and this can be interpreted by the free NCSA HDF Viewer. However, you may find it more convenient to use one of the two viewers developed by *SatSignal Software* to visualise these products. There are two programs because the polar orbiter data are sent in a different format from the geostationary data.

With the geostationary data, the map projections are standardised into well-defined regions, either full-disk, Europe, North and South Africa, and South America. The polar-orbiting data comes in the format of a data file, plus two rather large files with the latitude and longitude of each data point.

Viewing Geostationary data

Data from the geostationary satellites is available at a maximum resolution of 3-km at the sub-satellite point, decreasing to approximately 5-km resolution over Europe. Some data are sent out full-disk but other data are sent as regions, which makes it easy to handle.

The program I have developed to handle this HDF data is called the *HDF Viewer*, it is designed specifically for the LSA-SAF data sent over EUMETCast.

Figures 1 and 2 on the previous page show the two different wavebands of the downwelling flux, the shortwave (mainly sun dependant) and the longwave. To show some of the more unusual products, I have selected a region around the Nile delta to show the LAI, FVC and fAPAR data (figures 3, 4 and 5) derived from the MSG-2 satellite during April 2009. These data are cropped from the full north Africa image.

Viewing Polar Orbiter data

At the time of writing, there are just two products available at the higher 1-km resolution possible from the AVHRR instrument aboard the Metop-A satellite. These are the land surface temperature and downwelling surface longwave flux data. My *Metop LSA Viewer* software can handle this data, and figures 6 shows how the six segments comprising one particular pass have been combined on

the *Pass Overview* tab. Figure 7 is a detailed LST false-colour image showing parts of England and northern France while figure 8 displays Svalbard. Moving the mouse cursor over these images allows the temperatures or DSLF at a particular location to be read-off.

Acknowledgements

Much of the content of this article, and the illustrations on page 29, have been derived from the Land Surface Analysis SAF website. All images opposite are copyright © EUMETSAT 2009.

References

The programs *HDF Viewer* and *Metop LSA Viewer*, which include a full-function 30-day trial licence, can be downloaded from the 'Satellite Tools' section of my website at

<http://www.satsignal.eu/>

You can read more about the EUMETSAT SAFs at

http://www.eumetsat.int/HOME/Main/What_We_Do/SAFs/index.htm

and the LSA-SAF Web site at

<http://landsaf.meteo.pt/>

Francis Breame's *getCharts* software can be downloaded from

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

The NCSA *HDF Viewer* Software is available from

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

How to prevent Tellicast auto-starting when your computer boots up

Rob Alblas

Removing *Tellicast* from the 'start-at-boot' list

Installation of *Tellicast* software is done in such a way that it will start as soon as you log on (or after booting). For a 24/7 usage this is OK, but if your PC is used for other tasks, and if receiving *EUMETCast* is not always wanted, it is best to remove *Tellicast* from the 'start-at-boot' list and start it manually, when desired.

Under *Windows XP* this can be done in the following way. Navigate to the folder

- `I Documents and Settings\<user>\Start Menu\Programs\Startup`

(replacing <user> by your own user name).

At this location, the following link should be found:

- `I BusinessTV-IP.Ink`

Now create a new folder on the current location; you can call it something like 'not_started'.

Finally, move `I BusinessTV-IP.Ink` into this new folder.

Note - as filename extensions are generally hidden by Windows, you may find it easier to identify this link by means of its well-known purple 'T' icon with an arrow in the bottom left-hand corner.



That's all. Note that a real restart is necessary, going into 'sleep' mode is not enough! To restore 'auto-start', just move the link back to the original location.

To Start *Tellicast* Manually

If you use *WeView*, then this program will take care of starting/stopping *Tellicast*. Otherwise it can be started via the Start menu, for XP: under 'All programs', item 'T-Systems'.

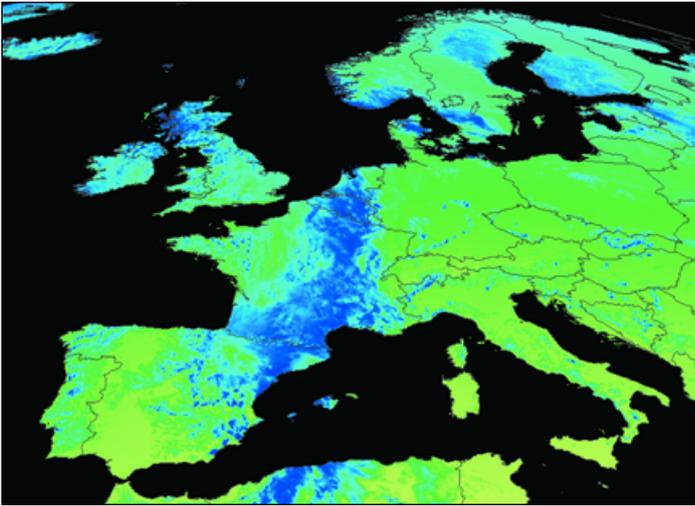


Figure 1 - The shortwave downwelling (DSSF) product for Europe

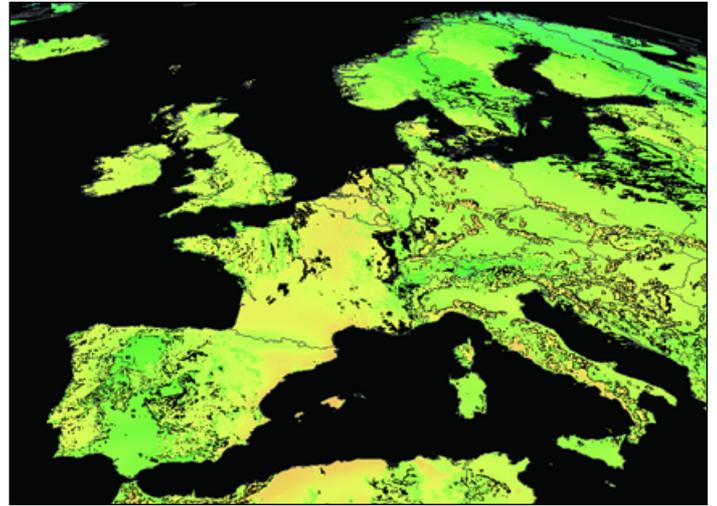


Figure 2 - The longwave downwelling (DLSF) product for Europe

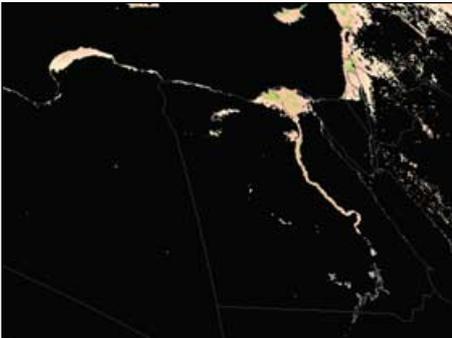


Figure 3 - Leaf Area Index (LAI) for the Nile Delta

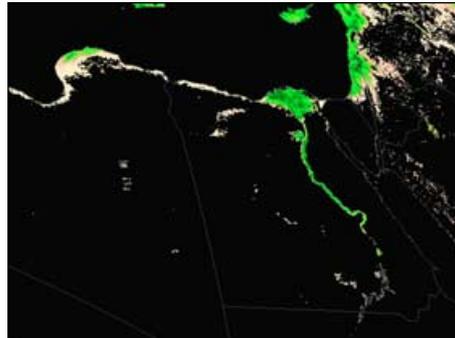


Figure 4 - Fraction of Vegetation Cover (FVC)



Figure 5 - fAPAR for the Nile Delta Region

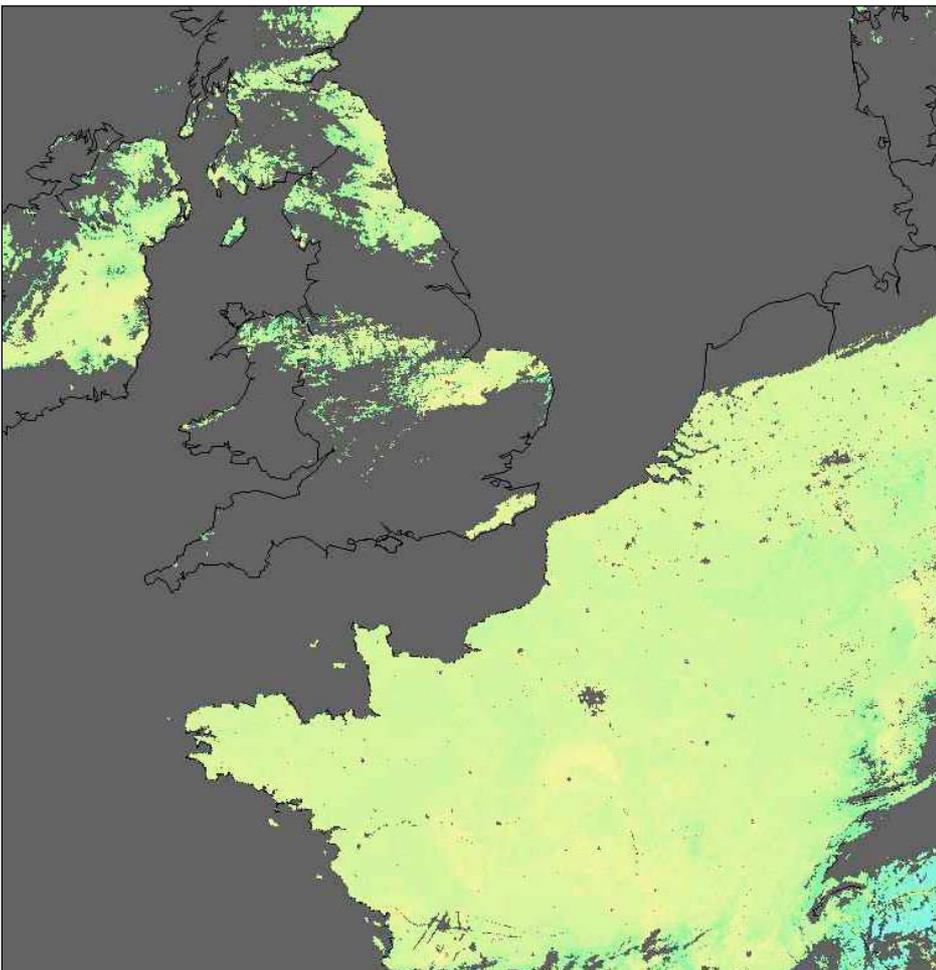


Figure 7 - Land Surface Temperature (LST) false colour image of England and France

