

Record of Images



A supplement to EOQ 65
ATSR Special Issue, March

ERS Products and Services from ESRIN

The Tromsø Satellite Station and the Rutherford Appleton Laboratory – *Partners of ESA/ESRIN in the ATSR Programme*

The Tromsø Satellite Station in Norway

Introduction

Tromsø Satellite Station (TSS) is Norway's national receiving station for data from polar orbiting satellites. Its very northern geographical position allows TSS to acquire many orbits a day, thereby permitting frequent surveillance operations to be performed. The area covered by TSS includes the entire Arctic area from West Greenland to the Russian Taymyr peninsula, as well as Northern Central Europe and large parts of Russia. TSS' s business idea is to provide near-realtime services to operational customers. TSS is also responsible for operating the new satellite ground station at Svalbard (Svalsat) under a contract with the Norwegian Space Centre (NSC).

TSS was established in 1967 and was an operational unit of NSC until its foundation as a public company in 1995. NSC and the Earth Observation Division of the Swedish Space Corporation now own the company in an equal partnership.

Which Missions are Handled?

NOAA/AVHRR data were the first data source used for service development at TSS. The AVHRR data are still exploited, but Synthetic Aperture Radar (SAR) data applied mainly for marine services have now become the most important source. TSS receives and processes SAR data from the European ERS, the Japanese JERS and the Canadian Radarsat satellites on a routine basis. The infrastructure,



View of Scandinavia from ATSR-2 (extracted from ESA's 'Europe from Space').

including both SAR processor and data dissemination means, has been especially developed for near-realtime operations. Since April 1999, TSS acquires and processes the ATSR-2 data in realtime. The products are made available through a Web interface <<http://192.111.33.173/ATSRNRT>>.

Which Services are Provided?

Oil Spill Detection

Since 1994, TSS has provided a near-realtime oil spill detection service based on ERS SAR data. TSS is capable of detecting and distributing information concerning possible oil spills at the sea surface within 1-2 hours to customers

in Northern Europe (Baltic Sea, North Sea, Norwegian and Barents Sea). The large coverage area, in combination with the near-realtime capabilities of TSS, represents the main advantages of this service.

The main ERS data infrastructure at TSS processes a 100x100 km² SAR image within 6-8 minutes. On average, 300 ERS scenes each covering 100 km² from the service area are analysed per month. Phone, fax, electronic networks and direct communication with the surveillance aircraft are applied. Oil companies have become increasingly interested in using satellite SAR data to detect natural oil seepage. Hence, the extensive SAR data archive at TSS can potentially increase this business.

Ship Detection

Since the availability of ERS SAR data in 1991, Norway has developed the technology for operational ship detection. TSS provides SAR data in near-realtime for this application. The Norwegian Coast Guard is a customer of this application, for which TSS's near-realtime products have been found to be beneficial.

Ice Mapping and Monitoring

During the winter seasons, TSS delivers ERS SAR data on a routine basis for ice mapping and monitoring to operational ice services in Northern Europe. The information derived from the data is applied for ship navigation and routing. The Norwegian Meteorological Institute has recently initiated a pilot ice mapping and monitoring service around Svalbard utilising satellite observation data.

Svalsat

A satellite ground station in Svalbard (801 N) benefits from the visibility of all 14 polar orbits. In addition, reliable telecommunications, well-developed general infrastructures, and easy access via airplanes and ships makes Svalbard unique for satellite operations. The Norwegian Space Centre is investing in the primary infrastructure for SvalSat and TSS is responsible for the operations.

