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Revision 1

ERS

USER HANDBOOK

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1. INTRODUCTION

1. INTRODUCTION

1.1 Background

This is the second edition of the ERS User Handbook, which is part of the ERS documentation series produced by ESA:

- ERS-1 System (SP-1146)
- ERS User Handbook (SP-1148)
- ESA ERS-1 Product Specifications (SP-1149)
- The CD Guide to ERS-1 (SP-1155).

The 'ERS-1 System' document provides detailed information on the whole ERS-1 system, including: the satellite, instruments, ground facilities and data services. The 'ESA ERS-1 Product Specifications' document describes the ERS-1 products in detail. The CD Guide to ERS-1 describes the system and its products in a brief and accessible form, and includes image examples in several different fields of data application.

The original version of the ERS-1 User Handbook was designed to assist ERS Users in accessing ERS services and in ordering products. At the time of writing, the ERS-1 satellite had been successfully commissioned; however the ERS-1 ground segment was still within the commissioning period in which all its elements were being tested and validated. Consequently some parts required revision once the operational phase commenced.

After some two years of successful operation of the ERS-1 ground segment it appeared, in mid 1993, to be the right moment to undertake a revision of the ERS User Handbook. The revision was sufficiently far advanced to issue a pre-release version of the handbook in time for the ERS-1 Hamburg Symposium in October 1993. The revision is now complete, and the current version of the handbook has been updated from the pre-release version to include all of the required changes to the original version and to provide the most up-to-date information on the mission programme.

This current version updates the main topics covered in Edition 1 and also adds some useful information concerning the ERS missions in general, and the ERS-2 mission in particular. This document is now more appropriately referred to as the ERS User Handbook.

Chapter 3 covering the ERS Catalogue has been substantially changed taking into account Users' requests for a more complete description of the Central User Service (CUS) as well as adding some information on the many other services available, such as the ERS Help Desk, the ERS Server as well as some useful information on the numerous documents and software packages now available.

The remainder of Chapter 1 which briefly described the ERS-1 mission now covers the ERS missions in general, with a particular emphasis on the new elements which will be present in the ERS-2 mission. Chapter 2 provides a list of ERS products available at the time of printing as well as examples of most of the products. Chapter 3 has already been described above. Chapter 4 is a practical guide for ordering products, both as an ESA Principal Investigator or Pilot Project and for other Users. Chapter 5 contains SAR ground coverage maps by regions and not by stations as in the original version. A set of updated appendices provide the User with additional useful information.

1.2 The ERS missions

1.2.1 Mission objectives

The ERS missions consist of a series of remote sensing satellites to be launched in the 1990s. The first of the series, ERS-1, was launched in July 1991. Meanwhile, ERS-2 has been approved for launch in 1994 in order to ensure the long-term continuity of the data which is

essential for many of its operational applications as well as for research purposes. These satellites are devoted entirely to remote sensing from a polar orbit and will make a substantial contribution to the scientific study of our environment. ERS-2 is also intended to make a significant contribution to atmospheric chemistry by the inclusion of an additional instrument, the Global Ozone Monitoring Experiment (GOME).

The ERS satellites provide global and repetitive observations of the environment using advanced microwave techniques which enable measurements to be made and imaging to take place irrespective of cloud or sunlight conditions.

The satellites measure many parameters not provided by other existing satellite systems, including those of sea state, sea-surface winds, ocean circulation and sea/ice levels. Sea-surface temperature can also be measured to a greater degree of accuracy than with any other current spaceborne system. Much of the data collected is from remote areas such as the polar regions and Southern Oceans, for which little comparable information is available.

Data generated by the ERS missions will contribute to:

- improved understanding of ocean-atmosphere interactions
- major advances in knowledge of ocean circulation and the transfer of energy
- more reliable estimates of the mass balance of the Arctic and Antarctic ice sheets
- better monitoring of dynamic coastal processes and pollution
- improved detection and management of land use change.

The system has also been designed to satisfy operational requirements for data products needed within a few hours of the observations. This is expected to make significant contributions to operational meteorology, sea-state forecasting and monitoring of sea-ice distribution — all of which are important for shipping and offshore activities.

The altimetric and precise tracking data provides valuable geodetic information.

1.2.2 Instruments

The satellite payload consists of:

- Active Microwave Instrument (AMI)
  comprising two separate radars
  - a Synthetic Aperture Radar (SAR)
  - a Wind Scatterometer
- Radar Altimeter (RA)
- Along-Track Scanning Radiometer (ATSR)
- Precise Range and Range-rate Equipment (PRARE)
- Laser Retroreflector.

ERS-2 will also carry the Global Ozone Monitoring Experiment (GOME) instrument.

Active Microwave Instrument (AMI)

The AMI combines two separate radars: the SAR and the Wind Scatterometer. These provide the three modes of SAR Image Mode, SAR Wave Mode, and Wind Scatterometer.

In **Image Mode,** the SAR obtains strips of high-resolution imagery, 100 km in width, to the right of the satellite track. The 10 m long antenna, aligned parallel to the flight track, directs a narrow radar beam onto the Earth's surface over the swath. Imagery is built up from the time delay and strength of the return signals, which depend primarily on the roughness and dielectric properties of the surface and its range from the satellite. Power considerations limit SAR Image Mode operations to a maximum of 12 minutes per orbit, while this also excludes the operation of all other AMI modes. The SAR Image Mode data rate is 105 Mbit/s, which is too high for on-board recording. Consequently, images can only be acquired within the reception zones of suitably equipped ground stations.

Wave Mode operation of the SAR measures the changes in radar reflectivity of the sea surface due to the surface waves in 10 km x 6 km 'imagettes' at intervals of 200 km along track. These imagettes are transformed into spectra providing information about wavelength and direction

of wave systems. Series of power spectra can be used to determine the evolution of swell wave systems.

The **Wind Scatterometer** uses three sideways looking antennae, one pointing normal to the satellite flight path, one pointing 45° forward and the third pointing 45° backwards. These antenna beams illuminate a swath 500 km wide as the satellite advances along its orbit and each provides measurements of radar backscatter from the sea surface for overlapping 50 km resolution cells using a 25 km-grid spacing. The result is three independent backscatter measurements relating to cell centre nodes on a 25 km-grid, which have been obtained using the three different viewing directions and are separated by only a very short time delay. Calculation of the surface wind vector in terms of speed and direction takes place using these so-called 'triplets' within a mathematical model which defines the relationship between backscatter, wind speed, wind direction and incidence angle of the observation.

While the Wind Scatterometer cannot be operated in parallel with the SAR Image Mode, it can operate in parallel with SAR Wave Mode (Wind/Wave Mode).

Radar Altimeter (RA)
The Radar Altimeter is a nadir-pointing radar designed to measure the echoes from ocean and ice surfaces. It has two measurement modes, optimised for measurements over ocean and ice, respectively. In ocean mode, it is used to measure wave height, surface wind speed and sea-surface elevation, the last of which is appropriate to the study of ocean currents, the tides and the global geoid. In ice mode, the instrument, operating with a coarser resolution, provides information on ice sheet surface topography, ice types and sea/ice boundaries.

Along-Track Scanning Radiometer (ATSR)
The ATSR consists of two instruments, an Infrared Radiometer (IRR) and a Microwave Sounder (MWS).

The **Infrared Radiometer** is a four-channel infra-red radiometer providing measurements of sea-surface and cloud-top temperatures with higher accuracies than similar instruments flown on previous satellites. The scanning technique enables the Earth's surface to be viewed at two different angles (0° and 52°) in two curved swaths 500 km wide and separated, along track, by about 700 km. Data from the two swaths are combined to eliminate atmospheric influence in the calculation of sea-surface temperature. The instrument has been designed to provide an absolute accuracy in sea-surface temperature of better than 0.5 K when averaged over areas of 50 km x 50 km and in conditions of up to 80% cloud cover. For cloud-free pixels, each 1 km x 1 km, the relative accuracy is about 0.1 K.

The ERS-2 satellite will carry an enhanced version of the ATSR, called ATSR-2. In addition to the four infra-red channels, ATSR-2 will carry three new channels. Two of these new channels are in the visible, and one in the near infra-red part of the spectrum. On-board calibration targets will be carried for the new channels, as is already the case for the infra-red channels on ATSR. All channels will have a signal-to-noise ratio of better than 20:1 at 0.5% albedo.

The **Microwave Sounder** is a nadir-viewing passive radiometer providing measurements of the total water content of the atmosphere within a 20 km footprint. This is used to improve the accuracy of sea-surface temperature measurements and also to provide an accurate tropospheric range correction for the Radar Altimeter.

Precise Range and Range-rate Equipment
The PRARE is an all-weather microwave ranging system designed to perform high-precision two-way microwave range and range-rate measurements using ground-based transponder stations. These measurements are used for orbit determination and for geodetic applications. Unfortunately, the PRARE on ERS-1 suffered fatal damage to its Random Access Memory due to radiation after a few hours of nominal operations. This means that no PRARE signals will be received from ERS-1 during the rest of the mission. An improved version of PRARE is being built for ERS-2.

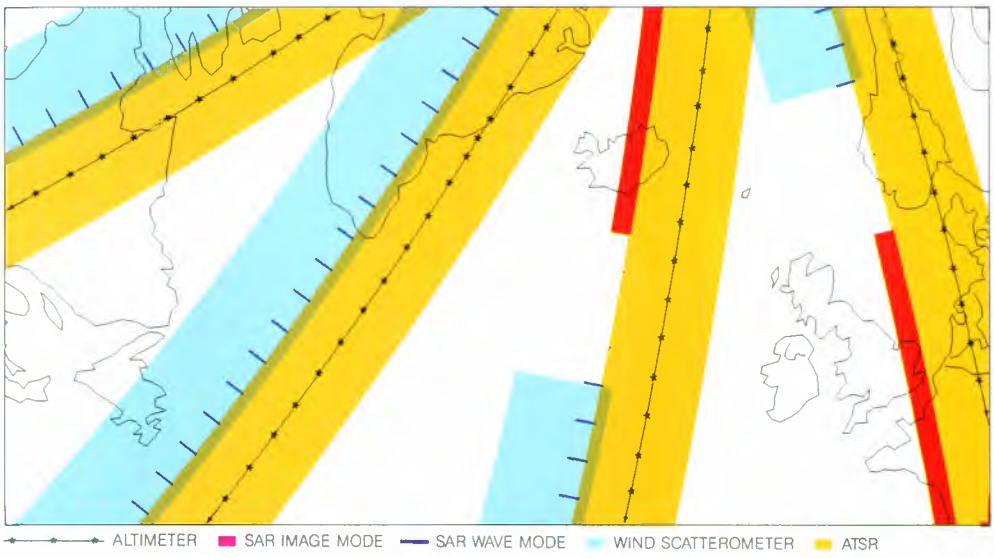

Figure 1.1. Comparative positioning of the swath coverage for different instrument measurement modes.

Laser Retroreflector

The Laser Retroreflector is a passive device operating in the infra-red. It is used as a target by ground-based laser ranging stations for accurate determination of the satellite's height.

Global Ozone Monitoring Experiment (GOME)

This instrument, present for the first time on ERS-2, is a nadir-viewing spectrometer which will observe solar radiation transmitted through or scattered from the Earth's atmosphere or surface. The instrument collects light arriving from the Earth's Sun-illuminated atmosphere and decomposes it into its spectral components. This decomposition is done in two steps in order to provide the required spectral coverage from 240 to 790 nm, as well as the exceptional spectral resolution of 0.2 to 0.4 nm. The GOME exploits the classical backscatter technique as well as the novel 'Differential Absorption Spectroscopy' technique. The recorded spectra will be used to measure a range of trace constituents including ozone, but also nitrogen dioxide, water vapour, oxygen/oxygen dimer and bromine oxide, in the troposphere as well as in the stratosphere. It is necessary to measure all these other species in order to be able to monitor ozone chemistry. The GOME instrument's instantaneous field-of-view is 40 km x 2 km or 2.8° x 0.14°. The instantaneous field-of-view is scanned across the satellite track, enabling global coverage within 3 days except for a small gap around the poles. This gap is filled by the inclusion of a special pole-viewing mode.

The table below details the constituents targeted by the GOME (it will not be possible to detect all these constituents continuously):

Global Coverage	Partial Coverage or Occasional Observation	
Constituents	Constituents	Qualifying Condition
O_3	SO_2	Tropospheric pollution/volcanic events
NO (above 40km)	HCHO	Tropospheric pollution/biomass burning
NO_2	OCIO	Twilight ozone hole conditions
H_2O	CIO	Ozone hole conditions
O_2/O_4	NO_3	Twilight condition i.e. close to terminator
Plus aerosols and Polar Stratospheric Clouds (PSCs).		

GOME data will arrive with the other Low Bit Rate (LBR) data at the various ground stations. The data as well as orbit and attitude information will be sent to the German Processing and Archiving Facility (D-PAF) for processing. The ozone total column amount, ozone vertical concentration profile and data on aerosol loading and cloud cover will be retrieved from the radiometrically and wavelength corrected geo-located spectra.

1.2.3 Orbit

The ERS satellites have Sun-synchronous, near polar, quasi-circular orbits with a mean altitude of 785 km and an inclination of 98.5°. To synchronise the orbital pattern with various requirements for ground coverage a number of adjustment manoeuvres take place.

For ERS-1, a 3-day repeat cycle at an altitude of 785 km (the 'reference orbit') was used during the Commissioning Phase. This provided frequent revisits of dedicated calibration sites with a constant geometry and illumination. Another phase of 3-day cycles took place with a different longitudinal phase. This gave highly repetitive coverage during Arctic winter of specific ice zones (Ice Phase). This phase is to be duplicated in early 1994. The main drawbacks of a 3-day cycle are the large areas between swaths which cannot be imaged by the SAR, and the wide separation of the radar altimeter tracks. The majority of the mission is performed in a 35-day repeat cycle (Multidisciplinary Phase). This gives SAR imaging of the entire area covered by ERS SAR receiving stations. Overlapping passes at middle and high latitudes provide repeat imaging at least twice within a cycle. The density of altimeter tracks also increases to a separation of just 39 km at 60° latitude. A 168-day cycle, offering a high density of altimeter tracks, is favoured for the measurement of mean sea-surface levels and the ocean geoid. However, conflicts with other requirements mean that this is only to be employed late in the mission (Geodetic Phase). A Roll-Tilt Mode campaign took place just before the Multidisciplinary Phase.

For ERS-2 a 35-day cycle is currently foreseen covering the entire mission.

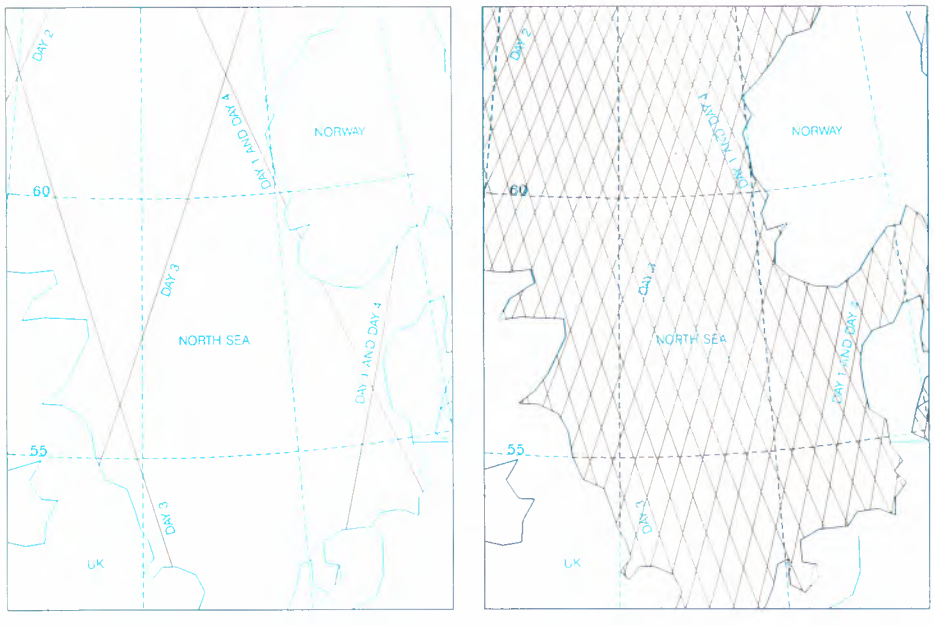

Figure 1.2. A comparison of the density of Radar Altimeter tracks over the North Sea using 3-day and 35-day repeat cycles.

1.2.4 Ground Segment

The ERS ground segment comprises all facilities for satellite control and operations, for instrument data reception, archiving and processing, and Fast Delivery and precision product generation and distribution.