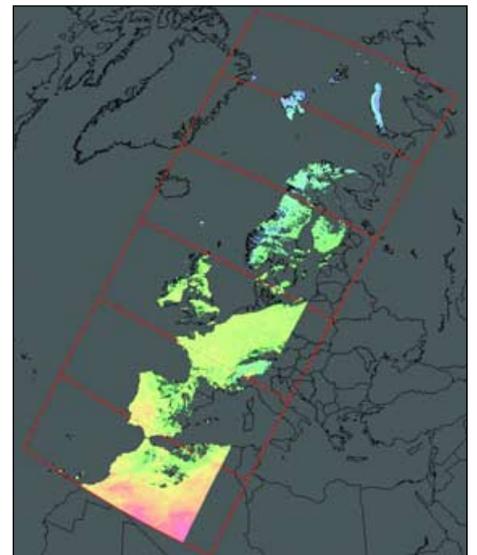


Figure 6 - The LSA Viewer pass overview tab

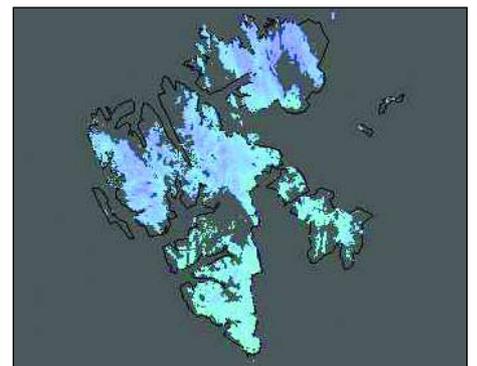


Figure 8 - LST false colour image of Svalbard

The Meteor M Series

of Russian Polar Orbiting Meteorological Satellites

Peter Wakelin

As stipulated in the *Federal Space Programme of Russia to 2015*, three hydrometeorological and oceanographic satellites are to be created within the framework of the *Meteor-3M* project. Meteor M-N1 was originally due for launch on May 15 but, as we go to press, the news is that this has now been delayed till July. Meteor M-N2, a similar satellite, is to be put into orbit in 2010 with the oceanographic Meteor M-N3 scheduled for 2012.

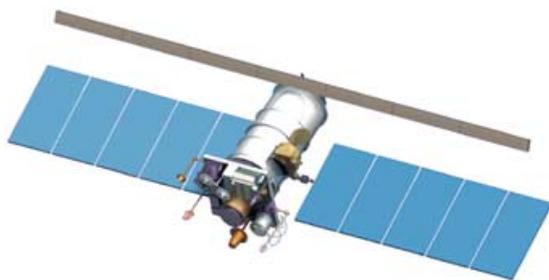
At their November 2007 meeting, the *Coordination Group for Meteorological Satellites* (CGMS) reported that the 1.7 GHz transmission would be AHRPT but the more recent CGMS 36 report (just received) states HRPT, giving the data rate as 665 kb, the same as for NOAA HRPT. I guess we just have to wait and see! Here's an extract from the relevant working paper.

Meteor M-N1 is now fully assembled and its integrated tests are in progress. The satellite is to be placed into a 98.77° sun-synchronous orbit at an altitude of 835 kilometres with the descending node equator crossing at approximately 09:30 local time. The satellite's information complex comprises:

- Hydrometeorological 6-channel visible and infrared-band scanner (MSU-MR)
- System of three 3-channel visible-band medium-resolution scanners
- X-band sideways looking radar with 400-meter and 800-meter resolution
- Heliogeophysical hardware
- Data acquisition and transmission system

Meteor M-N1 has three downlink radio lines:

- 2-channel SHF-band radio line (8.192 GHz and 8.320 GHz) with a 122.88 Mbaud data transmission rate
- UHF-band radio line (1700 MHz, which I suspect may not be precise) with a 665.4 kbaud data transmission rate
- VHF-band radio line with an 80 kbps operating transmission rate (LRPT format) at either 137.1 or 137.9 MHz.



Meteor 3M

Credit: ROSCOSMOS/ROSHYDROMET

Further Details

It is planned to launch Meteor M-N1 from the Baikonur cosmodrome using a *Soyuz-2-1b Fregat* launch vehicle in a piggy-back launch which will include five microsattellites.

Meteor M-N2 is planned as a duplicate of Meteor M-N1 but with some of the service systems upgraded. Both satellites are designed using hermetically sealed (pressurised) containers. Meteor M-N2 is currently at the stage of flight systems integration.

Meteor M-N3, currently still at the design stage, will be a hydrometeorological satellite of the next generation and will be



Soyuz Fregat-1b Launcher

Credit: Starsem

manufactured using non-hermetic technology. Its information complex, aimed at providing water surface monitoring will include:

- X-band multimode radar based on Active Phased Array Antenna (APAA) technology, with spatial resolutions from 1 to 500 m and a horizontal swath width from 10 to 750 km
- Ku-band scatterometer with a spatial resolution of 25 × 25 km and swath width of 1800 km
- A 4-channel coastal-zone scanner operating in the visible band with 80 m resolution within its 800 km swath
- An 8-channel ocean colour scanner operating in the visible band with 1-km resolution within the 3000 km swath
- Hardware for radio occultation measurements of Earth's atmospheric parameters.

The ground segment for receiving and processing the data from Meteor-M satellites is based at the Roshydromet complex. The major components are the three Regional Centres in Moscow (Scientific Research Centre Planeta), Novosibirsk, western Siberia and Khabarovsk in the Far East. The ground segment also includes the network of LRPT and HRPT receiving stations. Roshydromet's main satellite centre, *Planeta*, performs the scientific and methodological management and coordinates the activities of the above mentioned acquisition centres and stations. These centres cover the whole territory of Russia, neighbouring countries, as well as a major part of Europe.

WeView

A new, easy to use, EUMETCast Program

Rob Alblas

In *GEO Quarterlies* 18 and 20, Laurence Holderness addressed a need for a simple program to handle data from the new generation of weather satellites, broadcast via EUMETCast. Whereas for APT just one program was enough, for EUMETCast at least five programs are necessary:

- Receiver software
- *Tellicast*, to get data from receiver on to the hard disk
- EKU software, necessary for decryption
- *Tqchansel*, if a simple selection of received satellites is desired
- Processing software to translate received data into pictures

For the last item there is a choice between *xrit2pic*, which can handle both geostationary and polar satellites, and the programs of David Taylor. In the latter case, to handle geostationary and polar satellites, a number of extra 'manager' programs are needed (e.g. *GeoSatSignal* and *HRPT Reader*).

For the *Receive*, *Tellicast* and *EKU* programs, it is mainly an 'install and forget' story. However, the programs used to create the actual images (*xrit2pic* and David Taylor's programs) have a learning curve, making it sometimes too complex for people who only use these programs now and then.

I have tried to construct a program for very simple handling of EUMETCast data. The objectives are:

- Everything that is needed is provided in one program
- Built-in satellite selection
- A *Tellicast* start/stop button
- Viewing of recorded data, both black-white and coloured
- Translation into JPEG format, for external use
- Easy to install, and reporting clearly if something isn't installed correctly.
- Just one window (no pop-ups), and a very limited number of buttons/menus

The program is a combination of a greatly simplified *xrit2pic* [1] and *tqchansel* [2].

Program name

Finding a name is one of the challenges of making a new program. I started with 'wview, but this appears to be an existing program name, also dealing with weather related data. So I added the 'e' of EUMETCast, and we have 'WeView': 'Weathersatellite EUMETCast View'.

Installation

Installation of software for the receiver, *Tellicast* and EKU remains unchanged. Step-by-step installation instructions for these programs by Arne van Belle are provided on the GEO CD supplied when you purchase your USB DVB satellite receiver from the *GEO Shop*. David Taylor has also described how to set up the receiver software in a previous issue of *GEO Quarterly* [3].

Installation of *WeView* is easy. There are two self-installing executable files, one containing libraries and help files, the other the program *WeView* itself. Normally, only the latter one needs to be reinstalled to update to a newer version.

Weview will be installed under `\Program Files\xrit`, the same location as for *xrit2pic*. The reason is that both programs use the same libraries. If desired, *xrit2pic* may be used for tasks not

supported by *WeView*, like making a movie; both programs can be used simultaneously on the same set of received data.

Settings

An extra complexity with installing a multiple-program system is that they have to 'talk' with each other in some way. To do this all the programs need the right settings.

One of the objectives of *WeView* is to make this as simple as possible. It 'talks' with *Tellicast*, so any settings which have to do with that program especially, need to match.

By default *Tellicast* is installed in

Program Files\T-Systems\BusinessTV

and the default settings of *WeView* conform to this installation.