A New Realtime Service: ATSR-2 Data Acquisition

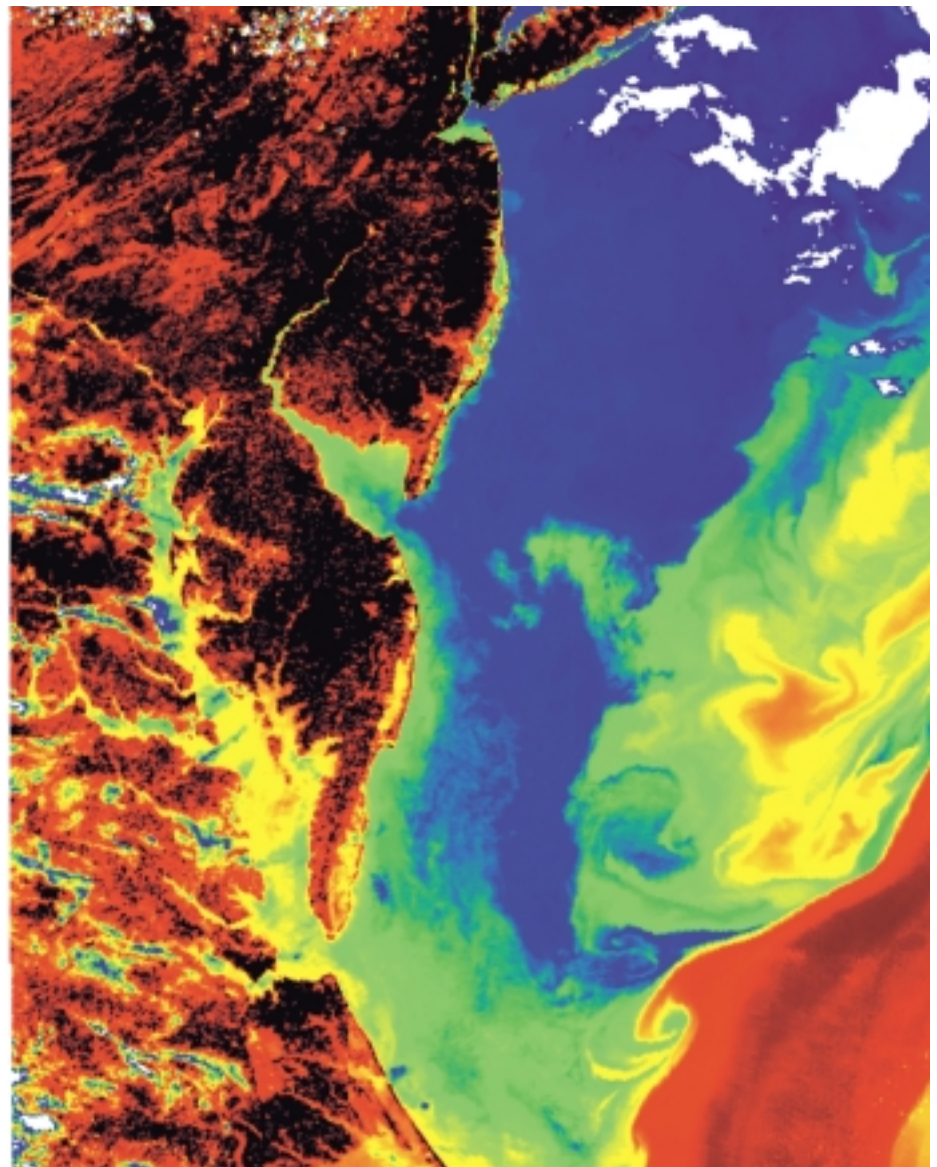
TSS acquires 10 out of the 14 ERS-2 daily orbits. The processing system allows near-realtime processing of the

complete ATSR-2 orbit in Gridded Brightness Temperature and Average Sea Surface Temperature. Product samples are processed in Gridded Sea Surface Temperature [see Buongiorno et al., EOQ 65]. The data can be used for many near-realtime applications including vegetation monitoring, fisheries application, disaster monitoring, oceanographic application, ice monitoring, etc. An interesting application for volcanic activity monitoring, currently under development, will also use the TSS service.

The Tromsø Satellite Station.



The Rutherford Appleton Laboratory in the UK



ATSR example image of ocean data (northeastern coast of North America).

What is RAL?

The Rutherford Appleton Laboratory (RAL) in the UK is part of the Central Laboratory of the Research Council, one of Europe's largest multidisciplinary research organisations supporting scientist and engineers worldwide. More specifically, RAL pursues the objectives of the Space Science and Technical Department, which are among others:

- To develop new technologies, facilities, and procedures to improve access to space and to exploit the new technologies with industry where possible.
- To carry out a research programme in related areas of science, including astronomy, solar terrestrial physics, planetary physics, atmospheric science, and Earth observation.
- To provide project management support and other specialist skills to national and international programmes.