The ESRIN ERS Central Facility (EECF)

The EECF, at ESRIN (Frascati, Italy), is operated by User Services for several activities:

- operation of Help Desk and Order Desk functions
- management of the Catalogue of planned, acquired and processed products
- payload planning based on User Requests and on the mission acquisition strategy
- ground station scheduling
- production planning and monitoring of the network of ground stations and processing facilities
- operation of the Network Supervision Centre (NSC) for scheduling and monitoring of the Broadband Data Dissemination Network (BDDN)
- planning and monitoring of the LBR data dissemination through the ESA Data Dissemination Network (DDN) and other conventional communication channels

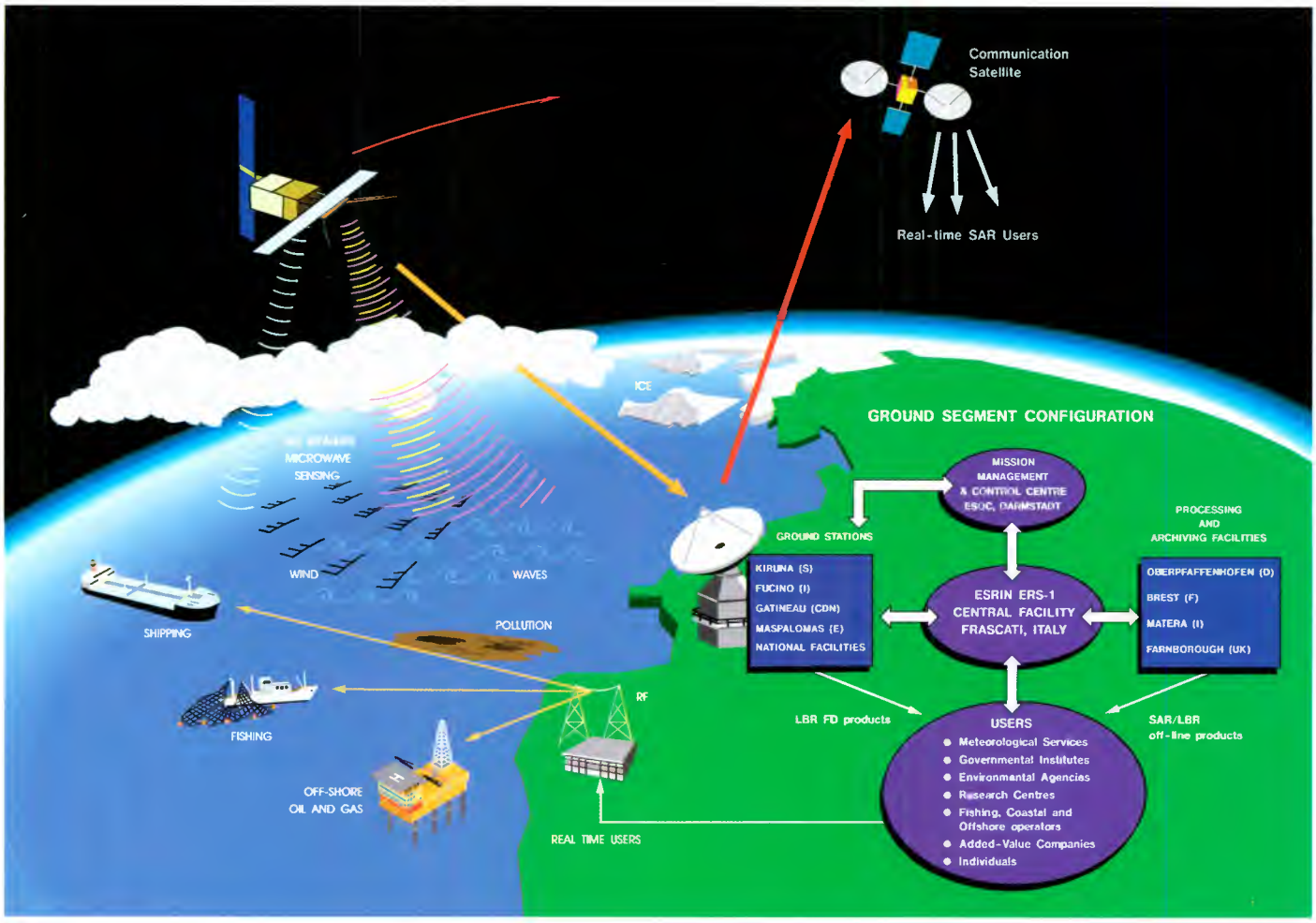

Figure 1.3. The ERS Ground Segment.

- operation of the Central Processing and Management Facility (CPMF) for special and back-up production
- product quality assurance.

The Mission Management and Control Centre (MMCC)

The MMCC, located at ESOC (Darmstadt, Germany), carries out all satellite operations management, including instrument scheduling based on payload planning at the EECF.

ESA Ground Stations

These are located at Kiruna (Sweden), Fucino (Italy), Maspalomas (Canary Islands, Spain), Gatineau and Prince Albert (Canada). The stations at Kiruna and Fucino provide the data acquisition, processing and dissemination of SAR Fast Delivery products. Kiruna, Maspalomas, Gatineau and Prince Albert acquire low bit-rate data, both directly and from the on-board recorders. The first three stations provide Fast Delivery data for transmission over the Global Telecommunication System Meteorological Network.

National and Foreign Ground Stations

Other stations world-wide also receive ERS data by arrangement with ESA; this extends the coverage of the SAR operating in Image Mode outside Europe (see Chapter 5 and Appendix E). Some delay should be expected by Users requiring data from these stations as they are not directly under the control of ESA.

Processing and Archiving Facilities (PAFs)

There are four PAFs, located at DLR (Oberpfaffenhofen, Germany), IFREMER (Brest, France), DRA (Farnborough, UK) and ASI (Matera, Italy). They are the main centres for the generation of off-line precision products and archiving of ERS data and products. The Central Processing and Management Facility (CPMF) at the EECF is also available to supplement the processing capacity of the PAFs.

1.2.5 ERS Consortium

In 1992 ESA signed an agreement with the ERS Consortium, consisting of Eurimage, Radarsat International and Spot Image, under which the Consortium received world-wide commercial distribution rights for data from ERS-1. Between them, the three companies bring together an extensive world-wide experience in promotion, marketing and distribution of satellite Earth Observation data.

Each member of the Consortium is responsible for the marketing and distribution of the data in specific territories:

- Eurimage - Europe, North Africa and the Middle East
- Radarsat International - Canada and the United States
- Spot Image - all other countries.

1.2.6 Applications

Oceanography and glaciology

The ability of ERS to acquire vast global data sets and provide local imagery of ocean and ice phenomena will contribute to scientific knowledge in several areas, for example:

- ocean circulation, tides, currents and current fronts
- occurrence and propagation of internal waves
- global wind/wave relationships
- shallow water bathymetry
- polar ice sheets and sea ice.

Climatology

ERS data has an important role to play in the study of the inter-relationships of oceanographic and climatic phenomena, and their influence on global climatic change and weather conditions. Significant contributions will be made to the World Climate Research Programme for monitoring climatic anomalies such as 'El Niño' and to the World Ocean Circulation Experiment for estimating and modelling the ocean's global heat and water circulation.

Solid earth

The combined use of various ERS instruments, leading to accurate orbit determination, will contribute to:

- accurate determination of the ocean geoid
- geophysical studies of the oceanic lithosphere and mantle convection
- precise relative geodetic positioning.

Weather forecasting/sea-state forecasting/ice mapping

The ERS missions provide global information in near real-time, suitable for use in established operational systems for forecasting weather, sea state and ice conditions. Significant benefits are expected in terms of improved efficiency and safety of all ocean related activities, including:

- offshore exploration
- ship routing
- fish resource management
- design of ships and offshore equipment.

Ship detection

Ships and their associated wakes are easily detected using imaging radar. The ERS satellites offer the means for ship surveillance over extensive sea areas.

Pollution monitoring

Oil slicks have a dampening effect on surface waves and this is detected by the radar as a reduction in backscatter. The ERS satellites complement existing operational airborne radar systems by providing large-area monitoring of oil pollution.

Land applications

The ERS SAR is very sensitive to surface roughness and to soil and plant moisture content. Therefore the data represents a unique opportunity to map these parameters and

Figure 1.4. This image was acquired on 5 June 1992 at 15.50 GMT, and shows the Southern Alluvial Plain and Gulf of Thailand. Bangkok, marked by a cluster of bright points, lies along the meandering Mae Nam Chao Praya, and also east and west along the roads in the delicate patchwork of mainly rice fields. The city of Nakhon Pathom at the extreme left is very bright. Along the coast to the west of the Chao Phraya the dark field pattern is an area of shrimp farming. Still farther west, the strip fields are salt pans. In the Gulf the cloud-like plume may be the river's fresh water interacting with the tides. Many ships are anchored near the island of Sichang (lower right corner). Some of these are cargo vessels serviced by the wooden barges visible as tiny points close to the island. This traditional mode of transport still serves Greater Bangkok through thousands of Klongs (channels). However most of the ships are tankers for the petrochemical industries which have developed in the area. This activity causes the oil pollution clearly visible in this part of the Gulf as the many dark streaks and patches; a long, thin dark line is most probably the trace of a tank-washing operation — it is more than 20 km long.

their spatial and temporal changes. In fact, multitemporal SAR data sets can be used for crop identification, land use mapping and soil moisture monitoring. Even through clouds, SAR can be used to assess the extent of floods or of snow cover. Forest mapping, especially in tropical areas, is an important contribution to attempts to control deforestation. The SAR is highly complementary to optical sensors and their combined use increases the reliability of object classification.

Interferometry

Radar Interferometry is based on the combination of two or more single-look complex data sets taken from only slightly different positions in orbit (in the order of hundreds of metres only). The phase differences can be used to compute the altitude of each pixel. In the case of more than two coherent data sets, spatial variations of an object or terrain at the centimetric scale can be determined. Hence ERS SAR data can be used to derive digital elevation models to high precision, even from cloud covered areas, and also serves to monitor earth crust movements in case of earthquakes or volcanic events. The phase information in multipass SAR imagery may be exploited to detect surface changes not only related to roughness and humidity, but also due to de-correlation linked to crop growth.

More specific information on ERS applications can be found in the proceedings of the Cannes (1992) and Hamburg (1993) symposiums as well as on the ERS-1 SAR Reference Coverage CD-ROM (see Appendix D.)

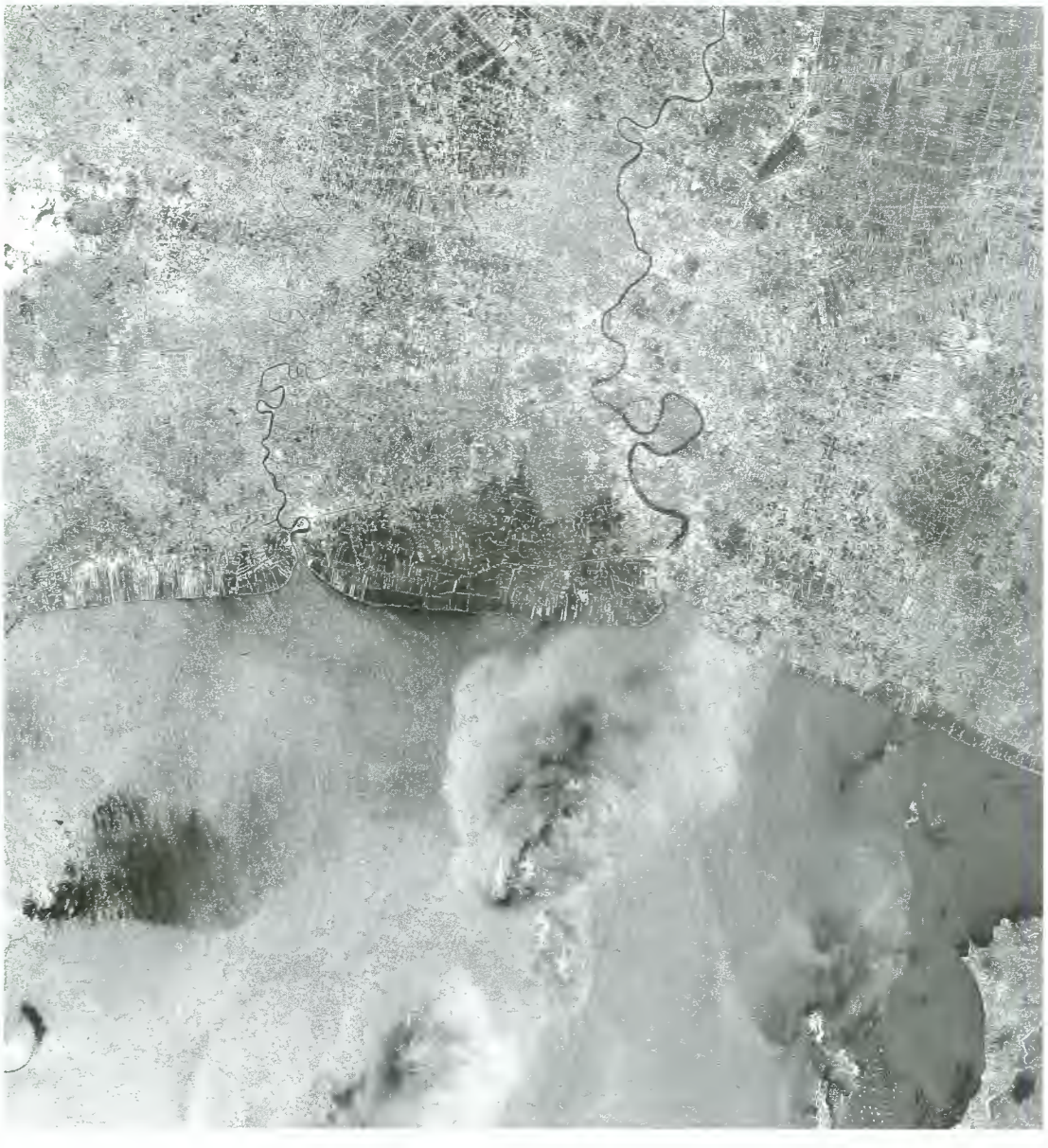

Figure 1.5. The edge of the Riiser-Larsen ice shelf in Antarctica, centre coordinates 71 7' South, 10°3' West, acquired by the German O'Higgins station on 6 February 1992. Such imagery offers opportunities to study ice floe mechanisms and snow behaviour. On the sea (left edge of the image) different ice types can be identified such as fresh slush ice (dark area), small ice floes (bright areas), icebergs (bright patches) and multiyear ice floes (patches with texture in the left lower corner).

Figure 1.6. A multitemporal SAR image of the Rhine-Main area composed of acquisitions from three dates: 10 September 1991 displayed in red, 13 October 1991 in green and 18 November 1991 shown in blue. All changes between these dates are expressed as colours, while cities and other unchanged features remain bright or grey. Meadows, water bodies and linear elements such as runways and highways are invariably dark. Note that railways are in general very bright linear features. The Rhine is found to the left of the image, and Darmstadt is near the centre. As the images are from late in 1991 only, they are not optimal for land use identification. However the diversity of field colours, ranging from green to yellow and to red, indicates the harvesting of late crops, and so is a possible indicator of their type.

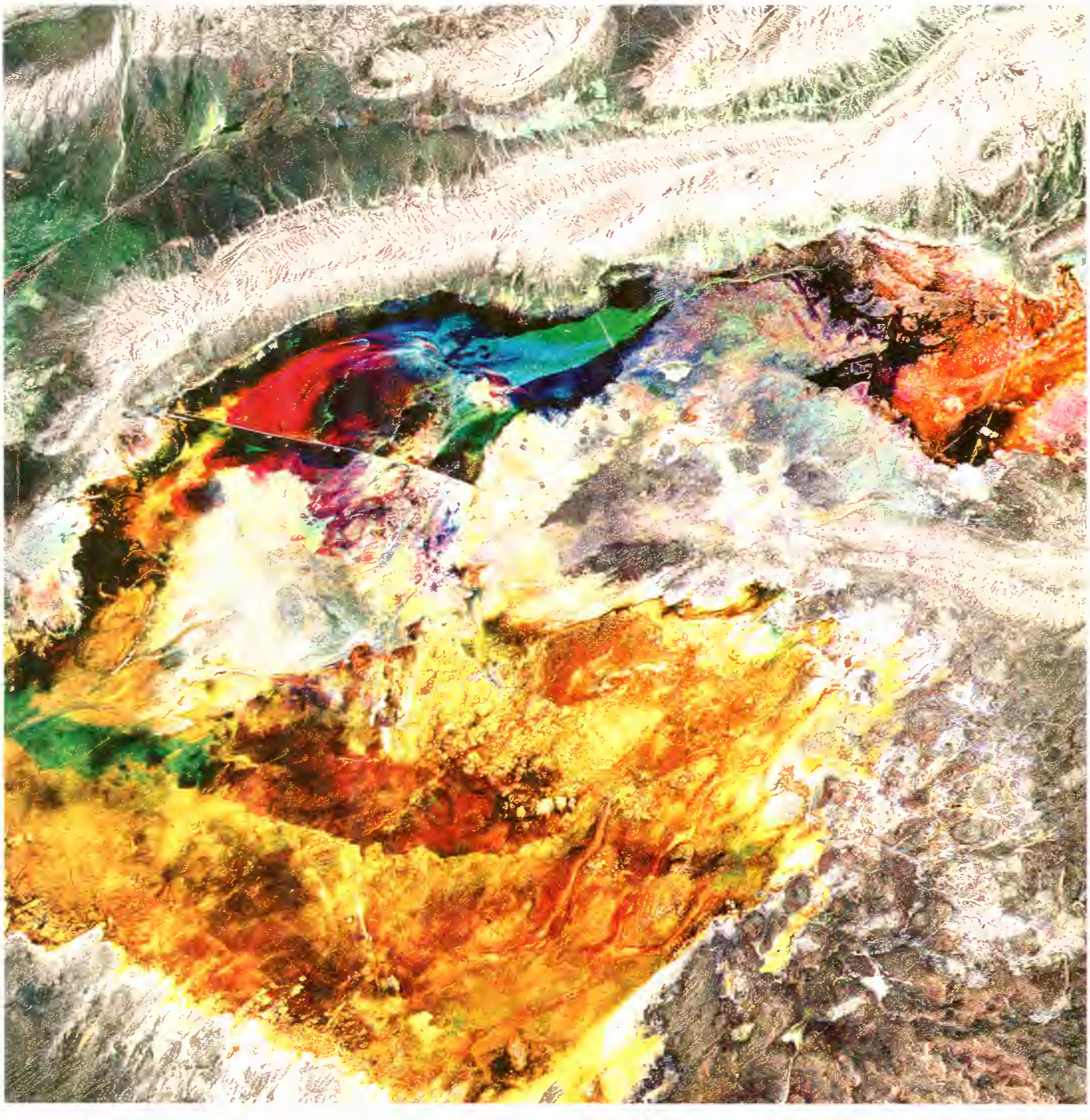

Figure 1.7. A colour combination of three SAR acquisitions from 29 May 1992 (blue), 7 August 1992 (green) and 16 October 1992 (red) over the salt marsh of the Chott el Jerid, Southern Tunisia. The apparent colours indicate changes in lake formation, evaporation, and aeolian transport and deposition during this period. While the mountain chains remain white or grey, indicating no changes, the valleys to the north are green, indicating higher soil moisture on 7 August. The yellow area gives evidence of a smooth surface in May only, caused by a high water table in a mudflat zone. On the other two dates the surface is considerably rougher, because of formation of crystals resulting from capillary evaporation. Wind-blown gypsum can also cause a decrease in backscattering. (After G.Wadge et al., NUTIS/Univ. Reading).