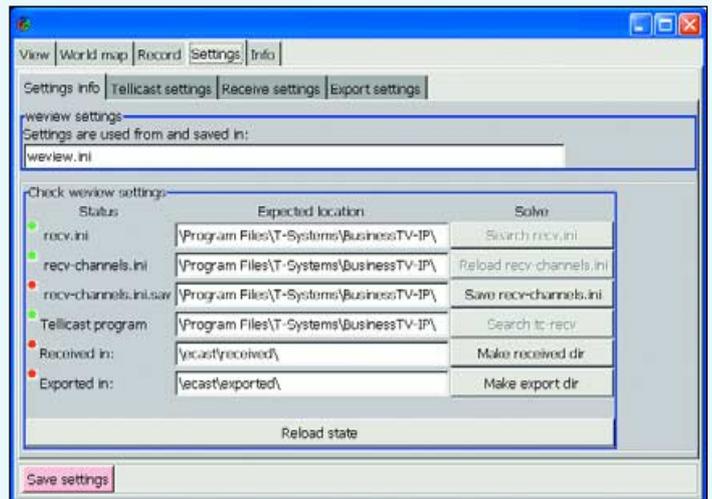


Figure 1 - The WeView 'Settings' Page

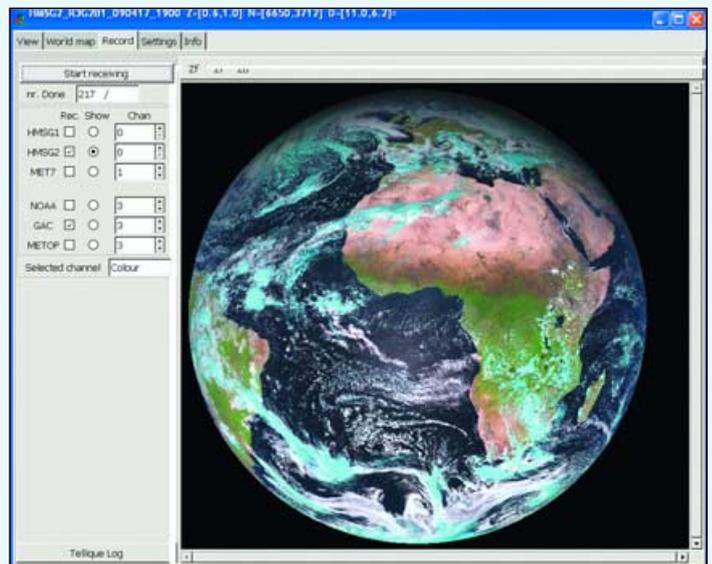


Figure 2 - The WeView 'Record' Page

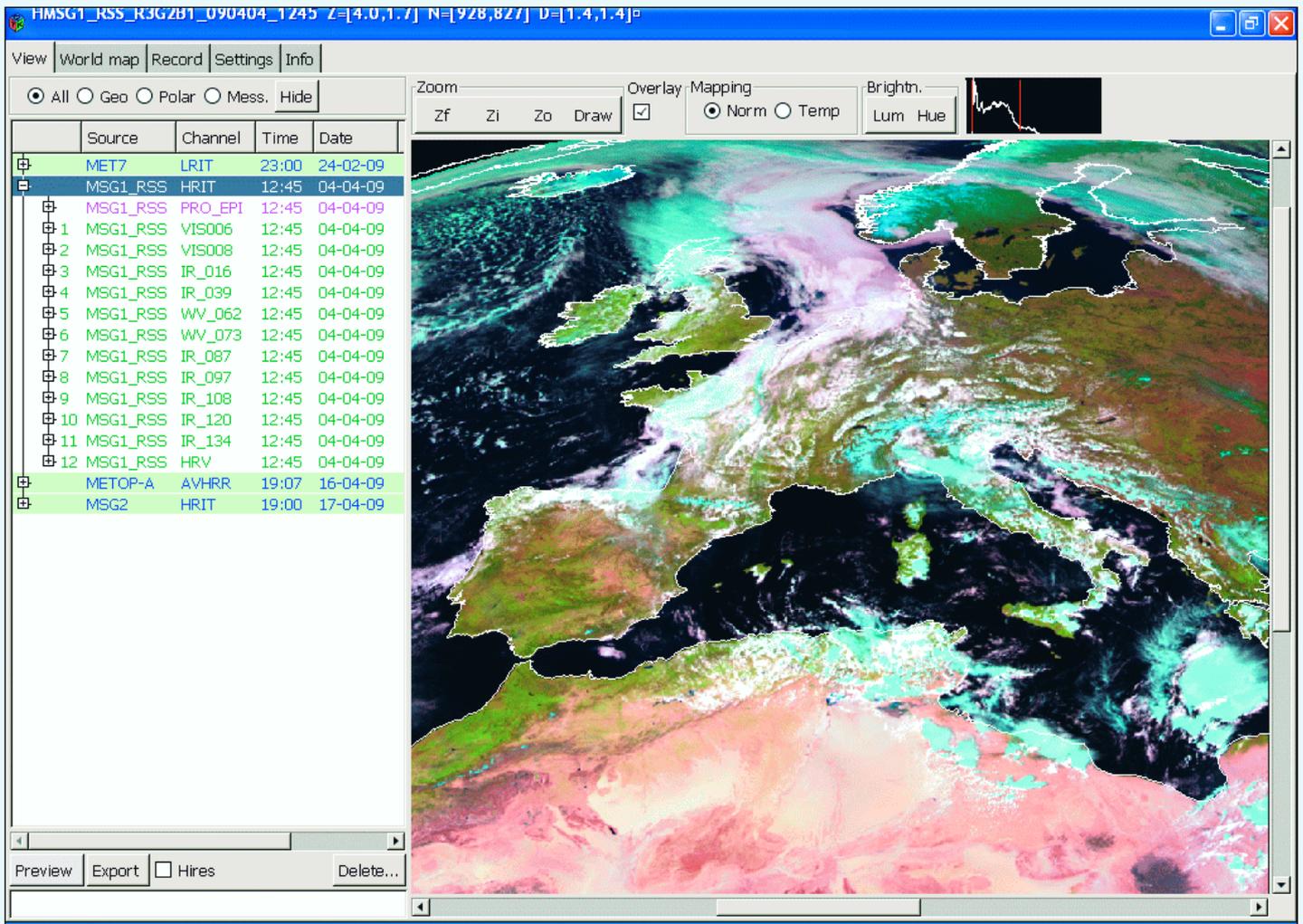


Figure 3 - Viewing previously recorded data in WeView

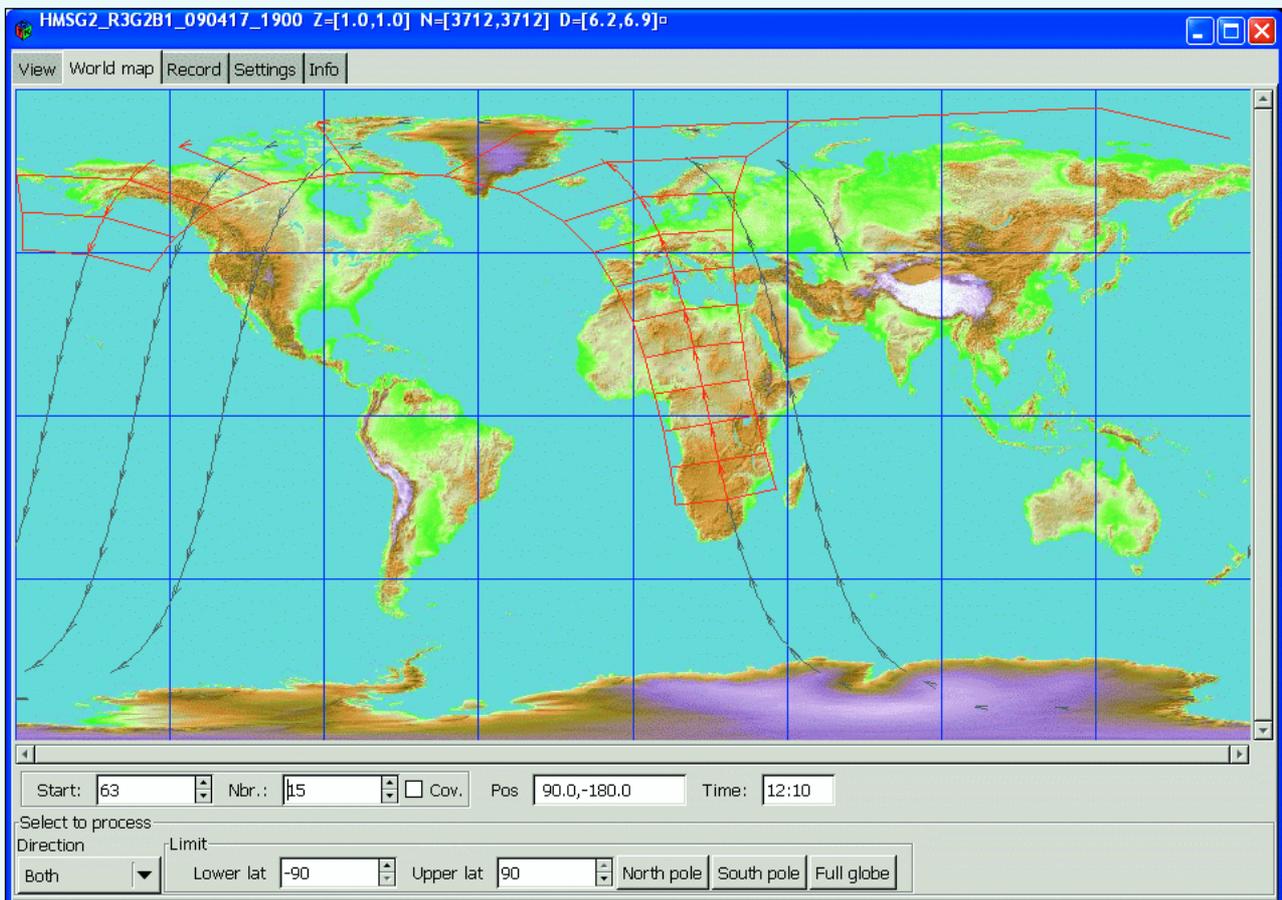


Figure 4 - The World Map Page

Figure 1 shows the **<Settings>** page of WeView. For each item the status is shown, and in case anything is wrong a 'Solve' button becomes active.

Figure 1 shows the situation after a first install. Green status lights at the left of the screen (beside 'recv.ini' etc) say that the *Tellicast* program has been found, as well as the file 'recv.ini'. This file was installed together with *Tellicast*. It should contain your user name and code but it also holds the location of the file *recv-channels.ini*. This file, which deals with channel selection, is used by *WeView*. Figure 1 shows that this file has been recognised too.