RAL's role in the ATSR Programme dates back to the 80's when the specifications of the ATSR instrumentation to be flown onboard ERS-1 were worked out in close contact with ESA.

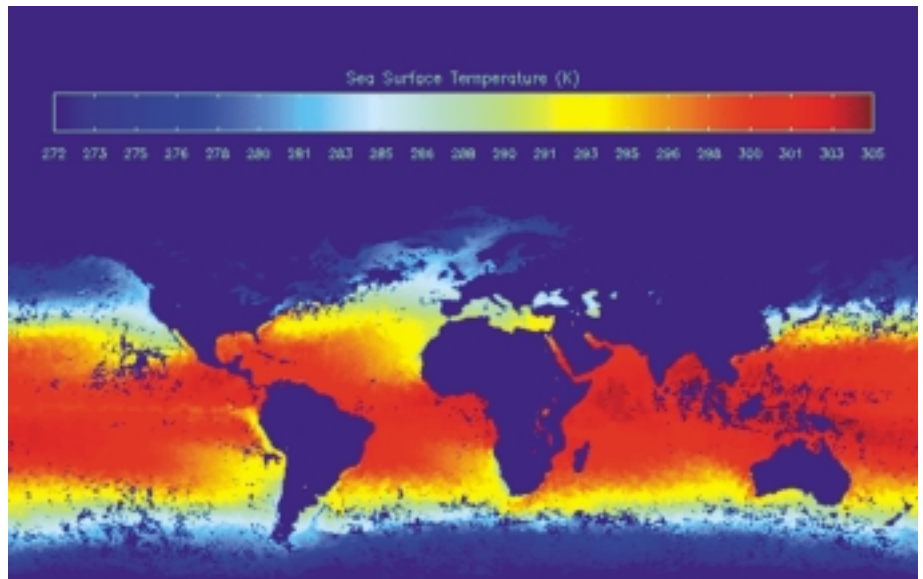
What is ATSR?

The Along Track Scanning Radiometer (ATSR) instruments are space-borne radiometers which produce stable, well-calibrated data sets for use in a wide range of Earth Observation studies, and, in particular, provide long-term observations of sea surface temperature (SST) needed urgently for the debate on climate change [see *Mutlow et al. EOQ 65*].

ATSR Data Products

The basic ATSR products come in two forms:

- 1) gridded images covering a 512 km² area at the instrument spatial resolution, and



SST data example from April 1999.

- 2) spatially-averaged products formed from image data averaged by latitude and longitude at two resolutions: 10 and 30 arc-min.

The primary data products from the ATSR Programme are the spatially-averaged sea surface temperature (SST) data for global climate change research (see image above).

ATSR image data are available globally at full-spatial resolution. No special arrangements need to be made to ensure that data for a chosen site is available in the archives.

Gridded brightness temperature/ reflectance (GBT) images, including all channels (infrared and visible) and both views, as well as retrieved gridded SST (GSST) images are available by customer order. As ATSR data are continuously collected, images over land, cloud, atmosphere, ice, and oceans are available.

All ATSR image products are geo-located, the nadir and forward views are collocated, and cloud flagging information is provided. Other higher level products can be generated from the GBT images and, using the visible channel calibration tables, vegetation and other products can be derived by users. Further information on ATSR products can be found on the ATSR Project WWW pages <[http:// www.atstr.rl.ac.uk](http://www.atstr.rl.ac.uk)>.

ATSR Intercomparison Project

To encourage the use of ATSR SST by the community, and to promote the development of the best possible geophysical products from the programme, the ATSR Project (funded by the UK Natural Environment Research Council (NERC)) has developed an 'Intercomparison Data Set' to be distributed free of charge to any research groups wishing to participate in the development of the ATSR SST products. This data set comprises three months of ATSR- 2 image data (brightness temperatures and retrieved SST) with collocated buoy observations.