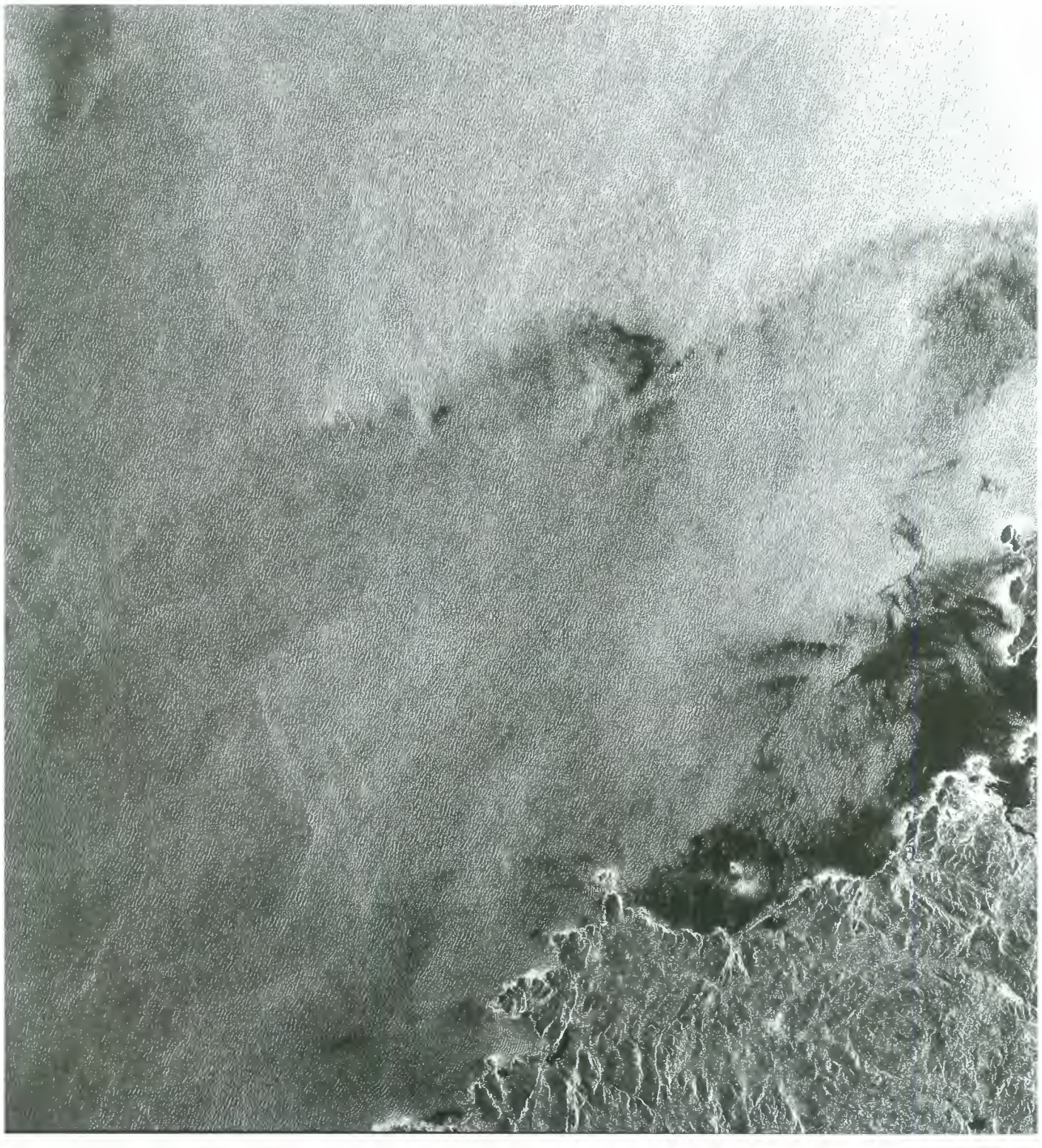

Figure 1.8. An ERS-1 SAR image acquired on 1 January 1993 over the northwestern tip of Spain. The town of La Coruna with its clearly visible harbour installations is situated on the small, brightly imaged peninsula near the mid-right edge of the image. On the sea many different features are visible. The dark area near the coast is caused by a huge oil slick from the Greek oil tanker "Aegean Sea". The ship ran aground at Torre de Hercules, near the entrance to the Ria de Coruna, on 3 December 1992. The tanker, carrying about 80 000 tons of crude oil, broke up and exploded. Practically all of the oil was released into the sea. The other dark zones might be caused by low winds, since wind speeds below 3m/s would also result in very little backscatter. The linear features visible are generated by ocean current shears, but several ship wakes can also be detected.

2. ERS-1 PRODUCT DESCRIPTIONS

2. ERS PRODUCT DESCRIPTIONS

2.1 Introduction

A wide range of ERS products are available to Users; these comprise Fast Delivery and Off-line products.

The instrument raw data is stored at the Processing and Archiving Facilities (PAFs).

The Fast Delivery products are generated and distributed from the Ground Stations within one day of instrument observation for SAR Image Mode and within 3 hours for low bit-rate data. Copies of all FD products in CEOS format are generated at the PAFs.

The PAFs generate a wide variety of different Off-line products to satisfy specific User requirements, including:

- off-line copies of Fast Delivery production
- precision products using refined auxiliary data such as in-flight calibration data, precise attitude and orbit parameters, ground control points, and digital elevation models.

Descriptions of the products currently available are given in the product description sheets that follow. Where appropriate, a sample product is also shown. Further details about the products can be found in the following ESA documents:

- ESA ERS-1 Product Specifications (SP-1149)
- ERS-1 Ground Station Product Specifications for Users (ER-IS-EPO-GS-0204)
- ERS-1 D-PAF Global Products Manual.

2.2 Product Summary

The list given below is correct at the time of preparation of this document. More products may become available in the future. For up-to-date information on product availability, Users should address the appropriate Order Desk (see Chapter 4).

The availability of specific SAR product types depends on the geographical area and the compatibility of ground station and PAF recording facilities. The need for auxiliary data may also be a constraint (e.g. ERS.SAR.GTC01 are only available over Central Europe).

Delivery times depend mainly on the time required for tape shipment between the acquisition stations and the processing facilities.

* availability to be confirmed

2.3 SAR Annotated Raw Data (ERS.SAR.RAW)

This product consists of the SAR telemetry data corresponding to 16 seconds of data collection; it also contains all required auxiliary data necessary for data processing.

The product serves two purposes:

- the testing of ERS-1 SAR processors independently from the HDDR system
- Users interested in full SAR data processing.

Product characteristics

Scene area	(range)	100 km
	(azimuth)	110 km
Scene size	(range)	5616 samples per line
	(azimuth)	27000 lines
Pixel depth		10 bits (5 bits I, 5 bits Q)
Total product volume		~ 190 Mbytes
Projection		slant range

Product standard media

CCT
E2

2.4 SAR Fast Delivery Image (ERS.SAR.UI16)

The Fast Delivery Image product is generated by the Fast Delivery processing chain at the ESA stations of Kiruna and Fucino. It can be sent by high-speed satellite link to the Nominated Centres in member countries within 24 hours of acquisition.

The product is a multi-look (speckle-reduced), ground range, digital image intended for near real-time applications. No correction is applied for the SAR antenna pattern or range-spreading loss.

Product characteristics

Pixel size	(range - across track)	20.0 m
	(azimuth - along track)	~ 15.9 m
Scene area	(range - across track)	100 km
	(azimuth - along track)	~ 96 km
Scene size	(range - pixels)	5000 pixels per line
	(azimuth - lines)	6300 lines
Pixel depth		16 bits
Product location accuracy		200 m
Total product volume		~ 63 Mbytes
Projection		ground range
Number of looks		3

Product delivery

ESA Broadband Data Dissemination Network (BDDN)

2.5 SAR Fast Delivery Image Copy (ERS.SAR.FDC)

Off-line copy of ERS.SAR.UI16 presented in CEOS format.

Product characteristics

Pixel size	(range - across track)	20.0 m
	(azimuth - along track)	~ 15.9 m
Scene area	(range - across track)	100 km
	(azimuth - along track)	~ 96 km
Scene size	(range - pixels)	5000 pixels per line
	(azimuth - lines)	6300 lines
Pixel depth		16 bits
Product location accuracy		200 m
Total product volume		~ 63 Mbytes
Projection		ground range
Number of looks		3

Product standard media

CCT
E2
Photographic print or film (positive or negative)

Product Example - ERS.SAR.UI16/ERS.SAR.FDC (photographic)

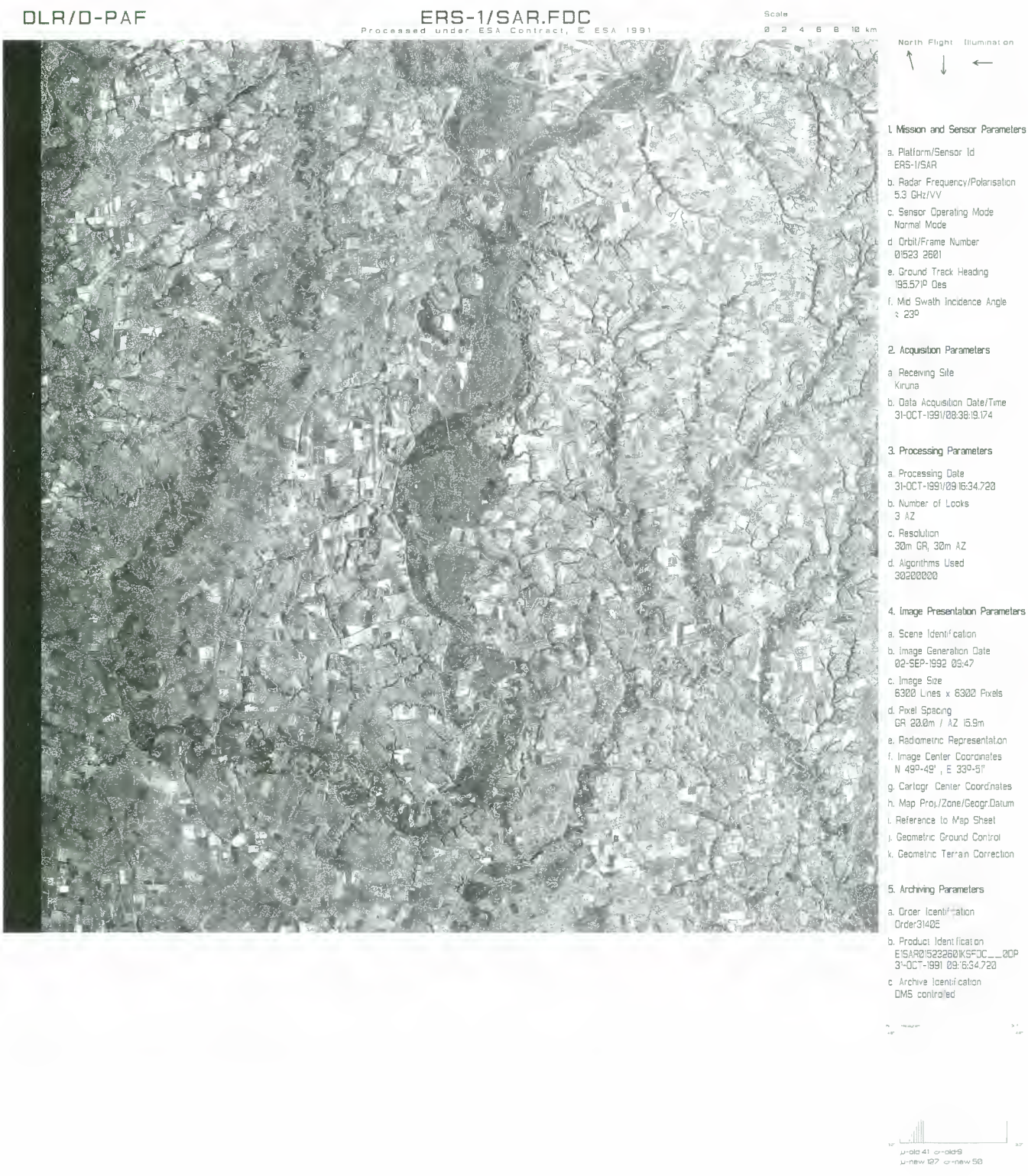

Figure 2.1. Fast Delivery SAR products (ERS.SAR.UI16) can be transmitted directly from the ESA stations of Kiruna and Fucino to the SAR FD Nominated Centres. The SAR Fast Delivery Image Copy (ERS.SAR.FDC) in CEOS format is produced later at the PAF. The example shows an area in the Ukraine, north of the River Dnjepr. It is traditionally a corn and wheat production area with large fields. It is assumed that at the time of acquisition, 31 October 1991, all fields were harvested and that their grey level differs because of different stages of field preparation, e.g. freshly ploughed corn fields would appear bright, while previously prepared wheat fields would be much darker. The homogeneous areas along the river courses are mainly woods.

Note: The ERS.SAR.FDC product illustrated here shows the CEOS frame annotation. Although the ERS.SAR.UI16 product also contains this annotation information with the image data, it appears as records within the digital file distributed via the BDDN.

2.6 SAR Single Look Complex Image (ERS.SAR.SLC and ERS.SAR.SLCF)

This product presents SAR data following preprocessing, but retains every sample as complex data. The product is single-look (i.e. no speckle reduction by multi-look processing), and in slant range. Phase continuity is preserved within the image. Three areas of application are:

- testing of SAR processing algorithms
- development of techniques using phase preservation, e.g. SAR interferometry
- application of SAR post-processing algorithms, e.g. geocoding from complex, slant-range data

There are two forms of the single-look complex product:

ERS.SAR.SLCF – a full-scene product. This product is available for those SAR data archived at the UK-PAF.

ERS.SAR.SLC – a product of quarter scenes or quadrants. Corresponds to just over one-half range by one-half azimuth of the full-size image, with some overlap of adjacent quadrants. This product can be generated for those SAR data archived at the D-PAF. The convention for numbering of image quadrants is illustrated below.

Product characteristics	**ERS.SAR.SLC**	**ERS.SAR.SLCF**
Scene size (range)	2500 samples	4992 samples
(azimuth)	15000 lines	26368 lines
Pixel depth	16I, 16Q complex	16I, 16Q complex
Product location accuracy	200 m	200 m
Total volume	~ 150 Mbytes	~ 530 Mbytes
Projection	slant range	slant range
Number of looks	1	1

Product standard medium

CCT
E2

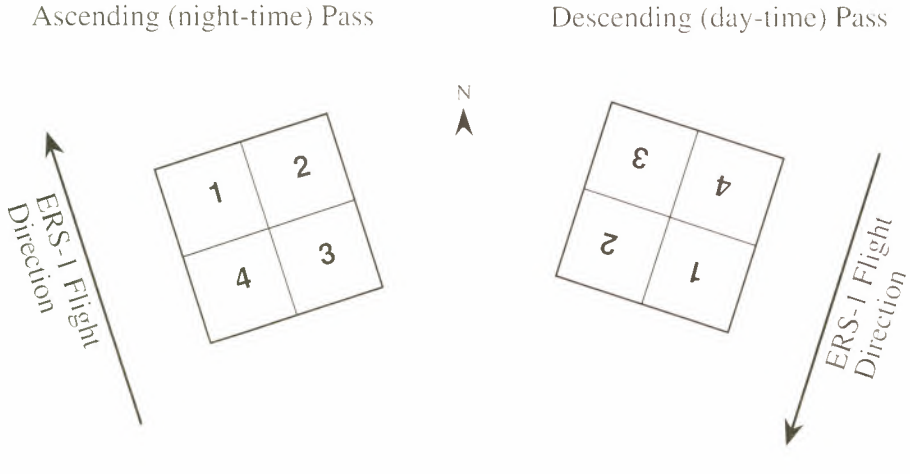

Figure 2.2. The numbering of scene quadrants for ERS.SAR.SLC products. Note that the numbering sequence is constant relative to the satellite position, and so has a different orientation for the Ascending and Descending scenes.

2.7 SAR Precision Image (ERS.SAR.PRI)

The Precision Image is a multi-look (speckle-reduced), ground range, system corrected image. It is the product applicable for most Users interested in remote sensing applications. The product is calibrated and corrected for the SAR antenna pattern and range-spreading loss; radar backscatter (σ°) can be derived from the product for geophysical modelling, but no correction is applied for terrain-induced radiometric effects. The image is not geocoded, and terrain distortion (foreshortening and layover) has not been removed.

Product characteristics

Pixel size	(range - across track)	12.5 m
	(azimuth - across track)	12.5 m
Scene area	(range - across track)	100 km
	(azimuth - along track)	at least 102.5 km
Scene size	(range - pixels)	8000 pixels per line
	(azimuth - lines)	at least 8200 lines
Pixel depth		16 bits
Product location accuracy	(range)	100 m
	(azimuth)	200m
Total product volume		~ 131 Mbytes
Annotation in image		lat./long. of scene centre and the four corners
Projection		ground-range
Number of looks		3

Product standard medium

CCT
E2
Photographic print or film (positive or negative)

Product Example - ERS.SAR.PRI (Photographic print)

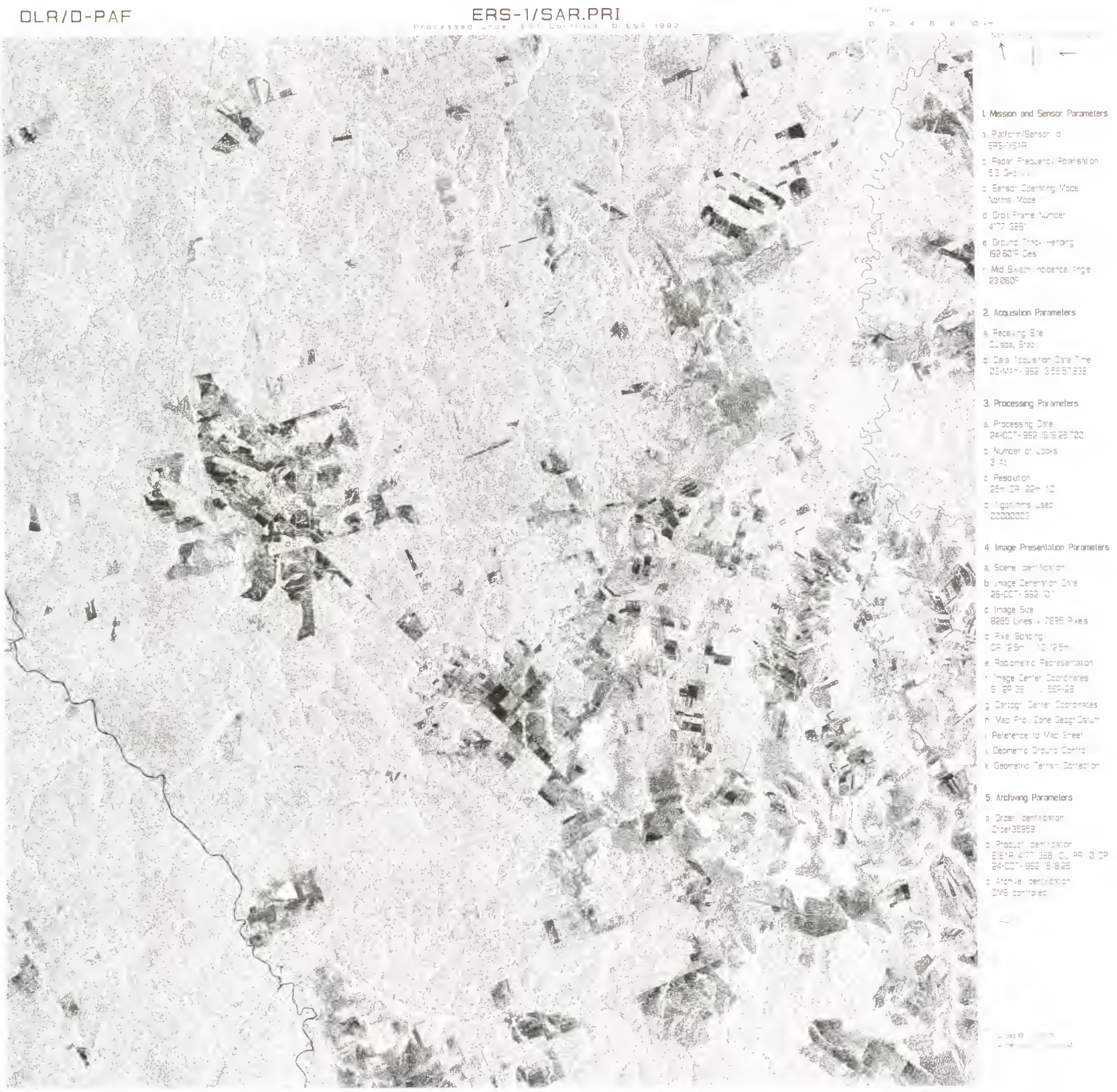

Figure 2.3. The SAR Precision Product (ERS.SAR.PRI) is the standard off-line SAR product. This example, acquired on 3 May 1992, shows a uniformly wooded area in southern Brazil. It appears bright, dissected by a drainage pattern. A patchwork of deforested area is seen along roads or sprawling from urban centres. The fields appear in different grey levels. A multitemporal data set would be of great help in identifying the actual land use, e.g. whether used for crops or just as grassland.