The *recv-channels.ini.sav* file initially has a red status light, meaning it isn't present yet. This should be a copy of the original *recv-channels.ini* file. Pressing the appropriate 'Solve' button to the right of this item will generate the missing file and the status light will change to green.

There are two more red status lights because the 'Received' directory and 'Destination' directory don't exist yet. Just push the buttons in the 'Solve' column and these directories will be created.

The locations shown above are the *WeView* defaults, but they may be changed using one of the *Settings* sub-pages if desired.

Now, all the status lights are 'green' and initialisation is complete.

Recording

Figure 2 shows the **<Record>** page. In the left part the satellites from which you wish to receive data can be selected.

In the 'Rec' column, one or more sources may be activated: some geostationary as well as some polar satellites are selectable. In the 'Show' column, you can select one of the received satellites for which data will be shown 'live' in the right hand panel. The channel number used for this 'Live view' may be set under the 'Chan' column. The actual name of the chosen channel is shown below the selection buttons. Choosing channel 0 (zero) means that a colour picture will be made by using a combination of several channels.

Note that all channels of the selected satellites are recorded; the choice here is solely which one is to be shown 'live'.

To start actual recording, the button 'Start receiving' at the top of the window needs to be clicked. This will start *Tellicast* and data will stream into the hard disk. Also, *WeView* starts to look at new files as they come in and will draw the selected picture on to the canvas in the right-hand frame. This window also allows a few simple tasks like zooming and panning using the buttons at the top of the image window. They may look a bit cryptic, but moving the mouse cursor over a button gives a more elaborate explanation about what it does, together with keyboard shortcut information.

Pressing the 'Start receiving' button a second time will stop recording. *Tellicast* will stop and no further data will flow into the hard disk until the 'Start receiving' button is clicked yet again.

Polar satellites will also be shown live. Each time a new segment arrives the previous segments will shift upwards to make space for the new one.

Note that a change in satellite selection will take immediate effect: there is no need to stop/start *Tellicast*.

Viewing Recorded Data

After (or during) recording, the data can be shown in a more sophisticated window. For this go to the **<View>** page (figure 3). This will show a list of all recorded items; if recording is still running then this list will be updated 'live'.

Each line represents a set of channels belonging to one satellite and for a particular time. Select a line and press 'Preview'; the picture will be shown in the right hand panel.

The picture will be a coloured composite one, but clicking on the '+' sign beside an item will show the individual channels, which you can select to display in black and white.

For MSG, ticking the 'Hires' box at the foot of the screen will give a high resolution colour picture. This gives very attractive colour pictures when zoomed into a small section (this method was described in GEO Q10: *High resolution MSG images in Colour*).

The canvas in the right-hand side of the window has some more possibilities than the one in the **<Record>** page. Apart from zooming and panning, it is also possible to adjust the luminance. Furthermore, infrared channels may be shown as temperature maps and there is a button to add coastlines.

Saving the currently shown picture as a standard JPEG format file needs just a click on the 'Export' button. Zooming and luminance settings will be taken into account.

Removing items is possible by selecting one or more lines and then hitting 'Delete'.

Handling polar satellite data, especially Metop and NOAA GAC, is a bit more complex because these pictures have no defined beginning or end. The **<World map>** page (figure 4) shows the available segments; from here the sections to show may be selected. For the rest, it is the same as for geostationary satellites.

Conclusions

With *WeView*, just one or two mouse clicks is enough to start recording or to view prerecorded data. Generating standard JPEG images needs just one extra click.

All received files not supported by *WeView*, like the BUFR files, will be deleted immediately, to keep the 'received' folder as clean as possible.

A RAMDisk isn't necessary, except perhaps if Metop data needs to be received without losing any segments. Instead, the lower resolution NOAA GAC data may be used: these also give world-wide coverage and don't need a RAMDisk.

There is one important point to note about *Tellicast*. The default installation is such that it will start as soon as the PC is booted, so data will be recorded immediately. For 24/7 usage this is OK but in other cases this may be a disadvantage. If the PC is started and used for another task, you might not be aware that the hard disk is filling with data you don't want. As described, *WeView* will take care of starting and stopping *Tellicast*. It is also possible to disable this auto-start option—see note on page 31.

New features will only be added if this doesn't increase the complexity for users. The most important objective remains to keep the program simple. Suggestions are welcome, by email, to

sat@alblas.demon.nl

You can download *WeView* and its DLLs from

http://www.alblas.demon.nl/wsat/software/winsoft_wev.html

where you can also find a manual.

Note that there is a Yahoo *xrit2pic* mailing list, which you may also use to discuss *WeView* items:

<http://tech.groups.yahoo.com/group/xrit2pic/>

References

- 1 Xrit2Pic
Rob Alblas: GEO Q5, page 28, March 2005
- 2 TqChanSel
Rob Alblas: GEO Q14, page 34, June 2007
- 3 Trialling the Dexatek USB Box for EUMETCast
David Taylor: GEO Q17, page 25, March 2008

Applying Snow Detection Software

to NOAA-17 and Metop Ch 3A images to view Britain's Winter Snows

John Tellick

I have commented before about the usual mild winters we experience in southeast England owing to our predominantly westerly winds off the Atlantic. This winter was rather different though: most of December was very cold with frost at night and below average daytime temperatures. And though it turned milder for a while over Christmas, prolonged cold conditions returned for New Year and lasted well into January. The UK was not alone in experiencing the prolonged cold weather which also allowed a period of much loved skating on the frozen canals of the Netherlands—the best for many years.

But, nobody was prepared for what was to follow.

In January, the UK Met. Office were monitoring an 'event' in the Arctic. The temperature above the North Pole is normally around -70°C but an area of dense air had suddenly penetrated the stratosphere some 50 km above the Arctic, causing a rapid rise in temperature. By mid January the temperature in this region of the stratosphere had increased by some 50°C.

Such an event happens every few years and throws the whole Arctic system out of balance, causing freezing easterly winds to descend through the atmosphere and head towards Britain, in place of the more usual westerlies. Southeast England has experienced this icy blast before but it usually results in just a period of strong easterly winds and some severe frost.

At this time the Met. Office were also monitoring a mass of warm, moist air moving up through France and heading towards Britain. Their job was now to predict when the two air masses would collide and how much snow would be produced. Their conclusion: an event which happens only every 20 - 30 years and which would create 'the perfect winter storm.' The forecast, issued several days in advance, proved very accurate.

It started snowing in London on the evening of Sunday, February 1 and kept going all night—bad news for the Monday morning rush-hour. Also, with very little wind, trees and bushes were groaning under the accumulated snow.

Monday morning revealed a changed landscape—a winter wonderland, with the heaviest fall of snow I've seen in London for 30 years or more. This, inevitably, brought chaos to the capitol: no busses, most tube trains not running, very few overland trains, Heathrow airport closed and motorways and side-roads blocked, either due to deep snow or stranded traffic.

Some mobile phone networks in the southeast became overloaded as commuters tried to phone their work to say they couldn't make it. Also some SatNavs failed and gave wrong directions because heavy snow was disrupting the satellite signals. Southeast England and London were almost at a standstill.

The storm moved on to the West Country then north to affect the whole of the UK. Another pulse of snow moved up into the Midlands and north later that week.

For the first time in many years, during that first week of February, the entire United Kingdom was covered by snow. Further stories of road and rail chaos were reported from many other parts of Britain and on the Friday both the Severn bridge crossings into Wales had to be closed after metre-wide blocks of ice had fallen from the support cables and smashed into cars.

If you could enjoy the snow (and many of all ages did), it was quite a sight for several days with the nights here in suburbia very light as an eerie orange glow from the street lighting reflected from snow was again reflected by low cloud.

It was all fairly short lived though, as by the middle of the following week most of lowland UK was snow free as the rest of February returned to more normal, milder temperatures.

Although very brief compared with previous severe winters such as 1947, 1963 (Britain's coldest since 1740, lasting from early January to late March) and 1991, this week of snowy disruption is estimated to have cost the UK economy £1.2 billion.

Snow detection with HRPT Reader

The events of early February led to me using more of the processing tabs of David Taylor's *HRPT Reader* software to differentiate better between low cloud and snow.

As most readers will know, HRPT Reader presents many tabs along the top of the frame, each providing a different approach to processing an AVHRR image at full resolution. Options include the individual greyscale channels-1 to -5 plus several false colour options. In the past, many readers have successfully made use of the RGB tab for snow detection, using the colour combination R3G2B1 (i.e. red is assigned to channel-3, green to channel-2 and blue to channel-1). This gives good snow highlighting using data from Metop-A and NOAA-17 (figures 1,3 overleaf) but results for NOAA-18 are poor by comparison. Notice the summit of Etna, on the island of Sicily, covered with snow.

This difference arises from the fact that NOAA satellites have the capability to transmit two different frequencies on channel-3, denoted as Channel-3A and channel-3B. This has been discussed in detail in a previous issue [1]. In short, channel-3A is used for daytime detection of snow and ice, imaging in the 1.6 micrometre range; channel-3B is used for fire detection and night time detection of cloud, using a frequency of 3.75 micrometres.

However, only one NOAA satellite, NOAA-17, makes the channel 3B/3A switch, doing so when it crosses the terminator between the night and illuminated hemispheres of Earth. Metop-A also makes this switch, but none of the other current NOAA satellites does.