If you have expertise in this area and are interested in taking part in this intercomparison please contact Dr. Chris Mutlow at the address given below. Participating groups will be expected to work closely with the ATSR Project team at RAL, and provide written progress reports.

Table 1: ATSR spectral channels

Feature	Wavelength	Bandwidth	ATSR-1	Detector
Chlorophyll	0.55 μm	20 nm	no	Si
Vegetation Index	0.67 μm	20 nm	no	Si
Vegetation Index	0.87 μm	20 nm	no	Si
Cloud Clearing	1.6 μm	0.3 μm	yes	PV InSb
SST retrieval	3.7 μm	0.3 μm	yes	PV InSb
SST retrieval	10.8 μm	1.0 μm	yes	PC CMT
SST retrieval	12.0 μm	1.0 μm	yes	PC CMT

How Do I Get ATSR Data?

Calibrated and geolocated ATSR-1 and -2 image data are now widely available to both scientific and commercial users.

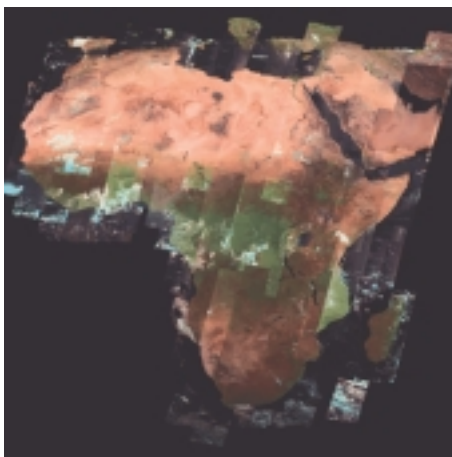
NERC- funded UK Scientists can order ATSR- 1/ 2 data from: ATSR Project, c/o Nigel Houghton, ATSR Data Processing Mgr, RAL, Chilton, Didcot, Oxon, OX 11 0QX, UK
Tel: +44 (0) 1235 446495/
Fax: +44 (0) 1235 445848
E-mail: N.Houghton@rl.ac.uk
<<http://www.atstr.rl.ac.uk>>

The ATSR Project WWW pages contain additional information about the ATSR programme, PDF versions of the ATSR User Guide, and also contain a hyperlink to the UK ATSR Browse Facility which can be used to browse ATSR images before you order them.

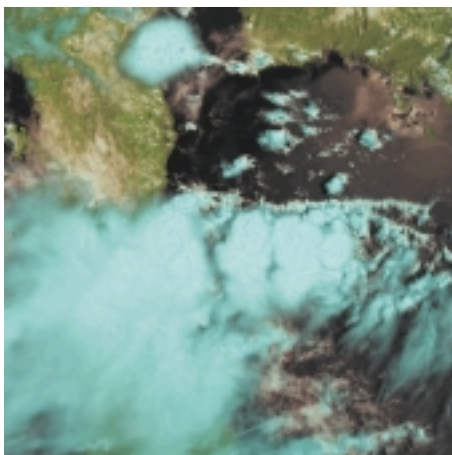
Other users (including all commercial organisations) can order their ATSR-1/-2 data from:
ERS Help Desk, ESRIN
Via Galileo Galilei, CP. 64
0044 Frascati, Italy
Tel: +39 06 94180666
Fax: +39 06 94180272
E-mail: eohelp@esrin.esa.it
<<http://earthnet.esrin.esa.it>>

To get ATSR-2 Near-realtime data:
Near realtime ATSR-2 data can now be obtained from ESA's exciting new ATSR-2 NRT data service running at the Tromsø Satellite Station. The WWW URL for the NRT service is
<<http://192.111.33.173/ATSRNRT>>.

Further information on the ATSR Programme can be obtained from:
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The first image of this article shows an example of ocean data available from ATSR, here are some examples of images that have application to ice, land (vegetation mapping) and cloud remote sensing.



Supplement to Earth Observation Quarterly

This supplement to EOQ is published quarterly by the ESA Publications Division. It is distributed free of charge to all readers who wish to be informed on the ERS products and services available at ESRIN, Frascati.

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