2.8 SAR Ellipsoid Geocoded Image (ERS.SAR.GEC)

This image is a multi-look (speckle-reduced), ground range, system corrected image. It is precisely located and rectified onto a map projection, but not corrected for terrain distortion. It is a high-level product for Users interested in imaging radar remote sensing applications where the geo-reference is important. It is calibrated and corrected for the SAR antenna pattern and range-spreading loss. Radar backscatter (σ°) can be derived from the product for geophysical modelling. There is no correction applied for radiometry.

Product characteristics

Pixel size	(Eastings)	12.5 m
	(Northings)	12.5 m
Scene area		100 x 100 km rotated according to map grid
Scene size	(Eastings - pixels)	9000 – 12000 pixels per line
	(Northings - lines)	9000 – 12000 lines
Pixel depth		16 bits
Total product volume		165 to 288 Mbytes
Product location accuracy		better than 100 m in areas of low relief
Projections available		UTM for latitudes within (-70°, +70°)
		UPS for the other latitudes
Ellipsoid		WGS 1984 (ref Kumar, M., 1988, Marine Geodesy 12, 117)
Number of looks		3

Product standard medium

CCT
E2
Photographic print or film (positive or negative)

Product Example - ERS.SAR.GEC (Photographic print)

Figure 2.4. This geocoded SAR product of 2 July 1992 shows a part of the Algerian Atlas Mountains with a series of open anticlines and synclines, the latter often marked by a valley in the middle. To the lower right is the start of the stone-and-gravel desert, shown in bright grey tones. This is in contrast to the sparsely vegetated plateau in the upper left corner which has a very different soil cover.

2.9 SAR Geocoded Terrain Corrected Image (ERS.SAR.GTC01)

This image is a multi-look (speckle-reduced), ground range, system corrected image. It is precisely located and rectified onto a map projection and is corrected for terrain distortion by use of a Digital Elevation Model. It is the highest level SAR image product and is intended for Users interested in remote sensing applications in terrain with significant relief and where the geo-reference is important. Radar backscatter (σ°) can be derived from the image, but there is no correction of terrain-induced radiometric effects. The product also includes a file with layover areas and a shadow mask, plus the local incidence angle for each pixel.

The database of Digital Elevation Models required to generate the ERS.SAR.GTC01 product is currently restricted in coverage to the area of Central Europe in and around Germany.

Product characteristics

Pixel size	(Eastings)	12.5 m
	(Northings)	12.5 m
Scene area		100 x 100 km rotated according to map grid
Scene size	(Eastings - pixels)	9000 – 12000 pixels per line
	(Northings - lines)	9000 – 12000 lines
Pixel depth		16 bits
Total product volume		~ 165 to 288 Mbytes
Product location accuracy		better than 50 m
Projection		UTM for latitudes within (-70°, +70°) UPS for the other latitudes
Ellipsoid		WGS 1984 (ref Kumar, M., 1988, Marine Geodesy 12, 117)
Number of looks		3

Product standard medium

CCT
E2
Photographic print or film (positive or negative)

Product Example - ERS.SAR.GTC01 (Photographic print)

Figure 2.5. A terrain corrected and geocoded SAR product from 17 August 1991. To generate this product a Digital Elevation Model is needed. The image data is corrected for the distortion typical of the SAR geometry (foreshortening or layover), but this cannot be completely reversed. No radiometric correction due to the local incidence angle is applied. In addition to the image map, the product includes a layover, shadow and local incidence angle file. ERS.SAR.GTC products can only be produced by the German PAF from data over the central part of Europe. The image map shows the Black Forest (north-eastern image corner), and the River Rhine with the bright patch of the city of Basle and its airport with dark runways. To the south, the chains of the Jura are followed by the undulating Swiss Plateau with its three lakes, two of them affected by local winds. The morphology of the landscape is well displayed and allows the Plateau to be separated from the conglomerates of the Napf, and from the rigid limestone of the Pre-Alps (south-eastern corner). Note that the woods are easily separated from agricultural land by their brighter grey level.

2.10 SAR Wave Fast Delivery Product (ERS.SWM.UWA)

Global product giving the power spectrum for each SAR Wave Mode imagette. One imagette occurs every 200 km along the satellite track. Available by subscription to the near real-time service.

Product characteristics

Imagette area	10 x 6 km
Spectrum size	12 angular sectors each of 15° representing range 0° to 180°; power given in 8 bits for each spatial wavelength in range 100 m to 1000 m
Imagette volume	604 bytes
Product volume per month/cycle	~ 40 Mbytes

Product delivery

ESA Fast Delivery system via subscription. Global data set; weekly, monthly or annual.

2.11 SAR Wave Fast Delivery Product Copy (ERS.SWM.FDC)

Off-line copy of ERS.SWM.UWA product presented in CEOS format.

Product characteristics

Imagette area	10 x 6 km
Spectrum size	12 angular sectors each of 15° representing range 0° to 180°; power given in 8 bits for each spatial wavelength in range 100 m to 1000 m
Imagette volume	964 bytes
Product volume per month/cycle	~ 65 Mbytes

Product delivery

Global data set: weekly, monthly or annual.

Product standard medium

CCT
E2

Product Example – ERS.SWM.UWA/ERS.SWM/FDC (visualisation of digital product)

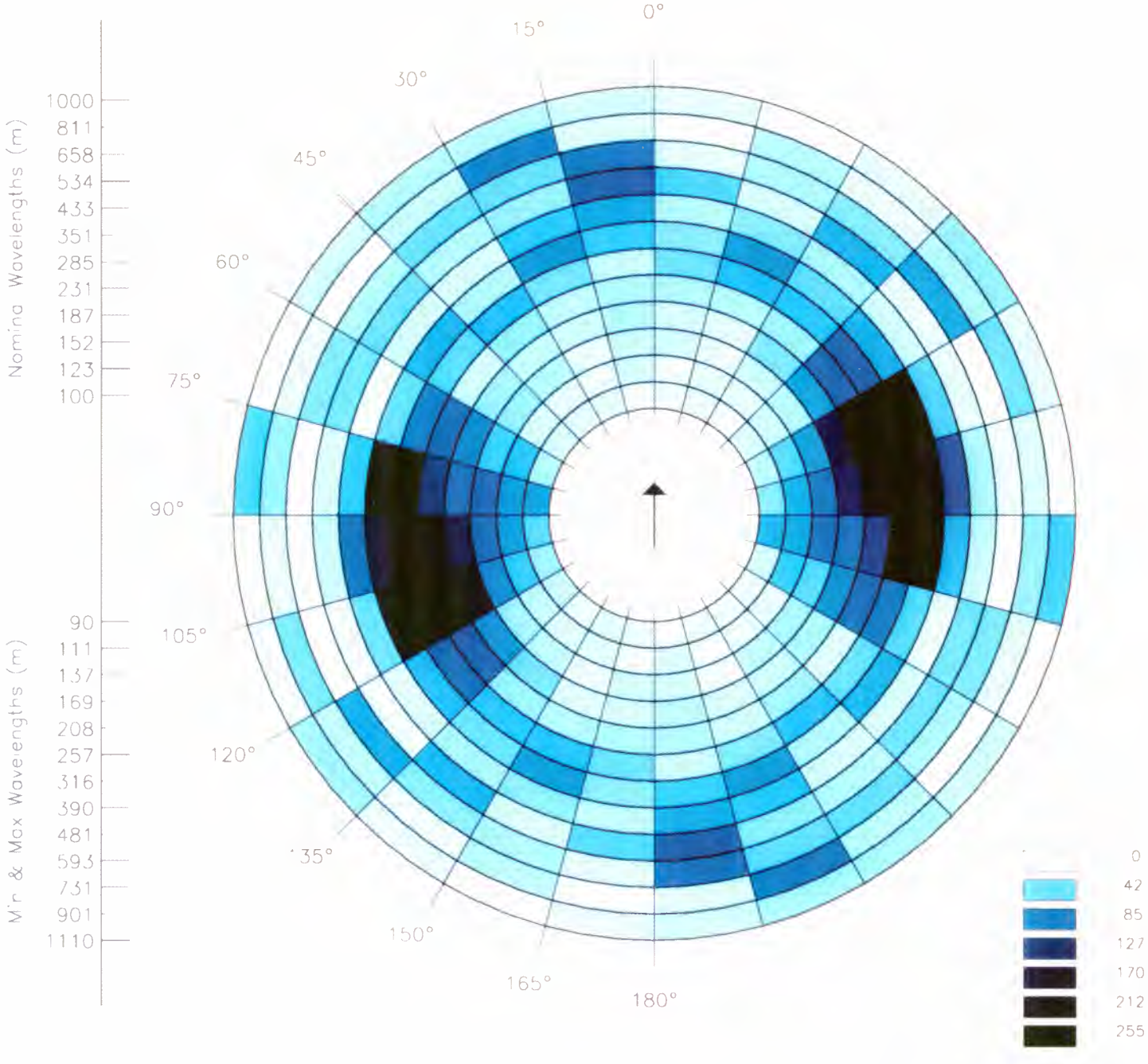

Figure 2.6. This illustrates a visualisation of the energy spectrum from a single imagette of an ERS.SWM.UWA product. The data was acquired on 26 January 1993 at 07:25:05 UTC, at a latitude of -46.785° and a longitude of -121.124°. The spectrum shows that the dominant waves in the imagette lie almost perpendicular to the satellite's track, and have wavelengths in the range 140 m to 480 m. A secondary set of longer waves occur at 90° to the main group, with wavelengths of about 500 m to 700 m.

2.12 Wind Scatterometer Fast Delivery Product (ERS.WSC.UWI)

Global product of 500 x 500 km frames giving wind speed and direction at nadir, plus the radar backscatter (σ°) values for the three beams of the scatterometer. Available by subscription to the near real-time service.

Product characteristics

Frame area	500 x 500 km
Frame size	19 x 19 grid points
Frame volume	17 kbytes
Product volume per month/cycle	~ 700 Mbytes

Product delivery

ESA Fast Delivery system via subscription. Global data set: weekly, monthly or annual.

2.13 Wind Scatterometer Fast Delivery Product Copy (ERS.WSC.FDC)

Off-line copy of ERS.WSC.UWI product presented in CEOS format.

Product characteristics

Frame area	500 x 500 km
Frame size	19 x 19 grid points
Frame volume	17 kbytes
Product volume per month/cycle	~ 700 Mbytes

Product delivery

Global data set: weekly, monthly or annual.

Product standard medium

CCT
E2

Product Example – ERS.WSC.UWI/ERS.WSC.FDC (visualisation of digital product)

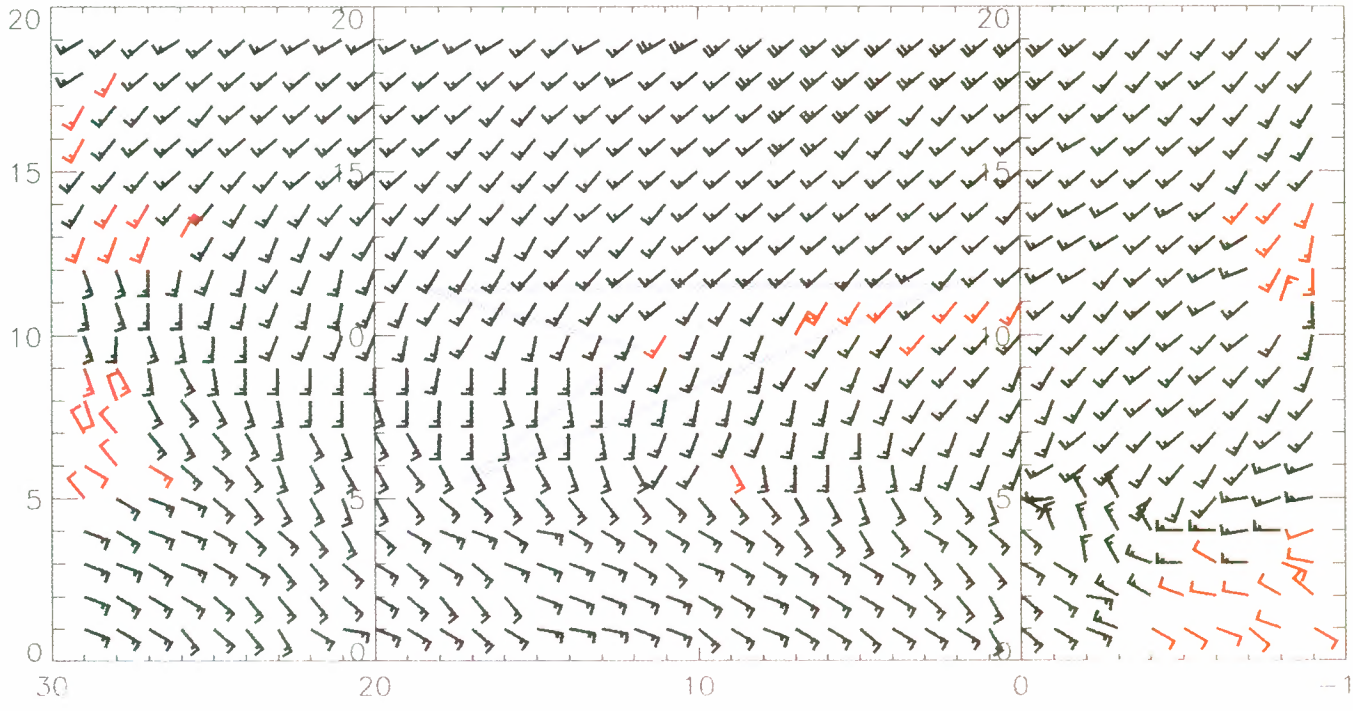

Figure 2.7. Three adjacent frames of Wind Scatterometer product are shown from one orbit. The wind field is given by wind direction and wind speed in a grid with a spacing of 25 km, with 380 measurements in an area of about 500 km x 500 km. The data is from about 25° North, 135° East, with North to the right. It was acquired by Gatineau on 9 August 1993 at 01:10:36.771 UTC and processed for Fast Delivery distribution.

2.14 Altimeter Fast Delivery Product (ERS.ALT.URA)

Global product giving values at regular intervals along the satellite track of satellite altitude, wind speed and significant wave height at nadir. Available by subscription to the near real-time service.

Product characteristics

Data sample frequency	1 Hz (~ 7 km) along-track
Product volume per month/cycle	~ 220 Mbytes

Product delivery

ESA Fast Delivery system via subscription. Global data set: weekly, annual or cyclical.

2.15 Altimeter Fast Delivery Product Copy (ERS.ALT.FDC)

Off-line copy of ERS.ALT.URA product presented in CEOS format.

Product characteristics

Data sample frequency	1 Hz (~ 7 km) along-track
Product volume per month/cycle	~ 300 Mbytes

Product delivery

Global data set; weekly, monthly or annual.

Product standard medium

CCT
E2

2.16 Ocean Product (ERS.ALT.OPR02)

Global product giving values at regular intervals along the satellite track of surface range and satellite altitude over the ellipsoid, wind speed at nadir and significant wave height. Processed with the precise orbit.

Product characteristics

Data sample frequency	1 Hz (~ 7 km) along-track
Product volume per month/cycle	~ 350 Mbytes

Product delivery

Global data set; weekly, annual or cyclical.
Regional data set; annual or cyclical.

Product standard medium

CCT
E2

2.17 Waveform Product (ERS.ALT.WAP)

Global product giving values at regular intervals along the satellite track of surface range, satellite altitude, wind speed and significant wave height at nadir, and the altimeter waveform data. Processed using the precise orbit and giving full geophysical corrections.

Product characteristics

Data frequency	20 Hz (~ 350 m) along-track
Product volume per month	~ 15 Gbytes

Product delivery

42 orbits in sequence.