The NOAA Tab in HRPT Reader

HRPT Reader has an additional tab devoted to a series of algorithms devised by NOAA for helping to interpret their satellite imagery. One of these, labelled 'Snow(3a)', assigns

continued on page 43

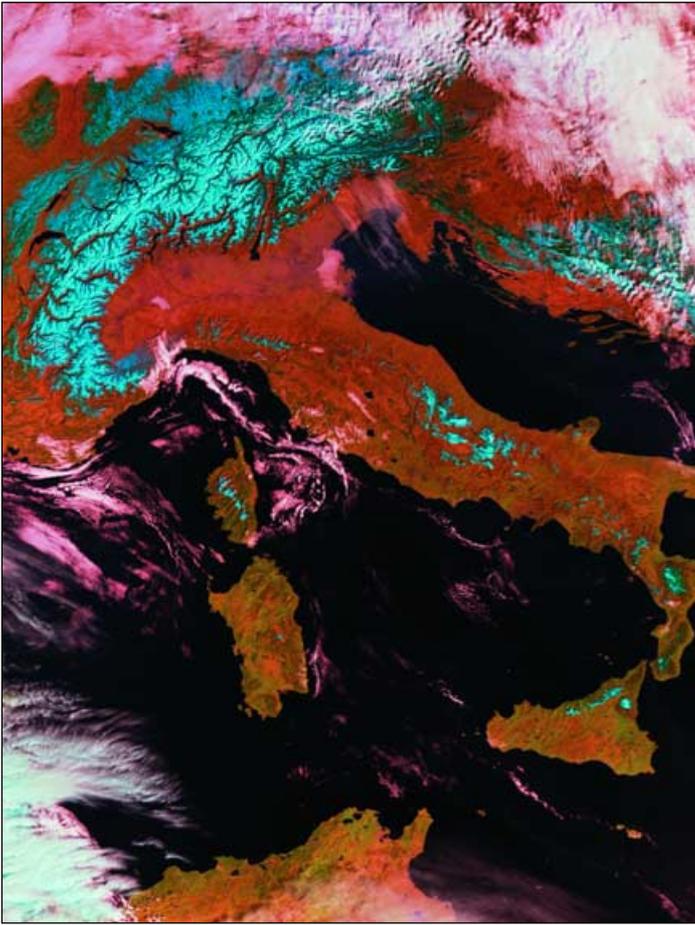


Figure 1 - Snow on the Alps

Metop-A, February 28, 2009 - RGB321 colour scheme - snow shows cyan

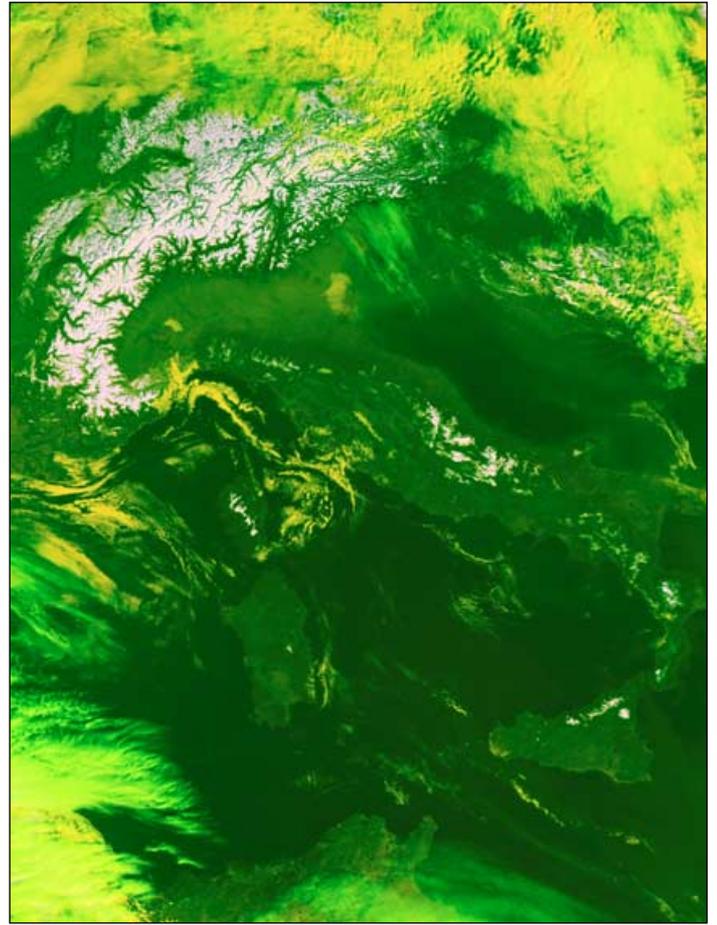


Figure 2 - Snow on the Alps

As left but processed with the 'Snow-3a' colour scheme - snow shows white

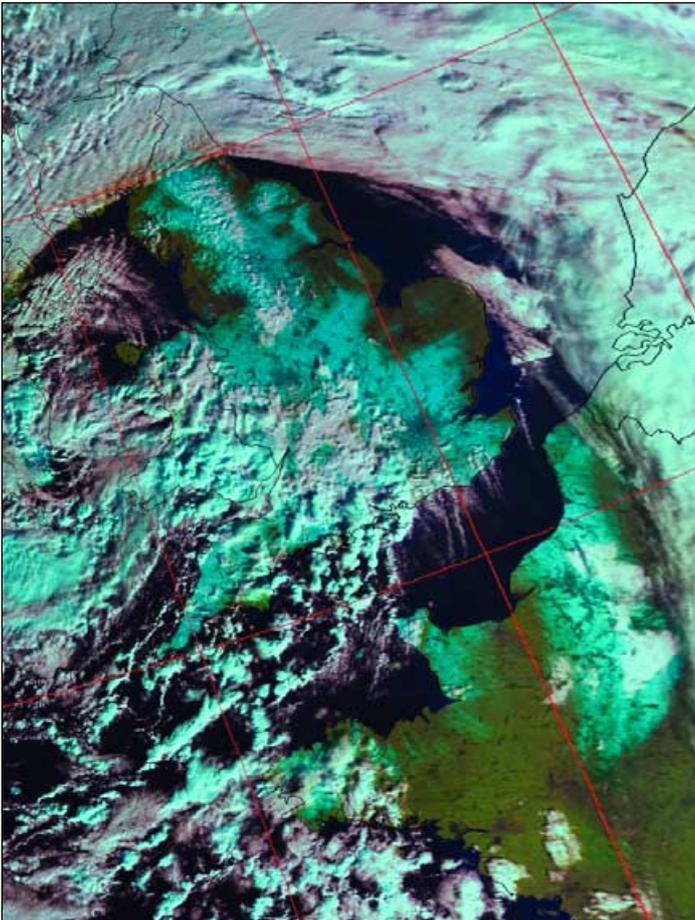


Figure 3 - Snow over England and parts of France

NOAA-17, February 3, 2009 - RGB321 colour scheme - snow shows cyan

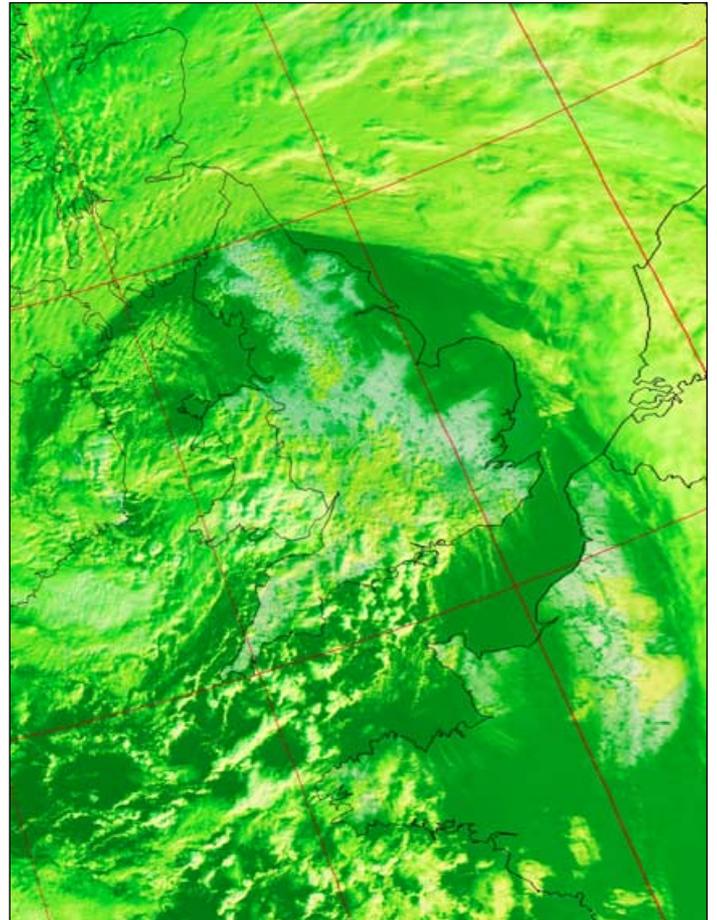
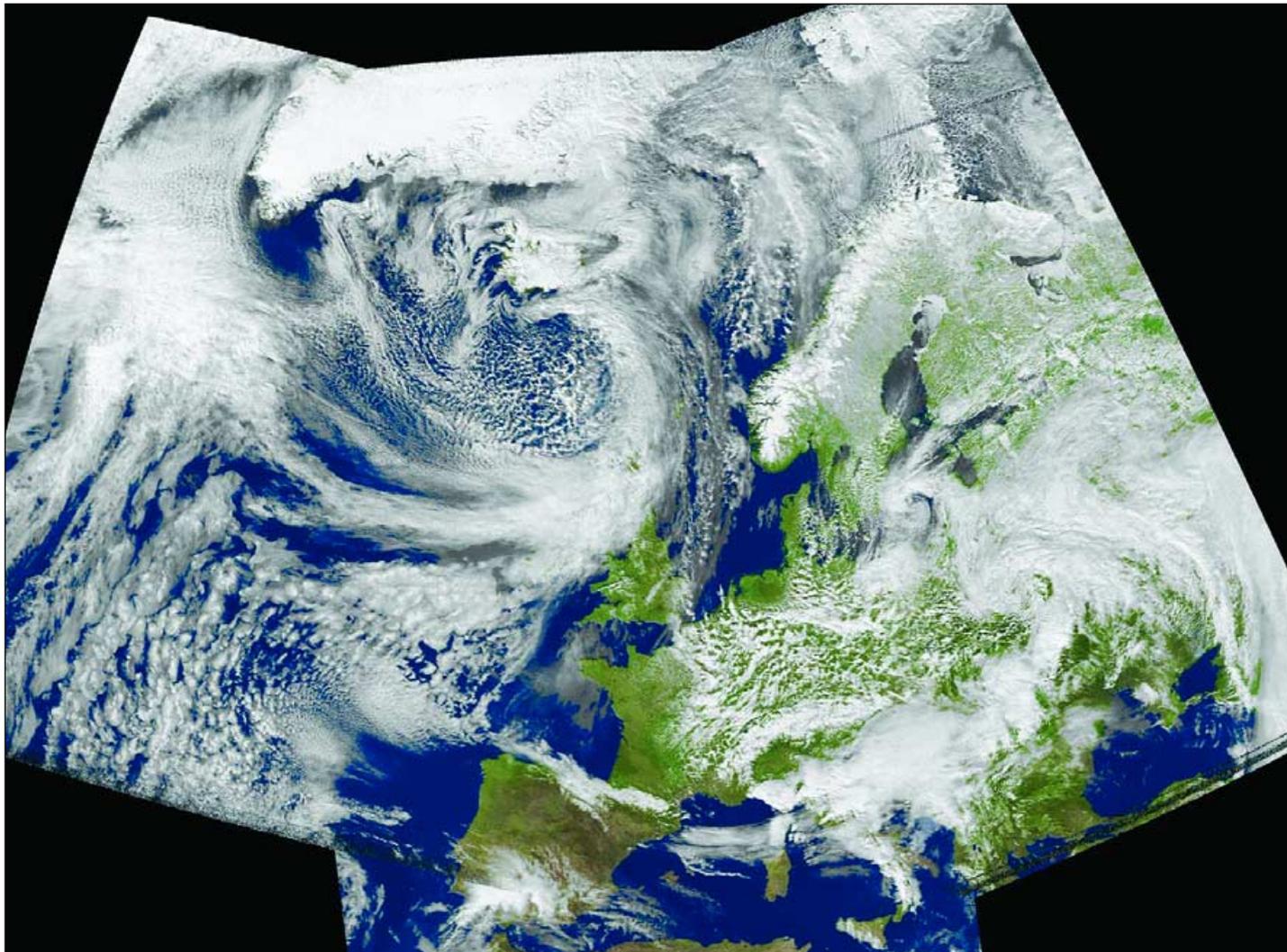
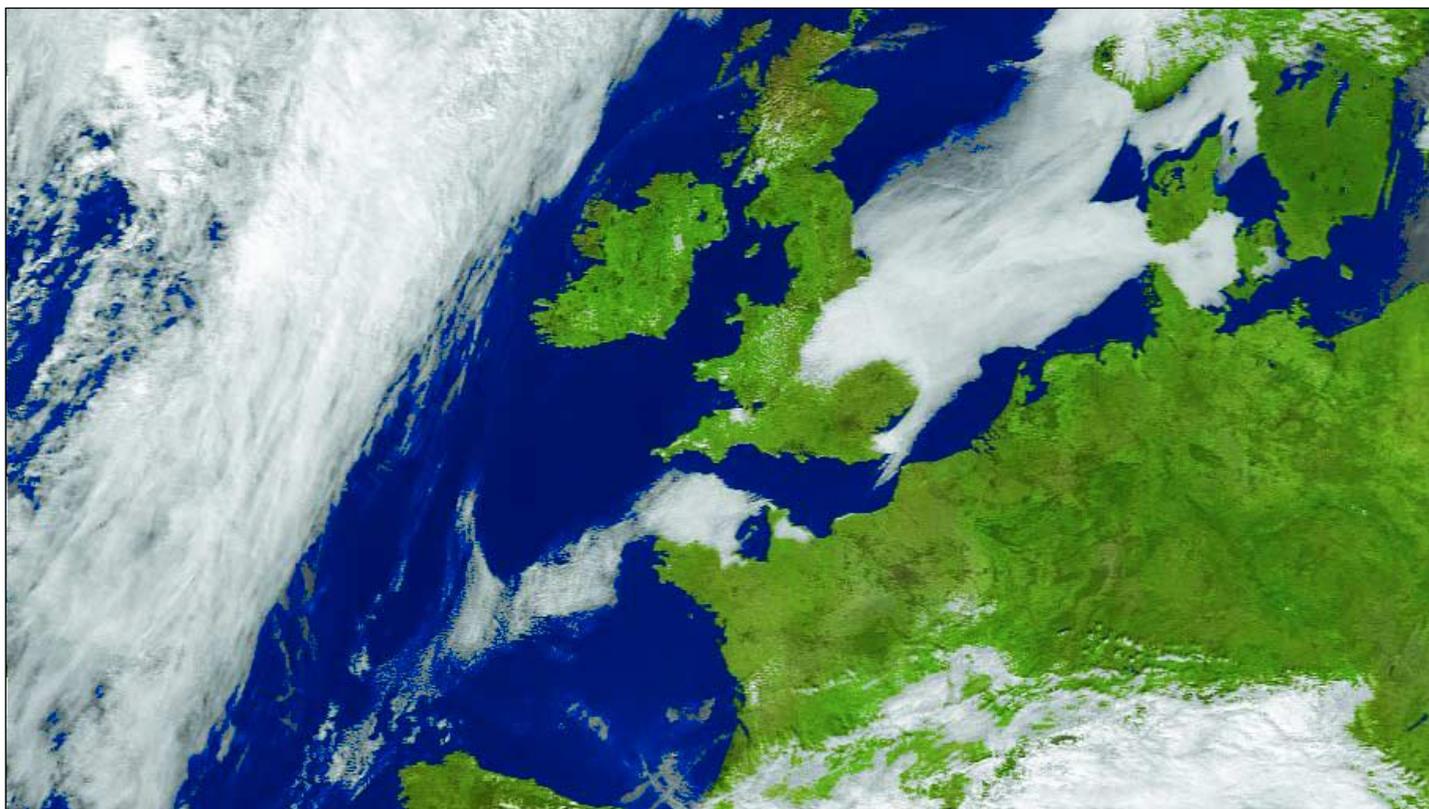


Figure 4 - Snow over England and parts of France

As left but processed with the 'Snow-3a' colour scheme - snow shows white



Peter Edwards used *Wxtolmg* software to create this 'msa mode' montage of three NOAA-18 APT images he received on March 24, 2009 using an EMGO receiver and home-built QFH antenna.



Anthony Lowe sent in this splendid NOAA-18 APT image from 13:06 UT on April 2, 2009, showing fog from the North Sea encroaching over eastern England

MOUNTAINS OF SNOW

Francis Bell

Although well forecasted by the UK Met. Office, the unusual weather in the early hours of February 2, 2009 still took me by surprise. Together with most of England I awoke to find there had been a considerable snowfall during the night. Over the past 18 years there has been almost no winter snow where I live in southwest Surrey: either none at all or just an ephemeral dusting of a few millimetres. This year I measured a depth of 25 cm on my garden lawn but, interestingly, no significant drifting of snow. Because my garden scene was so unusual, and just for my own record, I took some photographs of it.



Later in the morning, when light levels had increased, I wondered if any satellite images would show up the snow cover which, from news reports, had covered most of England. I once recorded an APT image in the USA which showed a very clear band of fresh snow covering several states (GEOQ 13, page 18) and wondered if I could do this for the UK. I turned on my EUMETCast system hoping for a high resolution