Product standard medium

E2

Product Example – ERS.ALT.URA/ERS.ALT.FDC (visualisation of digital product)

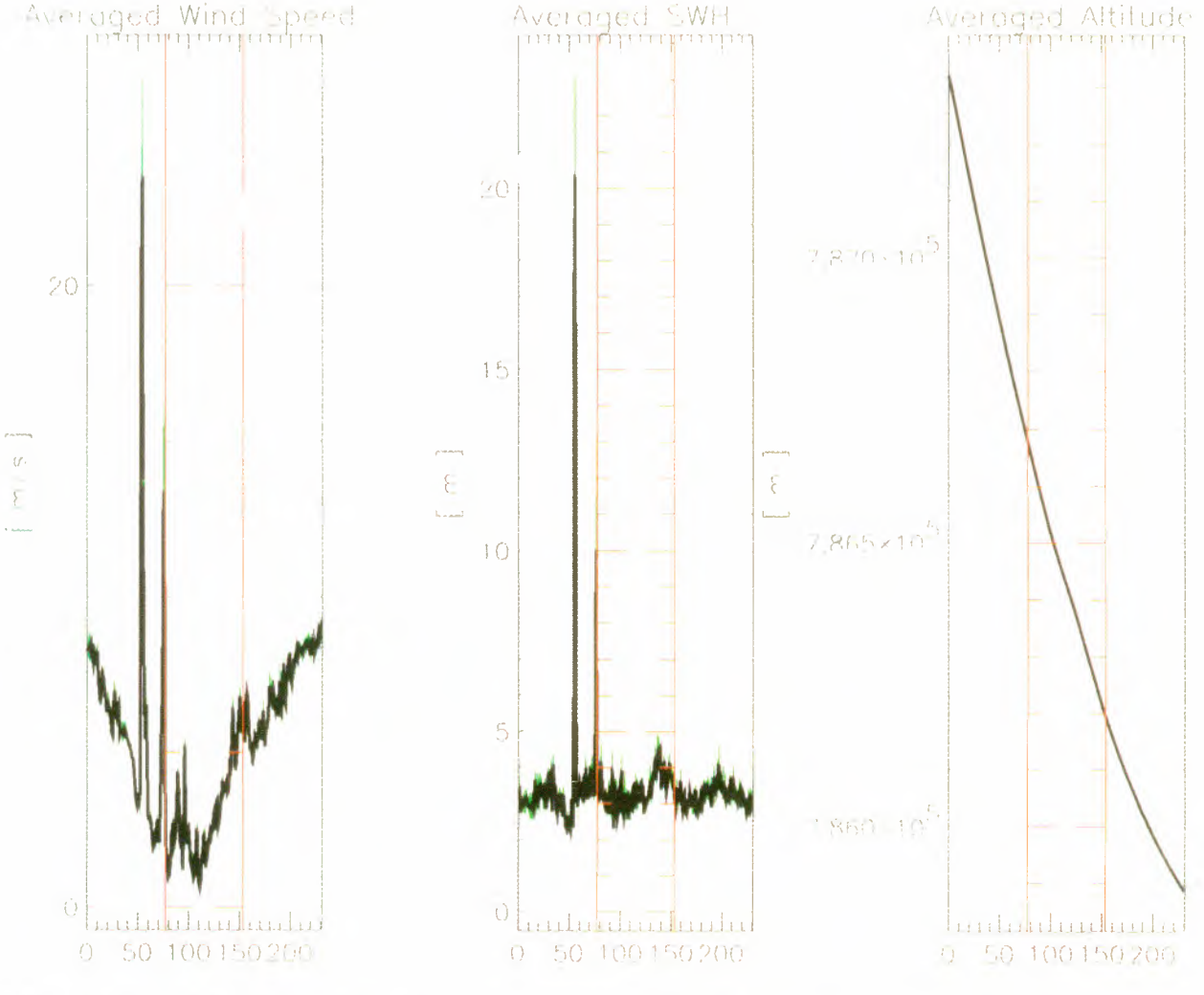

Figure 2.8. Altimeter Fast Delivery product with 3 of 16 parameters displayed: wind speed, significant wave height and altitude of the satellite. Three along-track segments of the product are shown from about 25° North, 135° East, spanning 231 seconds of flight. The data was acquired by Gatineau on 9 August 1993 at 01:10:09.906 UTC and processed for Fast Delivery distribution.

2.18 Quick-Look Ocean Product Records (ERS.ALT.QLOPR)

Global product giving satellite altitude, significant wave height at nadir, geoid height, atmospheric corrections from meteorological data and ocean and Earth tide corrections. This product is an upgrading of the Fast Delivery altimeter product ERS.ALT.URA.

Product characteristics

Product area	Global (ERS coverage)
Total product volume	~7 Mbytes

Product standard medium

Electronic access to daily files on the ERS Server.

2.19 Quick-Look Sea Surface Height (ERS.ALT.SSHQL)

Global set of sea-surface height point values relative to a reference ellipsoid computed from ERS.ALT.URA products. Data appears on a regular equiangular grid 15' x 15'.

Product characteristics

Product area	Global (ERS coverage)
Total product volume	30 Mbytes

Product delivery

Global data set: annual or cyclical.

Product standard medium

CCT
Plots

2.20 Sea Surface Height (ERS.ALT.SSH)

Global set of sea-surface height point values relative to a reference ellipsoid on a regular equiangular grid. Provides an estimate of long-period sea surface height.

Product characteristics

Product area	Global (ERS coverage)
Total product volume	79 Mbytes

Product delivery

Global data set: monthly, cyclical or ESA-defined periods.

Product standard medium

CCT
Plots

Product Example – ERS.ALT.SSHQL (Plot)

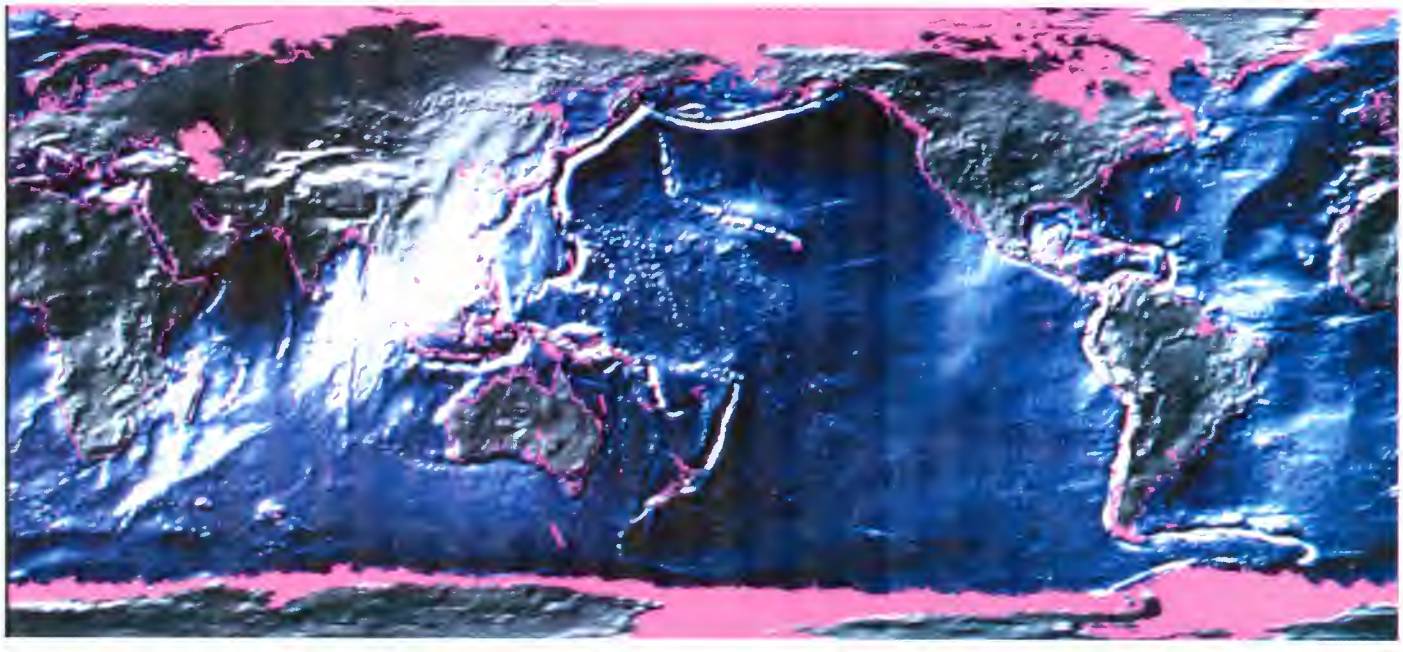

Figure 2.9. A plot of the Quick Look Sea Surface Height product for the 35-day cycle covering the period 27 April 1992 to 1 June 1992.

Product Example – ERS.ALT.SSH (Plot)

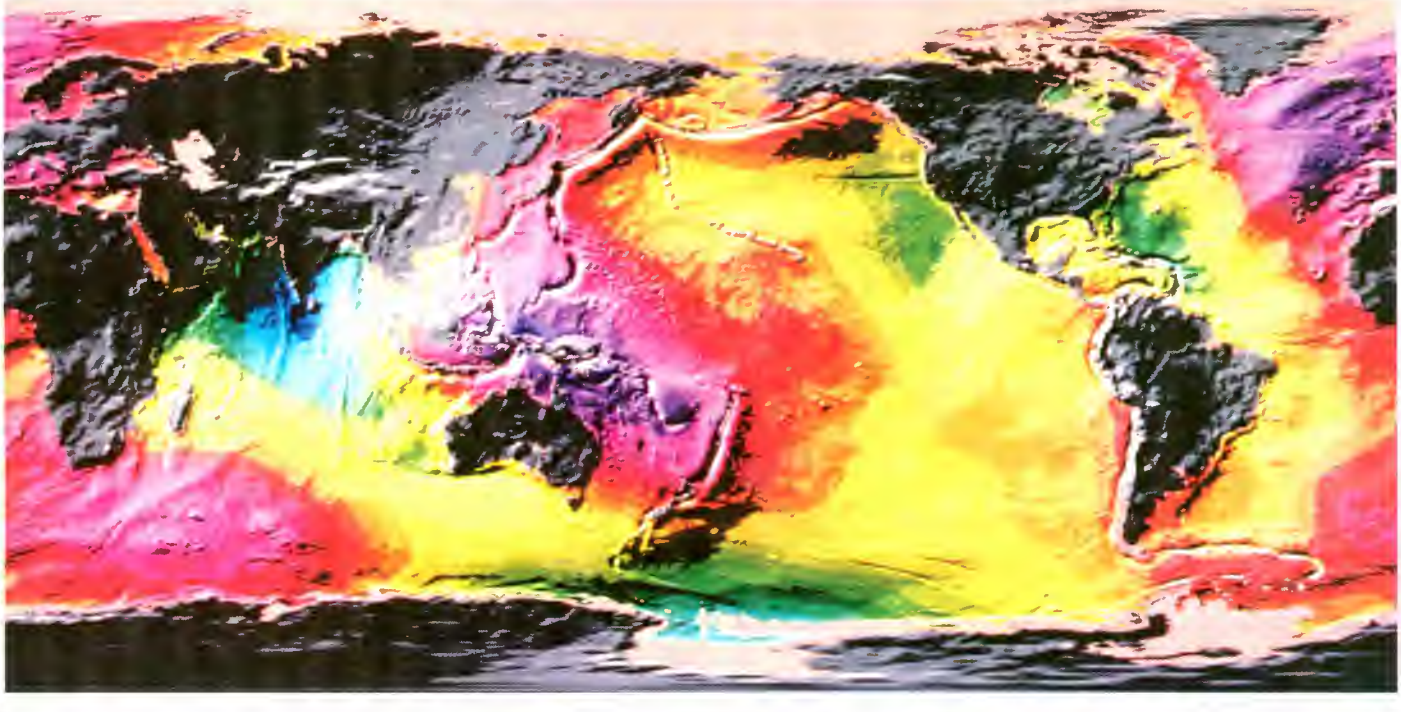

Figure 2.10. A sea surface stationary height model plotted with coloured isocontours. The ERS.ALT.SSH product is derived from the ERS.ALT.OPR02.

2.21 Sea Surface Topography (ERS.ALT.TOP)

Normalised surface spherical harmonic series providing a large-scale estimate of the structural deviations between the geoid and the mean sea surface.

Product characteristics

Product area	Global (ERS coverage)
Total product volume	~200 kbytes

Product delivery

Global data set; ESA-defined periods.

Product standard medium

CCT
Plots

2.22 Oceanic Geoid (ERS.ALT.OGE)

Point values of geoid heights above the reference ellipsoid for the nodes of a regular equiangular 30' x 30' Earth-fixed grid.

Product characteristics

Product area	Global (ERS coverage)
Total product volume	3 Mbytes

Product delivery

Global data set; ESA-defined periods.

Product standard medium

CCT
Plots

Product Example – ERS.ALT.TOP (Plot)

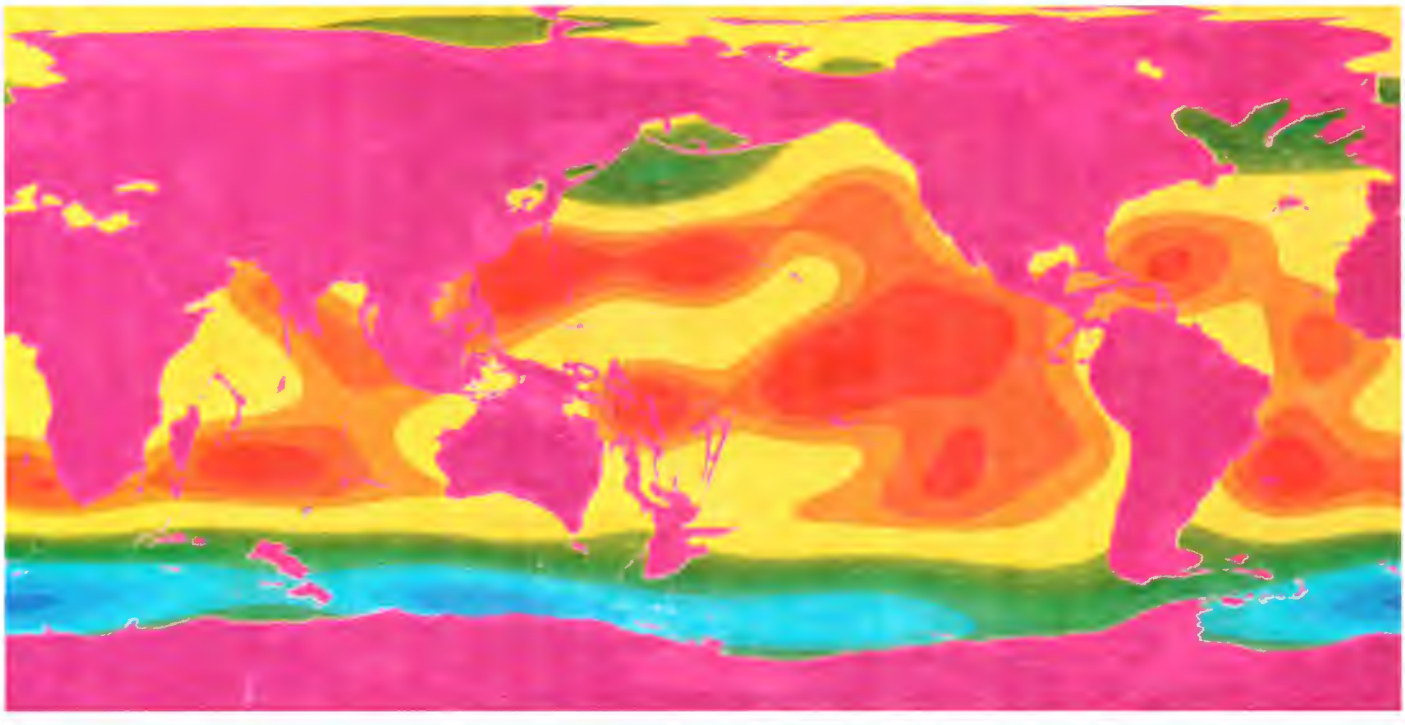

Figure 2.11. Sea surface topography derived from 9 months of ERS-1 Fast Delivery data for the period 15 April 1992 to 15 January 1993. The coloured isocontours represent the range from -1.5 m (blue) to 1.2 m (red). Large-scale ocean currents can be estimated from the differences between a mean sea surface and a satellite-only gravity field solution.

Product Example – ERS.ALT.OGE (Plot)

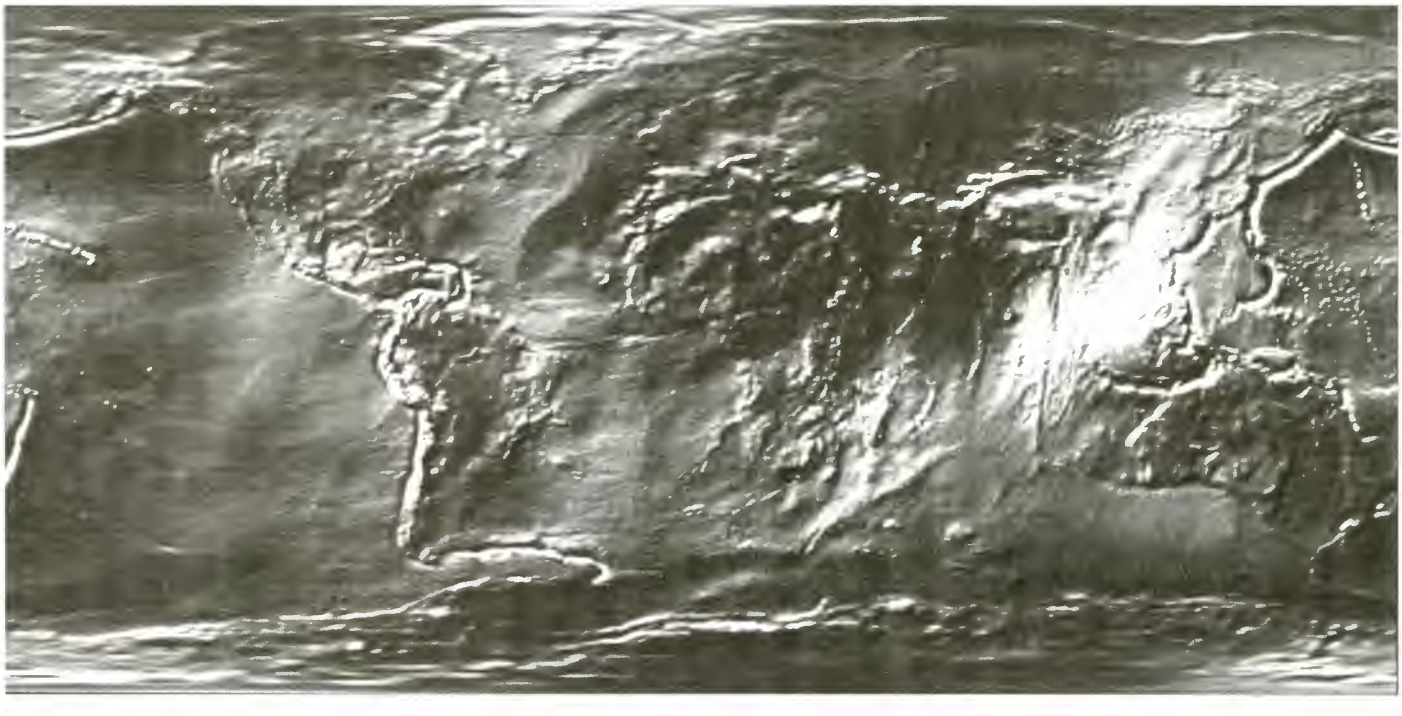

Figure 2.12. The geoid model from ERS-1 Fast Delivery data for the period 15 April 1992 to 15 January 1993. The long-wavelength structure of the geoid is derived from the satellite orbit perturbations, while small-scale features (ca. 50 km) are obtained by the combination of a high-resolution mean sea surface and terrestrial gravity data.