visible image within 15 minutes but was somewhat aghast to be confronted with a screen message stating 'No Satellite Signal'. My system had been working perfectly the night before so I was distressed to think that a fault of some description had occurred at the very time I wanted to record a special image. However, it transpired that the two events, the overnight snow and my imaging system fault, were closely related. When I went outside to inspect the receiving dish bolted to the side of the house I discovered the basis of my problem—the LNB at the focal point of the dish was covered with snow.

Interestingly, another satellite dish nearby had a layer of snow on it but the LNB was clear. The gentle breeze accompanying the snowfall had created eddies around my house that were enough to deposit snow on dishes which would otherwise have been protected. The careful use of a ladder to a flat roof gave me access to the dishes and, with a small hand brush, I easily cleared the snow from the dish surfaces and the LNB. Now my system worked perfectly; but the irony was of course that I could not receive any interesting images of the country's snow cover because it was all obscured by clouds.



My experience prompted me to think about commercial, professional and research satellite receiving stations and how they cope with snow. I know, of course, that in some cases receiving dishes are enclosed within a protective dome: but how is the dome itself kept snow free? The EUMETSAT ground station at Svalbard, well within the Arctic Circle, is an example which springs to mind and their Usingen ground station (where the dishes are not enclosed in domes) must also be subject to snow at some times.

Perhaps someone experienced in these matters could write to the editor and explain how this snow cover protection is achieved. I can think of a few ideas but I don't know if any of them are correct.

After my snow experiences of February 2009 and listening to weather forecasts and reports during the subsequent few weeks, I gained the impression that there had been more snow over Europe in early 2009 than the average. I receive APT and EUMETCast images on most days and I must have been sensitised into looking for snow, particularly on the Pyrenees, Alps, Norway and Iceland—all prime candidates for snow.