2.23 Brightness Temperature Image (ERS.ATS.IBT)

Three brightness temperature images and one reflectance image for the four channels of the ATSR infra-red radiometer. Both forward and nadir views are presented. The two views are geographically co-located relative to an Earth Reference Grid.

Product characteristics (provisional)

Pixel size	1 x 1 km
Scene area	512 x 512 km
Calibration accuracy	better than 0.1K (brightness)
Product annotations	lat/long pairs for all image grid points
Product location accuracy	better than 500 m
Product volume	5 Mbytes

Product standard medium

CCT
E2

2.24 Sea Surface Temperature Image (ERS.ATS.SST)

A sea-surface temperature image produced by the combination of forward and nadir views of the ATSR infra-red radiometer. Images are 512 x 512 km, with a 12 km overlap between consecutive images.

Product characteristics (provisional)

Pixel size	1 x 1 km
Scene area	512 x 512 km
Product accuracy	better than 0.5K
Product annotations	lat/long pairs for all image grid points
Product location accuracy	better than 500 m
Product volume	~ 1 Mbytes

Product standard medium

CCT
E2

2.25 Average Sea Surface Temperature Product (ERS.ATS.PST)

Global average sea surface temperature product giving sea-surface temperatures in 630 equiangular cells of 30' x 30'.

Product characteristics (provisional)

Grid cell size	30' x 30' of arc
Product area	global
Product accuracy	better than 0.5K
Product annotations	lat/long pairs for all grid points
Product location accuracy	0.5 km
Product volume	100 kbytes

Product standard medium

CCT
E2

Product Example – ERS.ATS.PST (visualisation of digital product)

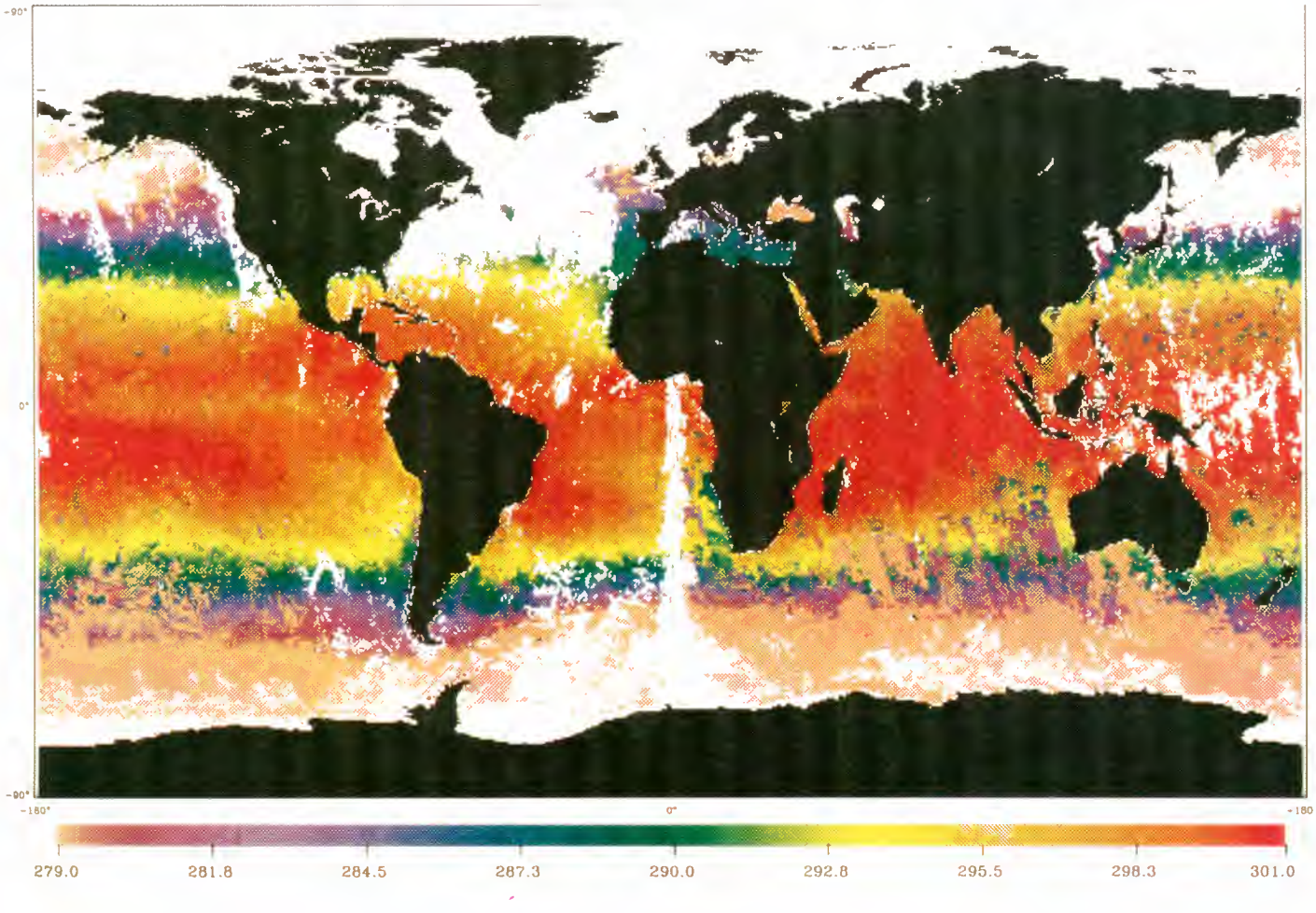

Figure 2.13. Along Track Scanning Radiometer product of spatially averaged sea-surface temperatures from one entire month/cycle.

2.26 Preliminary Orbit (ERS.ORB.PRL)

Satellite position and velocity vectors every two minutes derived from Quick-Look Laser and Altimeter fast delivery ranges.

Product characteristics

Product area	Global (ERS coverage)
Product sizing	Seven days arc
Total product volume	1.3 Mbytes/week

Product delivery

Global data set; monthly.

Product standard medium

CCT

2.27 Precise Orbit (ERS.ORB.PRC)

Satellite ephemeris position and velocity vectors every 30 seconds, derived from full rate laser tracking data.

Product characteristics

Product area	Global (ERS coverage)
Product sizing	1 month (nominally 5 to 7-day subarcs)
Total product volume	22.5 Mbytes/month

Product standard medium

CCT

2.28 ERS-1 Gravity Model (ERS.ORB.EGM)

ERS-1 gravity model provided as a set of fully normalised harmonic coefficients.

Product characteristics

Product area	Global (ERS coverage)
Total product volume	0.25 Mbytes

Product delivery

Global data set: monthly or ESA-defined periods.

Product standard medium

CCT
Plots

Product Example – ERS.ORB.EGM (Plot)

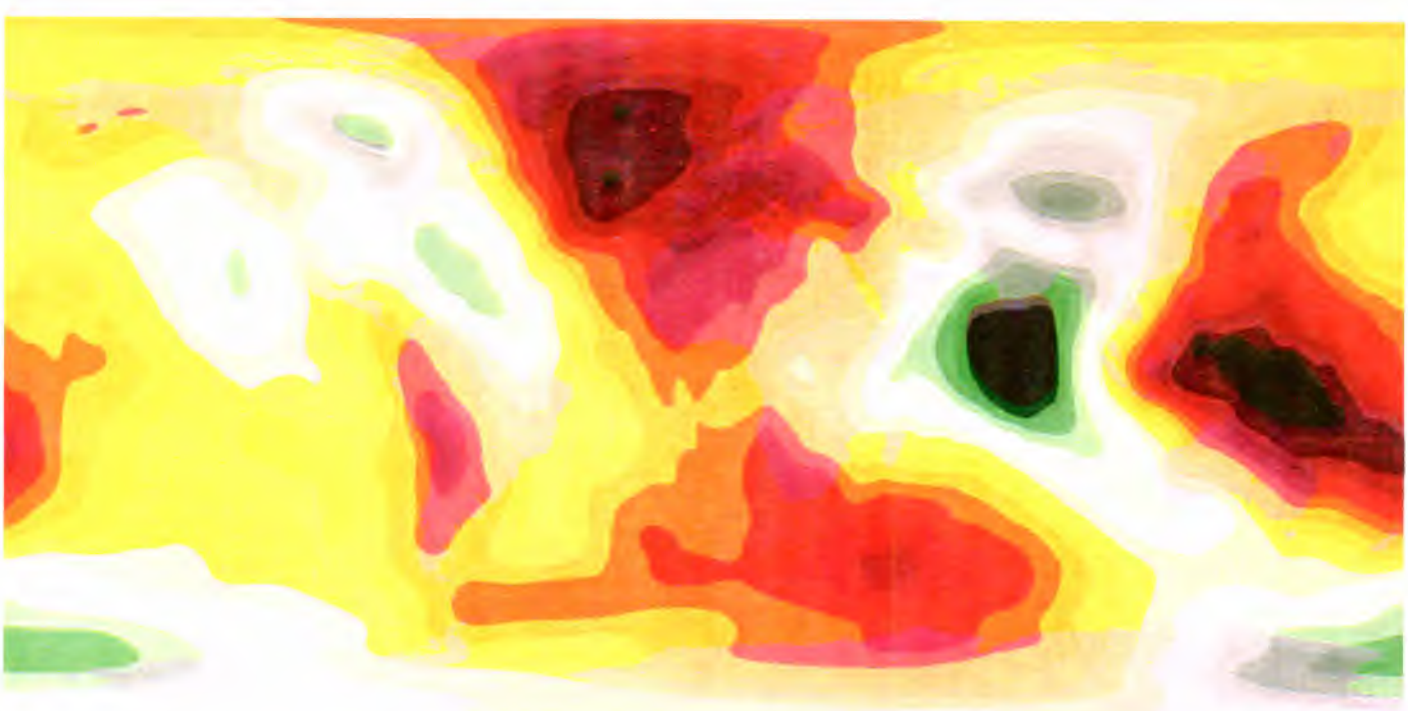

Figure 2.14. The ERS-1 gravitational equipotential model showing with coloured isocontours the range -105 m (blue) to 85 m (red). The gravitational geopotential produces the principal acceleration on the Earth. A precise orbit restitution applying dynamic methods therefore requires a precise model of the geopotential, with resolution requirements depending on the satellite's altitude.

3. THE ERS SERVICES

3. THE ERS SERVICES

3.1 Introduction

The ERS Help Desk (described below) and the ERS Order Desks (described in Chapter 4) are your contact points when you require ERS products, or information on the ERS missions. Very often they also act as the interface between you and the ERS services currently available. These services include:

- Central User Service (CUS)
- ERS Server
- Display ERS-1 SAR Coverage software (DESC)
- ERS-1 SAR Low Resolution Images (UILR) and Display ERS-1 Low Resolution Image software (DELI)
- Quick-Look Ocean Product Records (ALT.QLOPR)
- Documentation.

3.1.1 Central User Service (CUS)

The Central User Service (CUS) is the central management tool of the ERS system. It contains the Catalogue of all ERS SAR acquisitions and products, mission planning information, and your requirements for planning and production. These facilities are described in more detail in Section 3.3.

3.1.2 The ERS Server

The ERS Server is a self-service facility which enables you to download any item of interest to your own system. At present the Server offers the DESC software and the latest download of DESC files, the UILR images and the DELI software to display them, and the Quick Look Ocean Product Records (ERS.ALT.QLOPR).

3.1.3 Display ERS-1 SAR Coverage Software (DESC)

A PC software tool developed by the ERS User Services, DESC displays past and future ERS-1 SAR coverage over an Earth map. You can define your area of interest in time and space, limiting your search to specific mission phases or types of products. You can also use other parameters such as track or frame number to constrain the search. You can display the Earth map in either a Polar or a Mercator projection. DESC also allows you to prepare in advance an inventory file detailing specific frames for display on the world map. The software package is available on diskette and can also be downloaded from the ERS Server which always offers the latest version of the DESC data files.

3.1.4 ERS-1 SAR Low Resolution Images (SAR.UILR) and Display ERS-1 Low Resolution Image Software (DELI)

The SAR.UILR images are generated at the Kiruna ground station by compressing SAR.UI16 fast delivery images. They are broadcast shortly after acquisition, via the Broadband Data Dissemination Network (BDDN). All SAR.UILR images are received at ESRIN, where they are loaded onto the ERS Server. The ERS Server also contains the DELI software which offers display and zoom functions in order to study the SAR.UILR images in more detail. The 'UILR' subdirectory containing the images is updated regularly. Currently SAR.UILR images are kept on-line for several weeks.

3.1.5 Quick Look Ocean Product Records (ERS.ALT.QLOPR)

The German Processing and Archiving Facility (D-PAF) receives the Altimeter Fast Delivery products (ERS.ALT.URA). An improved product is made by merging them with recomputed satellite altitude data, path delay data and altimeter bias estimates; tidal corrections are also applied. Daily files are created, and delivered to ESRIN approximately one month after acquisition. To date more than one year of data is available on the ERS Server as a chronological sequence of files, beginning at the start of Phase C in April 1992.

3.1.6 Documentation and Information Materials

Much documentation and other items about the ERS missions are made available to you. This includes material providing general information, such as the ERS-1 System document, the CD Guide to ERS-1, and the ERS-1 SAR Reference Coverage CD, as well as more technical documentation, e.g. computer compatible tape formats of specific products. A list of these items can be found in Appendix D.

3.2 Points of Contact – ERS Help Desk and ERS Consortium

The ERS Help Desk at ESRIN (Frascati) and the members of the ERS Consortium, the Official Distributor appointed by ESA, are your points of contact for general and specific information. By providing help, they aim to give you a better understanding of the ERS missions from both the technical and applications perspectives. This support is available both before and after ordering a product. Information and advice is available on the satellites and mission objectives, on satellite acquisitions, and on services and products, including the distribution of relevant documentation and software. They also deal with all complaints.

As a specific service to those Users who have asked to be included on the mailing list, the ERS Help Desk regularly issues the ERS User Sheets. These keep you informed about the latest developments that occur in the ERS missions, and are distributed via electronic mail or traditional post. Details of product ordering are described in Chapter 4.

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C=it;ADMD=master400;PRMD=esa;O=esrin400;OU=ersus;S=helpdesk

OMNET/NASAMAIL
C:italy.ADMD:master400.PRMD:esa,O:esrin400,OU:ERSUS.S:helpdesk

INTERNET
helpdesk@ersus.esrin400.esrin.esa.it

SPAN
esagw::mrgate::"fpx_mbx::1=it::2=master400::3=esa::4=ersus::5=esrin400::6=helpdesk"

EARN/BITNET
helpdesk%ersus.esrin400.esa.it@interbit.bitnet

For details of ERS Consortium contact points see Chapter 4.

3.3 Central User Service (CUS)

The CUS is the management system for the ERS-1 Ground Segment. It is an integrated system including the Catalogue, and various functions for mission planning, acquisition scheduling and production planning and monitoring. In performing this role it interfaces with "External" and "Internal" Users. External Users are authorised members of the world-wide user community, who can access the CUS to query the Catalogue, to submit User Requests and to gain access to mission planning information. Internal Users include the ERS Consortium and ESA Order Desks, the Production Planner and Mission Planner.

CUS also interfaces with the Mission Management and Control Centre (MMCC), mainly for the exchange of mission planning information. The CUS uses information from User Requests and baseline planning to formulate a Preferred Exploitation Plan (PEP). The PEP is submitted regularly, and is used by the MMCC to generate the Detailed Mission Operation Plan (DMOP). This is returned to the CUS to keep the two facilities coordinated. The MMCC also sends special DMOPs whenever acquisition plans could not be carried out as foreseen.

An interface with the ground stations allows CUS to schedule and monitor the acquisition of the data from the satellite, as well as the processing and distribution of Fast Delivery products. The CUS receives reports about the execution of scheduled operations, shipment of data, and ground station availability.

The CUS interface to the PAFs is for off-line product ordering. The PAFs send archiving reports which update the Catalogue. In turn the CUS uses the information in the Catalogue to control the shipment of raw data from ground stations to PAFs, and to send product orders to the PAFs to satisfy your requests for products. Reports from the PAFs on production status keep the CUS, and hence you, informed of the progress of product orders.

3.3.1 User Interface Description

When accessing the ERS Central User Service you can interact with three types of text-based screens:

- Menu screens, consisting of an option list and an input field to select an option
- Query/Summary screens, providing one or two query areas to enter the query parameters, a summary display area for the retrieved information, and a menu area to perform a selected function
- Detail screens, which are generally accessed via the Query/Summary screen and consist of a detail display area and a menu area.

All interactive screens provide a title area and message area for easy identification and the display of error messages.

The CUS system uses standard Oracle keys. A list of function keys is given at the end of this chapter. The <HELP> key is a most useful item that enables you to display messages about the current field when pressed once, or about the current form or menu when pressed twice.

The first screen to be displayed upon successful entry into the system (see Appendix F) is a main menu from the Interface Subsystem (ISS). This will present you with the following options:

1 - Central User Service Applications
2 - Complementary Applications
3 - DDN Value Added Services
4 - System Information
5 - File Transfer N/A

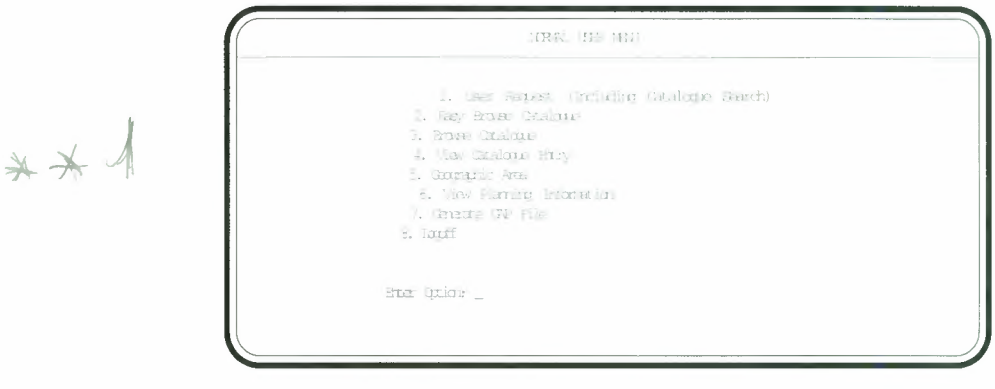
Option 1 accesses the Central User Service. Option 2 links to several applications, including the Global Products Catalogue. Option 3 enters the DDN Value Added Services where an X.400-based electronic mailbox service, an X.500 directory service and file transfer facilities are available to authorised Users. Option 5 (File Transfer) is not applicable to most "Normal Users". Caution is required when using these options, as it is possible to inadvertently generate large files or activate unnecessarily large database searches.

You enter the CUS via Option 1. The next screen is the CUS Normal User Menu.

3.3.1.1 Normal User Menu

You, the "Normal User", can carry out any of the functions appearing on the Normal User Menu.

Figure 3.1. Normal User Menu



(1) User Request (Including Catalogue Search)

The User Request is the formal item in the CUS describing a User's order. This first menu option allows you to create a User Request for SAR data acquisitions and products and submit it to the Order Desk for processing. Alternatively, the User Request can be formulated by the Order Desk on your behalf on the basis of correspondence received from you (e.g. letters, faxes or e-mail explaining the requirement). More information on how to compose a User Request, and a description of the control and monitoring functions available are given in Section 4.5.

(2) Easy Browse Catalogue

This option displays the Easy Catalogue Query/Summary Form, which is a simplified version of the Catalogue Query/Summary Form (Normal User Menu option '3. Browse Catalogue').

Easy Catalogue Query/Summary Form

This form allows you to search the Catalogue using a reduced set of query parameters. In the query area, you can specify the following fields in order to query the Catalogue:

- Satellite
- Sensor
- Acquisition Date Range
- Product Type
- Area.

You may perform queries for any or all of the available satellites. The default satellite identifier is E1 (ERS-1), which can currently be changed to J1 (JERS-1). However, if you change the satellite identifier to blanks, the query will be performed on the data for all available satellites, currently ERS-1 and JERS-1.

You define a query area by entering up to eight vertices. At least three must be entered to define a valid polygon.

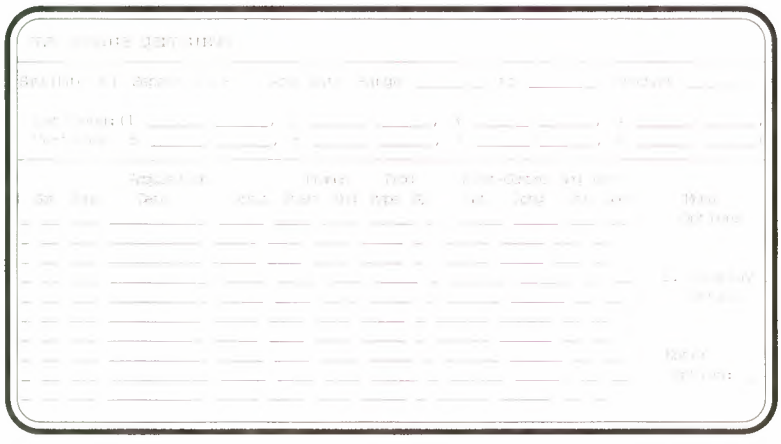


Figure 3.2. Easy Catalogue Query/Summary Form.

The results of a Catalogue search appear in the summary area. Here the line selection is automatic. The selected line is marked with an asterisk (*), and moving the cursor allows different lines to be selected, one at a time. The menu area provides an option to display the details of the frame in the summary area which is currently selected.

(3) Browse Catalogue

The Browse Catalogue menu option accesses the Catalogue Query/Summary Form, which allows you to query the Catalogue using the full range of search parameters.

Catalogue Query/Summary Form

In preparing the search details in the query area, a geographic area must be defined. If you enter a geographic name, the system first searches the Private Geographical Area Name database specific to your account to locate the name. If no match is found then the Global Geographic Area Name database is searched. The menu area allows you to edit the geographical area in the Catalogue Query Geographic Area Form.

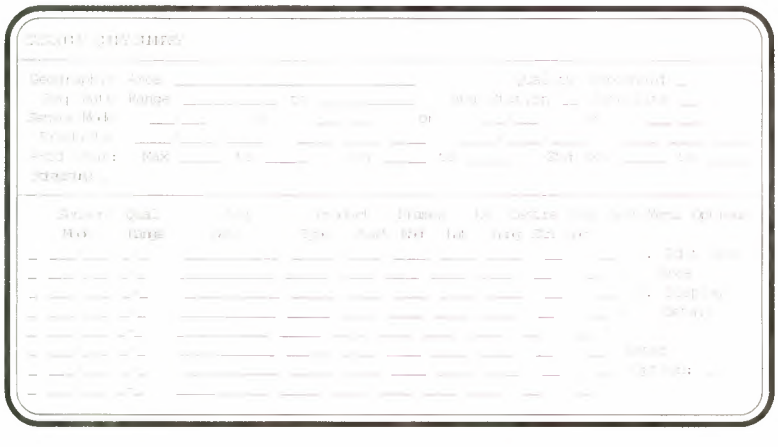


Figure 3.3. Catalogue Query/Summary Form.

The results of the query are displayed in the summary area of the form.

The menu area provides you with options to edit the geographic area coordinates for this query, and to display frames individually from the list in the summary area (Processed Catalogue Entry Detail Form or Unprocessed Catalogue Entry Detail Form).

Catalogue Query Geographic Area Form

This form allows you to create, edit, and view geographic area information associated with the Catalogue Query/Summary Form.

If the geographic area name specified in the Catalogue Query/Summary Form is found in the Private or Global Area Name database, the form appears with the area type and details displayed . If the name is not found, or no name is entered, a new query area must be defined starting with the area type ('P' for polygon or 'C' for circle must be entered).

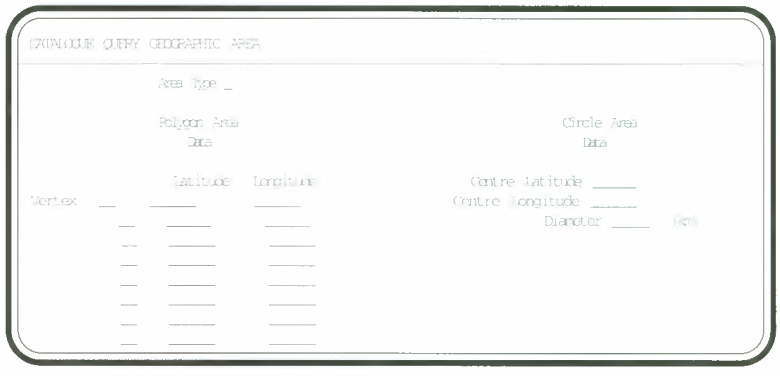


Figure 3.4. Catalogue Query Geographic Area Form.

You must enter the complete specification of an area. For a polygon, a minimum of three vertices must be specified, progressing in a clockwise direction, with latitude and longitude in degrees and minutes. For a circle, the centre latitude and longitude and the diameter in kilometres must be specified.

When creating or editing polygons, you can add new vertices by pressing the [Next Field] key, which will automatically number the vertex. You add a vertex between two existing vertices using the [Insert Record] key (which only functions in this section of the form). You can delete vertices using the [Delete Record] key. Note that you cannot use [Next Record] and [Previous Record] to navigate between vertices. To start again or to change the geographic area press [Clear Block].

Take particular care when creating polygonal areas enclosing the pole, as additional points need to be added in order to clarify which pole is to be defined. One way to do this is to take the last vertex and add four pole points starting at the same longitude (the pole points should be equally spaced at 120° longitude intervals), then duplicate the last vertex point. Note that the order of the pole points is dependent on the order of the vertices. For example, the area defined by (40:00, 10:00), (50:00, 145:00), and (30:00, 220:00) would need the following additional points to enclose the north pole: (90:00, 220:00), (90:00, 100:00), (90:00, 340:00), (90:00, 220:00) and (30:00, 220:00).

Following a query, the second option in the menu area allows you to display the details of either unprocessed (i.e. raw data) or processed (i.e. product) Catalogue entries.

Processed Catalogue Entry Detail Form

This form allows you to view the processed Catalogue entries. These are standard ERS SAR product frames processed from unprocessed data. There are two routes to this form:

- execute a query from the Catalogue Query/Summary Form
- execute a specific query for one frame from the View Catalogue Entry Form.

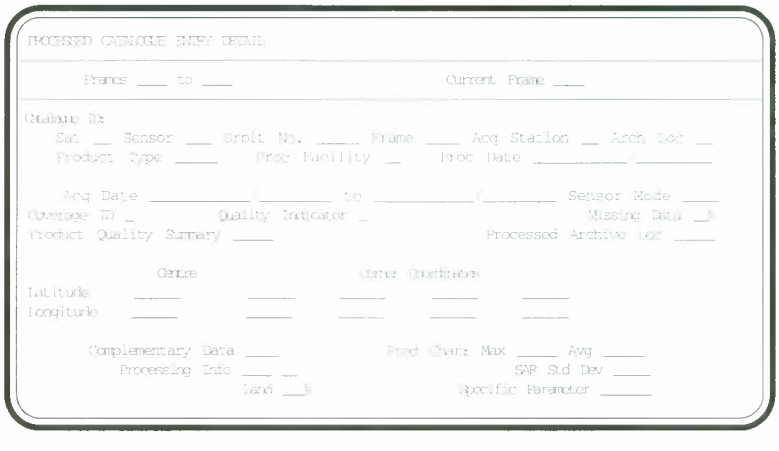


Figure 3.5. Processed Catalogue Entry Detail Form.

For a general query, you can access all the frames from the selected series on the Catalogue Query/Summary Form. You can scroll through the frames using the [Next Record] and [Previous Record] keys.

You can also enter a specific frame number, the details of which will appear automatically when either the [Next Field] or [Previous Field] keys are pressed. For all products, the frame number increases sequentially from the ascending node (i.e. satellite northbound equator crossing). For SAR products the frame number increments by 18 for adjacent frames. The frame number of the first SAR frame in an orbit is 9, the second 27, and so on.

Unprocessed Catalogue Entry Detail Form
This form allows you to view the unprocessed Catalogue entries. These are raw data received from the satellite and held on a recording medium. There are two routes to this form:

- execute a query from the Catalogue Query/Summary Form.
- execute a specific query for one frame from the View Catalogue Entry Form.

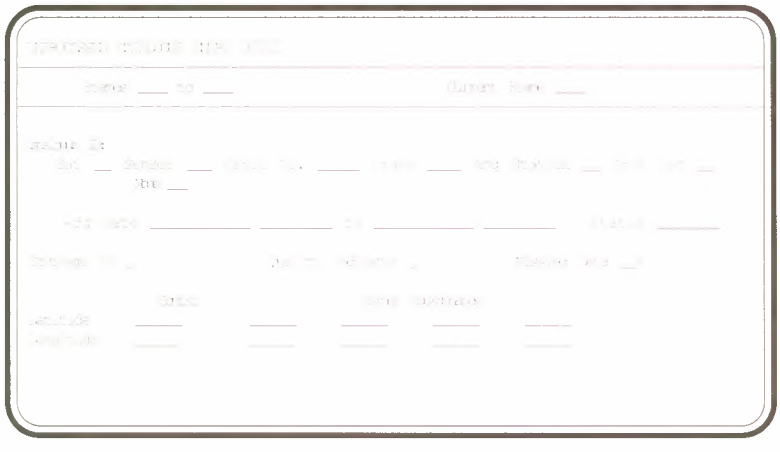


Figure 3.6. Unprocessed Catalogue Entry Detail Form.

For a general query, you can access all the frames from the selected series on the Catalogue Query/Summary Form. You can scroll through the frames using the [Next Record] and [Previous Record] keys.

You can also enter a specific frame number, the details of which will appear automatically when either the [Next Field] or [Previous Field] keys are pressed. For all products, the frame number increases sequentially from the ascending node (i.e. satellite northbound equator crossing). For SAR products the frame number increments by 18 for adjacent frames. The frame number of the first SAR frame in an orbit is 9, the second 27, and so on.

(4) View Catalogue Entry
This menu option allows you to see the details of specific frames in the catalogue by defining the requirement on the View Catalogue Entry Form.

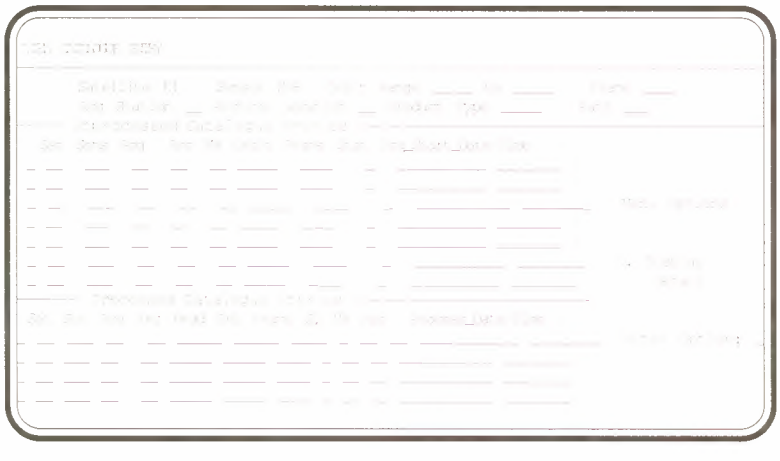


Figure 3.7. View Catalogue Entry Form

To view the details of an unprocessed frame, you must enter the satellite identifier, sensor, mission orbit number or path, frame number, acquisition station and unprocessed archive location. For a processed frame, you must enter all of the above, plus product type, processing facility and processing date/time.

Following the query, the resulting frame is displayed in either a Processed or Unprocessed Catalogue Entry Detail Form.

(5) Geographic Area

This option accesses the Geographic Area Query/Summary Form, allowing you to query for Private Geographic Area and Global Geographic Area Names in the Geographical Area Query/Summary Form.

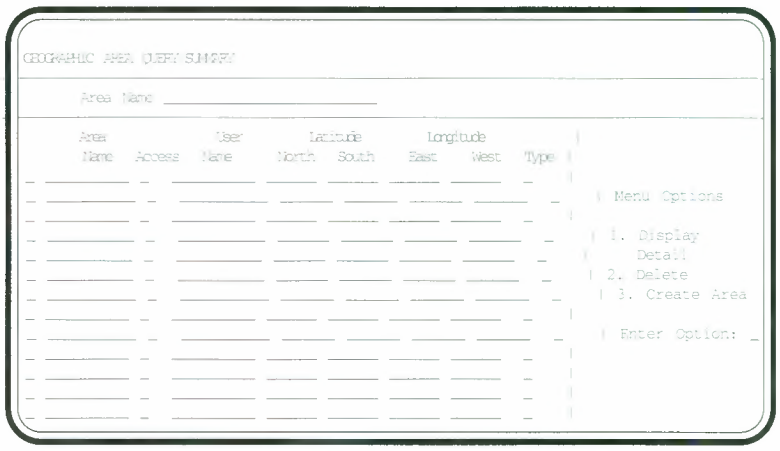


Figure 3.8. Geographic Area Query/Summary Form

You can specify in the query area an area name or format (e.g. MED or M%) as an optional query condition. The resulting areas from the query are ordered by access (private areas first), type (polygons first), and then area name.

The arrow keys scroll the area and User name fields in the summary area. To further specify the query conditions press the [Enter Query] key and specify an area type of P for polygon or C for circle. Press the [Execute Query] key to display the new list in the summary area.

Select Private Geographic Areas for subsequent action using the [Duplicate Record] key. This key is also used for de-selection.

The menu area provides options to display details and create and delete geographic areas. Several geographic areas can be selected for display, but only one can be selected for use as a template when creating a new geographic area. Creation can also be performed without using a template.

One or more geographic areas can be selected for deletion. You will be prompted to confirm the deletion after the menu option is entered. You can delete only Private Geographic Areas.

(6) View Planning Information

When you select the View Planning Information option, planning information stored in the Global Activity Plan (GAP) is displayed, showing the following activities, ordered by mission orbit number and activity type:

- sensor activities
- on-board recorder activities
- data link activities
- manoeuvre activities.

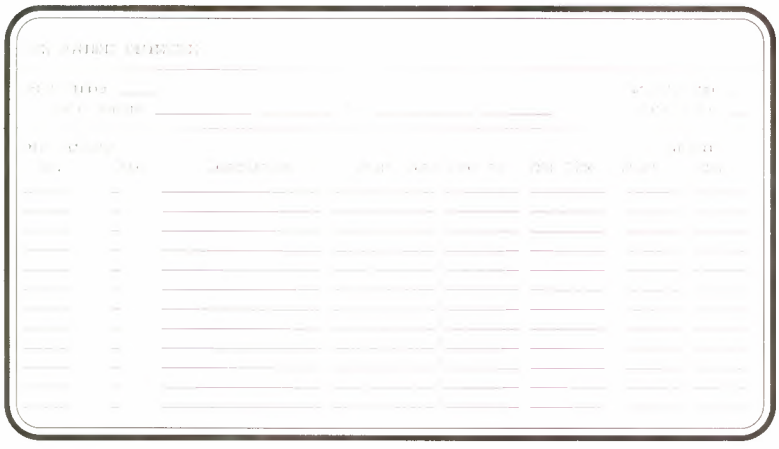


Figure 3.9. View Planning Information Form

In the query area, you can specify the mission orbit number, a start date range, the activity type, and the satellite identifier as query conditions. Either the orbit number or the date range are mandatory. If you enter a mission orbit number, the date range will be calculated and displayed on the form. If you enter a date directly, the range will default to a single day (e.g. 01-JAN-1993/00:00:00 to 01-JAN-1993/23:59:59) in order to query a manag number of records. The date range must fall within a single satellite mission phase. the [Execute Query] key in the query area for the resulting satellite activity list. Th Long coordinates correspond to the nadir of the satellite.

The mission orbit number is the only accessible field in this area and allows you to s through the records displayed.

(7) Generate GAP File Menu Option

The Generate GAP File Form allows you to generate GAP files of your choice based up the input date range and satellite. The GAP file is an ASCII file containing informati on the satellite and its planned activities which is transferred to you to be used as input to, for example, a graphical software package.

You must enter the date range and satellite before selecting the type of GAP file for generation. Two families of GAP file can be generated: SAR files and LBR files. The SAR file contains the SAR sensor and manoeuvre activities while the LBR file contains LBR sensor activities, all on-board data recorder activities, manoeuvre activities, and data link activity orders. The GAP files generated are sent to your telecommunication subsystem with a destination ID pre-defined by you. In the GAP file the Lat-Long values correspond to the mid-swath coordinates.

You cannot use this option without special authorisation. This can be sought through the relevant Order Desk or the ERS Help Desk.

(8) Logoff

This will terminate your session on CUS.

3.3.2 Numeric Conventions

The following conventions for units and formats are used for numeric values in the forms described above:

- dates & time — Universal Coordinated Time (UTC)
  dd-mmm-yyyy (e.g. 01-APR-1993), hh:mm:ss (e.g. 12:03:15)
- latitude — range ± 90°00' — format ±DD:MM (e.g. +90:00)
- longitude — range 0°00' to 360°00' — format DDD:MM (e.g. 360:00).