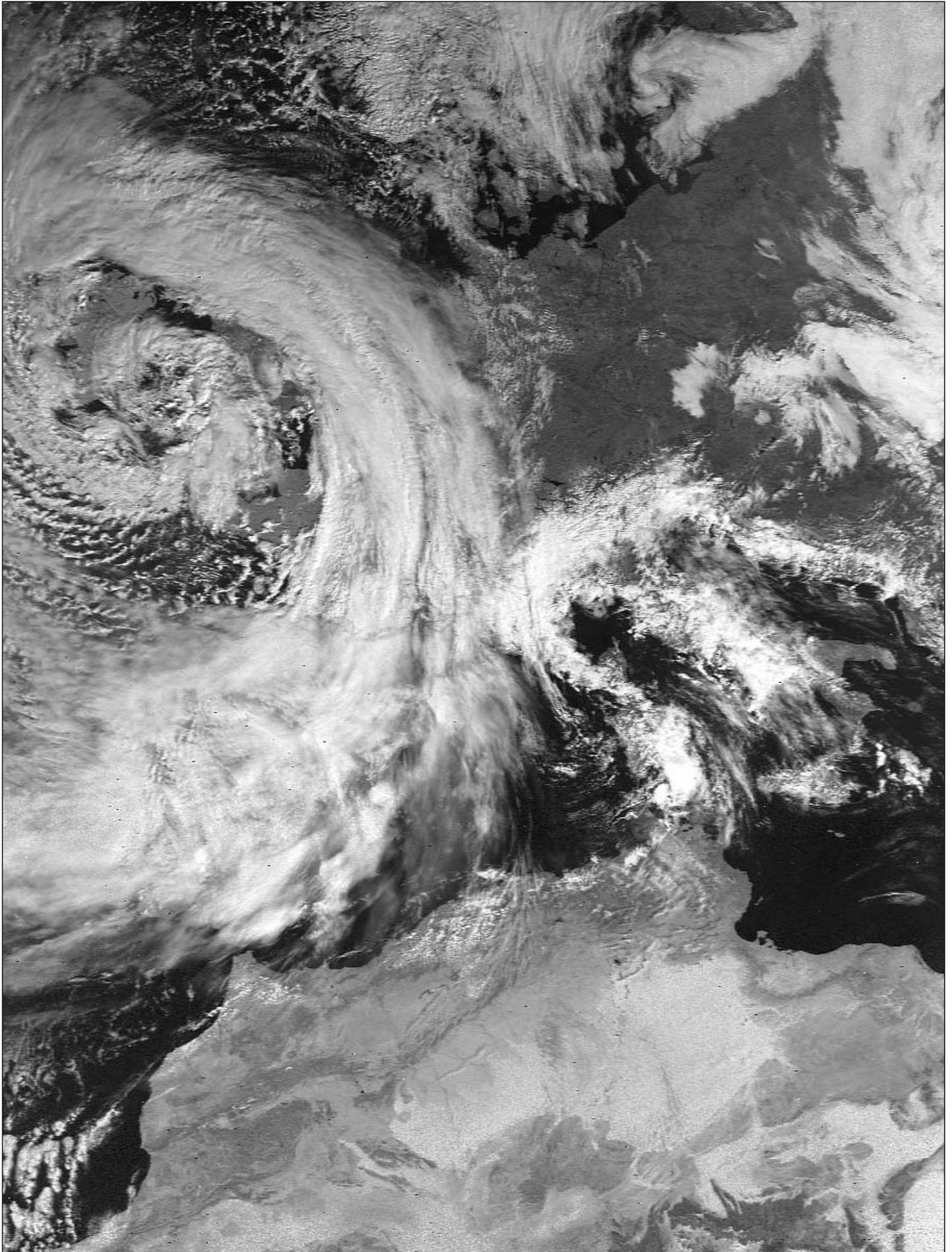
I was specially interested in snow in Africa, particularly on the High Atlas mountains of Morocco. I judged that the news reports relating to amounts of snow were correct because, on browsing through some of my past images, I found one of the High Atlas from March 2008 which seemed to show less snow than the same area this year. It is the day-by-day persistence of the snow on these images which distinguishes it from the more variable clouds which form over mountains. I find March and April are the best months to record images of snow on mountains in the northern hemisphere. Most of the winter snow has fallen by then and the daylight levels make snow easy to image.

This is not the first time I have written about snow on mountains. Readers may recall my article in GEO's Launch Issue in spring 2004 which related to the *Snows of Kilimanjaro*. I had visited that area in early 2004 and viewed the mountain from a game reserve. I understand there are only three places in Africa where there is permanent snow: *Kilimanjaro* (5895 m) and *Mount Kenya* (5200 m), both close to the equator, and the High Atlas of Morocco where some of the peaks retain permanent snow. My reference books indicate that *Jbel Toubkal* (4167 m, latitude 30°N) is the highest point in the several hundred kilometre length of the Moroccan High Atlas mountain chain; it is also the highest peak in North Africa. My understanding is that there will not be permanent snow on Kilimanjaro or Mount Kenya for much longer because of our planet's general warming and I expect the same will be true of permanent snow cover in other places.

My travels have allowed me to see at first hand snow in the High Atlas mountains and other places but Kilimanjaro has to rate as spectacular, being viewed from tropical grassland. And no! I didn't climb to the top.

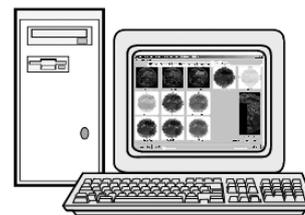
But perhaps the most impressive snow-capped peak I have seen is *Cotapaxi*, viewed from Quito. This beautiful conical volcanic peak lies very close to the equator in Ecuador and has a cap of permanent snow. Interestingly, *Cotapaxi* (5896 m) is almost exactly the same height as *Kilimanjaro*.

Please, can any reader submit a satellite image from any source of *Cotapaxi*, showing the snow cap. I have my own terrestrial photographs but it would be great to see a satellite image showing snow on the equator. Again, no! I didn't climb *Cotapaxi*, though I did reach an altitude of 4167 m in the Andes. And yes, it does take your breath away!



An APT image showing the storm that deposited snow the length and breadth of England in February 2009. The white speckling over the High Atlas mountains of Morocco indicates the areas of permanent snow.

Computer Corner



Douglas Deans - dsdeans@tiscali.co.uk

Last quarter, I mentioned that I hoped to get some further information about Microsoft's next Operating System, *Windows 7*. With many people now beta testing the new Operating System there is a wealth of early information available, so my intention is to allocate the majority of this column to a first look at *Windows 7*, particularly as beta testing seems to be going very well. The early reports are most encouraging and even those who were highly critical of *Vista* are commenting very favourably. Below I have outlined some of the more interesting details about *Windows 7* and have touched on how Microsoft have dealt with some of the least liked aspects of *Vista*. The User Account Control (UAC) quickly comes to mind; indeed one comment I read suggested that it was the best early beta of any previous Microsoft releases ... praise indeed! Microsoft are very aware that *Vista* has not been the most popular of Operating Systems so it now seems very likely that *Windows 7* will be released this year. I have also included a couple of reviews of new programs, from familiar faces.

Windows 7

As I touched on earlier there are now thousands of people beta testing Microsoft's next operating system. Whilst there is always interest in what is coming next, it seems that *Windows 7* has attracted more intense scrutiny, mainly due to the considerable criticism that *Vista* has received. That has reflected seriously on *Vista* sales.

The first thing that has to be clarified is that the new Operating System (OS) is still *Vista* based but Microsoft say that they have listened very closely to what has been said over the past few years and that it has evolved from that feedback. Early reports, even from *Vista*'s most severe critics, seem to suggest that Microsoft have done their homework correctly. I have not used *Windows 7* myself but, from reading many reports, it seems that the consensus is that the new OS has taken the best bits of XP and *Vista* and added a range of new features. Some existing *Vista* features which have been criticised have been redesigned. As I

mentioned above, one of the most annoying features of *Vista* has been the UAC with its frequent pop-up windows. On the other hand, most computer experts agree that the UAC is an important security tool and not wasteful in resources. What Microsoft clearly did not do was to provide a good balance between annoyance and security, so whilst UAC remains in *Windows 7*, there are a range of controls to better suit the mood of the user.

Below I take a look at what appears to be the more interesting of the new features, and although it is likely that they will remain, please keep in mind that this is beta stage and subject to change before the final release.

New Taskbar

Probably one of the most obvious changes is the new Taskbar. You can launch and switch between applications from the Taskbar and provide shortcuts. Clicking on the icons allows you to see a larger preview and you can actually see a full screen preview before switching to that window.

Jump Lists

Taskbar icons feature a jump list which is a form of pop-up menu customised for a particular application. It can be used to find files you have recently been working with. For example, I could right click on the *Word* program icon and see the files (such as this one) I have been recently working on.

Desktop

According to Microsoft, *Windows 7* simplifies the way you work with the windows on your desktop by providing more intuitive ways to open, close, resize and arrange them. You can drag open windows to screen borders, so you'll no longer have to click on tiny objects in the corner of a window to make it do what you want. You can maximise a window by dragging its border to the top of the screen and return it to its original size by dragging it away from the top of the screen. It is now easy to copy files or compare the contents of two windows by dragging the windows to opposite sides of the

screen. As your cursor touches the edge the window will resize to fill that half of the screen. All this is part of a feature called *Aero Snaps*. If you want to see all your desktop gadgets, then just drag your mouse to the lower right corner of your desktop. That will make all the open windows transparent and make your desktop, and hence all the gadgets on it, immediately visible.

Internet Explorer 8

The new OS will incorporate the latest version of *Internet Explorer*. For those interested, *Internet Explorer 8* can now be downloaded as a beta and will happily work with other versions of the OS. Updates include changes to the address bar, search, tabs and the favourites bar.

Action Centre

Problem solving has become much simpler and less frustrating thanks to a new feature in Control Panel called Action Centre. The most common maintenance and troubleshooting tasks have been brought together under a single interface.

Networks

Although, in my opinion, one of the biggest improvements in *Vista* related to setting up a home network (XP was diabolical), there has been further improvements to the ease of network set-up in *Windows 7*.

A new tool called Home Group makes it easier to connect to other computers and devices on a wireless home network so you can share files, photographs, printers etc. over the network. However, as I understand it, to use Home Group you must have at least two computers running *Windows 7*, so perhaps the ghost of a *Vista/XP* network has not yet been laid to rest.

Device Management

One of the important things about computers is the ability to attach devices such as printers, phone, cameras etc. In the past you had to use several screens to manage different types of devices. With *Windows 7* a single Devices and Printers screen can be used to connect, manage and use a

range of printers, phones and other devices. A new technology in Windows 7 called Device Stage takes device management a step further. Device Stage helps you interact with any compatible device connected to your computer. From Device Stage you can see device status and run common tasks from a single window. There are even pictures of the devices which makes it really easy to see what is there.

So there we have it. Just a brief snapshot of what will be coming next. Obviously there is much more, some interesting, some not so interesting. There is a wealth of information about the up and coming new Operating System on the Internet. Just type Windows 7 into a search engine and choose one of the 600 million hits for more information !

One final word from Microsoft on the different versions that will probably be available although once again this is not finalised.

Windows 7 Starter

This does not have the 3D features included with Aero (most users would not consider this a great loss!). In addition, it is limited to running a maximum of three programs at the same time. This version will not be widely available in the developed world.

Windows 7 Home Basic

No restriction on number of programs running. Still no Aero. No Internet connection sharing. Again, limited availability.

Windows 7 Home Premium

This is the one that most people are likely to want. It includes Aero, touch screen functionality (hardware permitting) and DVD playback and burning. It will be available everywhere.

Windows 7 Professional

This includes advanced backup and networking features. It will also be available everywhere.

Windows 7 Enterprise

This version includes improved encryption and allows you to boot from a Virtual Hard Disk (VHD)—this is the format created by Microsoft for their Virtual PC software. This will only be available to organisations, companies, universities etc.

Windows 7 Ultimate

This is basically everything. It includes all of the features of the other versions of Windows 7. This will only have limited availability.

So the reality is that you are likely to be interested in Windows 7 Home Premium or Windows 7 Professional

Software Updates

This quarter it is not so much updates as two new programs, both from programmers already well known to the weather satellite fraternity.

Metop LSA Viewer

This is a program from the keyboard of David Taylor to handle new LSA-SAF data products on *EUMETCast*. The Land Surface Temperature (LST) and Downwelling Surface Long Wave Flux (DSLFL) is based on Metop data and is provided for the European region. Although we already receive similar products for this area (and many others) these new data are of a considerably higher resolution. DSLFL is probably for more specialised users but the land surface temperature at this resolution, for this area, is clearly very interesting. The inside front cover shows an LST image for the Turkey-Saudi-NE Africa area. I have chosen this area as, at this time of year, it demonstrates a wider range of temperatures than would be seen in Europe.

For more information and to download the program go to

<http://www.satsignal.eu>

Weview

You may recall that in GEO 14 (June 2007) I did a brief review of a free program from Rob Alblas which can provide images from HRIT and LRIT data from MSG satellites along with many other data services. Rob has now produced a new program called *Weview*, which is a simplified version of his original *XRIT* for those who only require a limited range of features. This is still a work in progress but the program allows you to process and view MSG, NOAA AVHRR and GAC, and Metop data. There is more information available at

http://www.alblas.demon.nl/wsat/software/man_weview.html

and to download the beta go to

http://www.alblas.demon.nl/wsat/software/winsoft_wev.html

David Taylor's Latest Releases

ATOVS Reader	v 1.1.4
AVHRR Manager	v 1.5.0
BUFR Viewer	v 1.0.0
CMA Viewer	v 1.2.0
DWDSAT HRPT Viewer	v 1.1.0
GeoSatSignal	v 7.0.2
GRIB Viewer	v 2.2.2
GroundMap	v 2.0.6
HDF Viewer	v 1.3.0
HRPT Reader	v 2.8.2
Kepler Manager	v 1.3.2
MapToGeo	v 1.1.6
Metop Manager	v 1.3.2
MSG Animator	v 2.5.26
MSG Data Manager	v 2.5.26
PassControl	v 3.2.2
SatSignal	v 5.1.2
Sea-Ice & Viewer	v 1.3.4
Wxtrack	v 3.7.2

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

<http://www.satsignal.eu>

Applying Snow Detection Software

(continued from page 37)

channel-4 to red, channel-1 to green and channel-3A to blue then combines them in a non-linear manner to differentiate snow and ice from cloud and fog. The algorithm attempts to display snow and ice as white and most other surfaces as intuitively natural colours, as follows:

- Grassland, farmland, desert are rendered tan
- Snow on treeless land is white
- Forests without snow are light green
- Forests with snow show dark green with a greyish white 'frosty' tinge
- Ice cover shows up as white
- water is greyish blue, tending towards purple with increasing temperature
- Low clouds are yellow
- Higher clouds range from yellow through green to light blue as cloud temperature decreases.

Examples using this algorithm can be seen in figures 2 and 4 on page 38.

We have seen that only NOAA-17 and Metop have this channel-3A switching activated, allowing 'snow detection' with HRPT Reader, highlighting this well but with differing results depending on the tab. Using the RGB tab (R3G2B1) and the NOAA tab [Snow (3a)] settings on NOAA-18's channel-3B gives very poor snow highlighting ability with either tab.

Personally, I prefer the RGB tab result in which snow is highlighted well in cyan and there is generally good (colour) differentiation between snow and white cloud—see image examples.

Reference

- 1 Apparent Anomaly in Midwinter NOAA-17 Channel-2 Images - Les Hamilton - GEO Q12, December 2006, page 14.

DWDSAT

Angus Crawford

I will admit from the start that I am not a very technical meteorological or computer person, just a pilot who has an interest in the present weather in Europe.

Several years ago, *Deutscher Wetterdienst* (the German national meteorological service) started disseminating a high resolution set of AVHRR images from the NOAA orbiters under the title DWDSAT. These images are segments of NOAA 15-18 passes centred on north-western Europe. I was browsing through David Taylor's offerings for *EUMETCast* late last year, came across this product, and thought it would be an interesting addition to my set-up. In order to receive DWDSAT you need to be registered with *EUMETSAT* and have a dongle, etc. Originally, DWD charged for the service but now it is free to registered amateur users. Go to

www.dwd.deldwdsat

to obtain a request form. Send this back to them and they will forward permission to *EUMETSAT* who will then enable transmission to your data set.

Software Changes

Once *EUMETSAT* informs you that you are 'live', you need to make a couple of changes to your receiver setup. In **<DVB receiver options → Setup4PC → Data Services>**, include '303' in the PID list. No changes are required in the *recv.ini* file but in the *recv-channels.ini* file you need to add something like

```
[DWDSAT]
Target_directory=C:\Received Files\DWDSAT
```

The file types downloaded are .bzz, -tiff, -tar, -ias and -ps. I am primarily interested in the images transmitted in the .bzz files, deleting the others as needed by means of *TrimTree*. The -tiff files are meteorological charts of significant weather and winds which may be viewed, if desired, by any of the commercially available tiff readers (*Alternatiff* is a good one).

DWDSat Reader

David Taylor's *DWDSAT HRPT Viewer* is typically straightforward to download and install. In the **<File>** menu you have the choice of **<Open Pass>** and two **<Save>** options. **<Open Pass>** reveals a list of all the currently downloaded NOAA files. If you have ticked **<Use tall File|Open dialog>** in the *Setup* tab, this will display a larger **<Open Pass>** window displaying all the .bzz files for at least the previous two days. David is working on a way to display the files in 'Date Modified' order rather than by name. At present, just click on the 'Date Modified' tab twice to have them displayed in chronological order (newest first). The **<Save As>** option lets you save the displayed image as a JPEG file, to a location of your choice.

Double-clicking on the filename in the **<Open pass>** dialogue box will load it into the viewer. Not all of the passes include the British Isles and on others, Britain is shown at the edge of the frame where the resolution drops off markedly. You may need to look through several files before you find one showing the area desired. In the viewing window there are several tabs across the top allowing you to view each of the individual AVHRR spectral channels individually, as well as *False colour*, *RGB* and *Vegetation* combined images. I

normally use the *False colour* tab to get the best picture but scrolling through the other images can sometimes reveal features like jet contrails in better relief.

Below the main picture window are two buttons. The left one toggles the country boundaries as specified in the *Setup* tab; these boundary lines can be nudged into place with the arrow keys to the left of the boundary toggle. The right hand button is used to display grid lines. The *Setup* tab lets you define boundary paths, colours and line width. The RGB settings look too technical for me so I just leave them alone!

The images displayed with the *False colour* tab are often very striking, as the March 9, NOAA-16 image reproduced opposite shows. Mainland Britain, Ireland and France are mostly cloud free and a myriad of contrails are visible over the North Sea. I now use the *DWDSat* images daily, along with those from MSG-1 and MSG-2, to get a pretty good view of the general and specific weather in our region.

The *DWDSat HRPT Reader* is available from

www.satsignal.eu/software/dwd-hrpt.htm

You can download the software for a 30-day evaluation period before purchase, if desired. This link also provides other useful information about the program not mentioned above. For £39.95 I think it is a great value-for-money addition to the *EUMETCast* imaging software suite of programs.

A quick note about my Weather Setup

I have a *Shuttle Cube XPC* computer with a *Celeron* 2.53 GHz processor, 2 GB of RAM and a 250 GB *Diamondmax-10* SATA *Maxtor* hard drive. I have enabled a 600 MB RamDisk using instructions from Arne van Belle's article [1]. I have the standard *TechniSat SkyStar-2* PCI DVB card installed. Using *Windows XP Pro* with SP3, I run *DWDSat HRPT Viewer*, two installations of *MSG Data Manager* (MSG-1RSS and MSG-2), *Metop Manager*, and *Weatherlink* data logger software for my *Davis Weather Monitor II* weather station. These all run concurrently on the system and I have not suffered any data loss. If anyone wants a copy of my *recv.ini* and/or *recv-channels.ini* files, please e-mail me at

angus@mendocino.co.uk

and I will send them to you.

The *Weatherlink* software also uploads my weather station information to the *Weather Underground* site, using their 'Rapid Fire' system, every 5 seconds or so! To see my station, log on to the *Weather Underground* at

<http://www.wunderground.com/cgi-bin/findweather/getForecast?query=gatwick>

and scroll down to: '*Weather Stations > Personal Weather Stations*'. My station is called 'Mendocino, Domewood' (normally about the 4th one down the list).

Reference

- 1 Using the Arc Soft RAM Disc on Windows XP, Arne van Belle - GEOQ 11, September 2006