3.3.3 Example Catalogue Search

The procedure for carrying out a specific catalogue search (the availability of SAR images for a particular area of Peru) are outlined below. The example is intended to help you access the Catalogue for the first time for a simple search, in order to become familiar with

the basic operations. The previous sections in this chapter outline the function of the various forms which you will meet. Section 3.3.4 on key functions may also be useful.

First, log-on to the EECF CUS system, following one of the procedures outlined in Appendix F. Access the Catalogue by choosing option '1. Central User Service Applications' from the Main Menu which is displayed on entry to the system, and option '3. Browse Catalogue' from the CUS Normal User Menu.

The first form displayed is the Catalogue Query/Summary Form (see Figure 3.3). This Form allows you to define a set of query parameters.

> In this particular case the only query parameter to be input in the Query Area of the form (top block) is 'SAR' in the Sensor field (to move through the fields press Return).
> You want to see all available data so enter no date range.

To define the geographical area of interest you need to move to another form.

> Move to the Menu Area (bottom right hand block) of the current form by pressing the <NEXT SCREEN> key twice.
> In the Menu Area choose option '1. Edit Geo Area'.

The Catalogue Query Geographic Area Form is displayed (see Figure 3.4).

> Enter an area type 'C' for circle and move to the Circle Area Data fields.
> In these fields enter '-5:30' for Centre Latitude, '280' (appears as '280:00' after pressing Return) for Centre Longitude and '100' for Diameter.
> Press PF4 and then any other key (e.g. space bar) to return to the previous screen.

The cursor is still in the Menu Area of the form.

> To return to the Query Area press the <PREVIOUS SCREEN> key twice.
> Once the cursor is back in the Query Area press the <FIND> key.

The system searches for acquisition and product frames which satisfy the query parameters.

> When prompted, press any key (e.g. space bar), and again when the 'Querying complete' message appears at the bottom of the screen.

The data satisfying the query parameters are displayed in the Summary Area (bottom left block). In this case twenty three records are retrieved (press <COUNT QUERY HITS>) ranging from 17 April 1992 to 27 June 1993. Information which the User can see displayed includes, for the first record:

- Sensor: SAR
- Acquisition date: 19-MAY-1992
- Frames start and end: 3717 and 3735 (by this you know that two frames are available since adjacent frame numbers differ by 18)
- Acquisition station: CU (Cuiaba, Brazil)
- Archive location: DP (German PAF).

And for the second record:

- Sensor: SAR
- Acquisition date: 23-JUN-1992
- Frames start and end: 3717 and 3735 (i.e. two frames are available)
- Acquisition station: CU (Cuiaba, Brazil)
- Archive location: DP (German PAF).

You should be aware that while these twenty three records satisfied the query in late August 1993, the Catalogue is constantly updated. Therefore, the same search performed at a future date is likely to provide different results.

In order to obtain more information about frames you need to select the record and move to another form. The first record is already selected (the asterisk on the left is against this entry).

> Move to the Menu Area of the current form by pressing the <NEXT SCREEN> key.
> In the Menu Area select option '2. Display Detail'.

The data has been archived, but remains as yet unprocessed, so the Unprocessed Catalogue Entry Detail Form is displayed (see Figure 3.6). From this form you can obtain information such as exact frame coordinates, acquisition time, orbit number, status (planned, acquired or archived) and quality.

> Press the <PF4> key to return to the previous form.
> Press the <PREVIOUS SCREEN> key to return to the Summary Area of the form. Then move back to the Menu Area of the form by pressing the <NEXT SCREEN> key.
> In the Menu Area select option '2. Display Detail'.

The Unprocessed Catalogue Entry Detail Form is displayed. The details for each frame are displayed on a separate form: at the top-right of the first form the current frame is identified: 3717. Other information given includes:

- Orbit number: 4407
- Acquisition date: 19-MAY-1992/15:32:43 to 19-MAY-1992/15:32:58 (i.e. the length of a SAR frame is 15 seconds)
- Centre Latitude: - 05:30
- Centre Longitude: 280:26
- Quality Indicator: 5 ('0' indicates perfect quality, decreasing to a minimum quality indicated by '9').

> In order to obtain information about the second frame press the <DOWN ARROW> key.

This time the current frame identified at the top of the form is 3735. Other information given includes:

- Orbit number: 4407
- Acquisition date: 19-MAY-1992/15:32:58 to 19-MAY-1992/15:33:13
- Centre Latitude: - 06:23
- Centre Longitude: 280:31
- Quality Indicator: 0.

> Having completed the catalogue search press PF4 to return to the previous form and once again to return to the Main Menu.

You can use the information from the catalogue search when ordering ERS products.

3.3.4 EECF CUS Key Functions

The CUS system uses standard Oracle keys. The functions given below are for VT-200 terminals. The keys are listed by function and physical key allocation, e.g. Help (function), <HELP> (physical key allocation).

General Keys

Help <HELP>

When pressed once, displays a help message about the current field. When pressed again, displays a full page of help about the current form or menu. Available for every enterable field on an alphanumeric form or menu.

Delete Character <DELETE CHARACTER>

Deletes the character to the left of the cursor. Available for all forms and menus.

Exit Form *<PF4> or <CTRL-%>*
Returns control to the previous form in the form/menu hierarchy. Available for all forms and menus. From Detail forms, the changes that have been made are automatically validated, then committed to the database. If a change fails the validation procedure, you are prompted to re-edit the entry or quit (i.e. rollback the changes).

Quit *<F11> <PF4>*
Quits from a Detail form, rolling back all changes to the current record.

Execute Option *<ENTER> or <RETURN> or <TAB>*
Enters menu selections. Available on all menus.

Delete Record *<REMOVE>*
Removes an entry from the database. Only available on a few screens. It is more common to use a menu option to delete selected entries.

Clear Record *<F19>*
Removes a summary entry or a set of query parameters (in the query area) from the screen. This does not affect the database and is only used on summary entries when a menu includes an option which can act on all displayed entries. Available on some Query/Summary screens.

Cursor Control
Next Field *<ENTER> or <RETURN> or <TAB>*
Moves cursor to the next enterable field on a Query/Summary or Detail screen. In some cases fields are not enterable but can be visited to scroll text which is too long to fit in the screen entry area. In some Query/Summary screens where only one field can be visited in the summary area, this key can be used to move to the menu area. Available on all forms.

Previous Field *<F12>*
Moves the cursor between fields on the screen. When a menu is embedded in a Query/Summary or Detail screen, this key can be used to move from the menu area to the summary or detail area. Available for all Query/Summary and Detail screens.

Next Record, Previous Record *<DOWN ARROW>, <UP ARROW>*
Moves the cursor between entries in summary and detail areas. Use of the Next Record key will not allow movement past the last summary entry in a list. When these keys are used in Detail screens, the changes that have been made are automatically validated then committed to the database. If a change fails the validation procedure, you are prompted to re-edit the entry or rollback the changes. Available for all Query/Summary and Detail screens.

Next Block, Previous Block *<NEXT SCREEN>, <PREVIOUS SCREEN>*
Moves the cursor between different blocks on a screen. A block is generally a screen area bounded by a rectangle. For example, Query/Summary screens are composed of three blocks, corresponding to the query area, summary area and menu area. Available for all forms and menus, but some contain only one block, so these keys will not move the cursor.

Read Messages *<PF2>*
Moves the cursor to the message area. Available on all forms and menus. Once the cursor is in the message area, this key is used to return the cursor to its original position.

Scroll Up, Scroll Down *<F11> <UP ARROW>, <F11> <DOWN ARROW>*
Scrolls the display in the summary area. Used in the case where all the entries cannot be displayed in the available space, to scroll the display up or down. Available for Query/Summary screens.

Horizontal Scroll <F11> <NEXT SCREEN>, <F11> <PREVIOUS SCREEN>
Scrolls horizontally through a number of possible field or record entries. Available only in a few cases.

Control Within a Field
Move Cursor Right, Move Cursor Left <RIGHT ARROW>, <LEFT ARROW>
Moves the cursor one character at a time. If the field is longer than the screen entry area, this will cause the text to scroll within the screen window. Cannot be used to move between fields. Available within a field in all forms and menus.

Scroll Left, Scroll Right <F11> <LEFT ARROW>, <F11> <RIGHT ARROW>
Scrolls in fields that cannot be displayed in the available space. Causes the cursor to move the full width of the entry area and the contents of the field to scroll by that distance (provided that the actual field is longer than the available space). Available in all forms and menus.

List Field Values <F13>
Displays a list of values available for a given field. You may select one of these values to be entered into the field. Available for certain fields in the Query/Summary and Detail screens.

Clear Field <F20>
Sets the contents of a given field to blank. Available for all enterable fields on forms and menus. Clearing of fields in summary lists has no effect on the database contents.

Query Control
Execute Query <FIND>
Executes a query, based on the query parameters entered in the query area. If used from the query area, all entries which match the query criteria will be fetched from the database. If used from the summary area, the use of Enter Query can be combined with this key to further customise queries. Only available for Query/Summary screens.

Enter Query <SELECT>
Causes the query mode to be entered. In this mode, additional query criteria related to the summary items that are displayed for each entry can be specified. Available in the summary area of most Query/Summary screens.

Count Query Hits <F8>
Counts the number of entries that will be returned by a query. Available in the summary area of some Query/Summary screens.

Select/Deselect Entry <F7>
Selects and deselects entries from the summary area. Selected entries are identified by an asterisk in the first column of the list. Depending on the screen, one or more entries may be selected at one time. If only one entry can be selected, the asterisk moves automatically with the cursor as the operator presses next record and previous record in the summary list, so that use of this key is not required. Available on all Query/Summary screens.

Count Summary Records <F8>
Counts the number of summary records that have been returned by a previous query. This is available when querying is a complex and time consuming process, for example during catalogue query.

Requery Summary Records <SELECT>
Causes query mode to be entered, in order to customize a query on summary records that have been returned by a previous query. This is available when querying is a complex and time consuming process, for example during catalogue query.

Other Keys

Commit <DO>
Validates all changes then commits them to the database. If a change fails the validation procedure, a warning message is issued and the record will remain on the screen for further editing. Available on most Detail screens.

Create Record <INSERT HERE>
Allows you to add a new record immediately following the current record in a list. Available in certain Detail screens, for example Geographic Area Detail (polygons only).

Clear Block <F18>
Performs SQL*FORMS clear block function. Available in the query area of most Query/Summary screens.

Display Error <PF3>
Displays details of the last error detected by SQL*FORMS. Available for all forms and menus.

Insert/Replace <F14>
Performs SQL*FORMS Insert/Replace function. Available for all forms and menus.

Next Set of Records <F10>
Performs SQL*FORMS Next Set of Records function. Available in the summary area of some Query/Summary forms.

Print <F9>
Performs SQL*FORMS Print function. Available for all forms.

Redisplay Page <CTRL-R>
Performs SQL*FORMS Redisplay page function. Available for all forms and menus.

Show Function Keys <PF1>
Shows the currently available function keys. Available for all forms and menus.

4. ORDERING ERS-1 PRODUCTS

4. ORDERING ERS PRODUCTS

4.1 Introduction

Orders for ERS products are split into two categories, depending on your status:

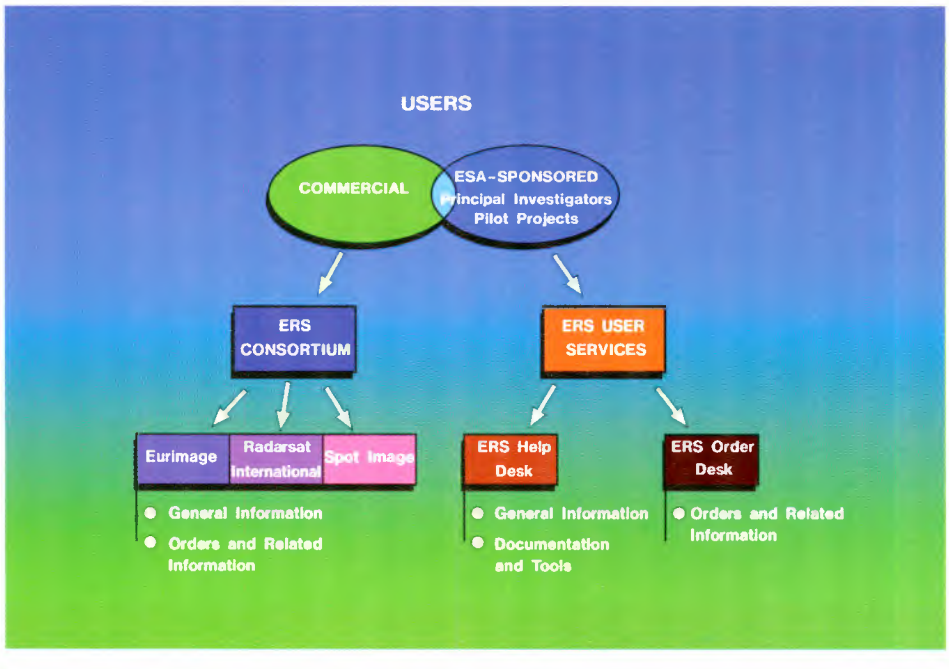
1. **Principal Investigators** and **Pilot Projects** for ERS-1 are ESA-sponsored Users who receive a fixed quantity of products free of charge. This access has been granted to these users following the selection of their proposals submitted in response to several Announcements of Opportunity. These Users address ESA directly for products, at the ERS Order Desk.

2. The ERS Consortium (ERSC), comprising Eurimage, Radarsat International and Spot Image, has been appointed by ESA as the official distributor to **all other Users** of ERS products. Each member of the Consortium has responsibility for Users from a particular geographical area. Users address the appropriate Consortium member.

Your product requirements may be satisfied either with data which has already been acquired by the satellite or with data from future data acquisitions. If the future acquisitions which are already planned do not meet your requirements, every attempt will be made by ESA to programme the necessary acquisition.

You have access to the CUS Catalogue, which provides information on the availability of data and products and on planned acquisitions. Further details regarding access to the Catalogue are provided in Chapter 3 and Appendix F.

Figure 4.1 ERS Services



4.2 ERS Consortium Order Desks

The ERS Consortium's three Order Desks give you world-wide access to ERS products. Each ERS Consortium Order Desk serves you from a specific area of the world:

- If you are in Europe, N. Africa and the Middle East - Eurimage ERS Order Desk ('Middle East' includes Syria, Lebanon, Iraq, Jordan, Kuwait, Saudi Arabia, Bahrain, Qatar, United Arab Emirates, Oman and Yemen; In Iran you may contact either Eurimage or Spot Image.)

- If you are in Canada and the United States - Radarsat International ERS Order Desk

- If you are in other countries - Spot Image ERS Order Desk.

Each ERS Consortium Order Desk provides end-to-end support to those interested in using ERS. To become more familiar with the ERS system, you can initially ask for information about the capabilities and coverage of the instruments, the range of products available and their costs. This is to enable you to make an objective assessment of how ERS can best help you. The ERS Consortium Order Desk can then provide specific information about dates and times of past and future acquisitions to support a particular project or field campaign, and advise on the most suitable product for the application.

Once you have identified suitable data and have chosen a product type and medium, you can place a firm order. You submit the order to the ERS Consortium Order Desk, which makes a final check of the details and then confirms the order. For SAR images you receive a detailed report confirming any planning of future acquisitions, and confirmation that the production has been requested with an estimated completion date. Following this, the completed product is dispatched to you from the processing centre. You are free to request an update on the status of your order should you need to at any time. Invoicing takes place shortly after product dispatch.

The ERS Consortium Order Desk is also available to provide support should there be any difficulties with products which have been received. The reproduction of a damaged or faulty product will be dealt with as a priority. You must provide a full description of the problems encountered for a product to be replaced. Should the product prove to be fault-free, you may incur a charge.

You can contact the Order Desks of the ERS Consortium at any of the following locations:

Eurimage ERS Customer Services
ESRIN
Via Galileo Galilei
00044 Frascati
Italy

Tel (+39-6) 94180 478
Fax (+39-6) 94180 510
Telex 610637 ESRIN I

Radarsat International ERS Order Desk
3851 Shell Road
Suite 200
Richmond, B.C., V6X 2W2
Canada

Tel (+1-604) 244 0400
Fax (+1-604) 244 0404

Spot Image ERS Order Desk
5 rue des Satellites
B.P. 4359
F-31030 Toulouse Cedex
France

Tel (+33) 62 19 41 46
Fax (+33) 62 19 40 55
Telex 532079 F SPOTIM

4.3 ESRIN ERS Order Desk

Principal Investigators and Pilot Projects address product orders to the ERS Order Desk at the following address:

ERS Order Desk
ESRIN
Via Galileo Galilei
00044 Frascati
Italy

Tel (+39 6) 941 80 336/406/457
Fax (+39 6) 941 80 361
Telex 610637 ESRIN I

The ERS Order Desk and ERS Help Desk work in close harmony. While the ERS Help Desk provides a wide range of information, which can include specific information about dates and times of past and future acquisitions, the ERS Order Desk is the point of contact for all orders and order-related information (e.g. User Request status).

Once you have identified suitable data and have chosen a product type and medium, a firm order can be placed. You submit the order to the ERS Order Desk, which makes a final check of the details and then confirms the order. In the case of SAR imaging, the ERS Order Desk can formulate the User Request on your behalf. Alternatively, if you have created your own User Request (see Section 4.5), the ERS Order Desk ensures that the User Request is well defined and confirms with you any further details needed to process the request. You receive a User Request Detail Report (see Section 4.6) confirming any planning of future SAR image acquisitions, and then a confirmation that the production has been requested.

Following production, the completed product is dispatched to you from the processing facility. Should any problems arise with the product, you should contact the ERS Help Desk to initiate a Product Rejection.

You are free to request an update on the status of your order should you need to at any time. You can monitor the status of your own User Requests by connecting to the Central User System (CUS) (see Chapter 3, Section 4.5, and Appendix F).

The Order Desk will inform you about any unusual event which affects the correct processing of an order and will offer alternative ways to satisfy your needs.

4.4 Product Ordering

You place orders for SAR Image Mode and LBR products in different ways, but for all orders the product type and medium must be indicated.

4.4.1 SAR Orders

The SAR Image Mode has limited resources in each orbit, so the planning of its acquisitions is actively managed. The CUS plays a major role in this activity, and all orders for SAR acquisition and production will enter the CUS as a User Request.

Orders for SAR are best communicated in one of two ways: Location and Time, or Orbit and Frame Numbers.

4.4.1.1 Location and Time

All SAR orders and User Requests are defined in the CUS by location (area of interest) and time period of interest (date range). This method of definition is particularly suitable for requests for future data which require planning of SAR acquisitions, but requests for past acquisitions can also be defined in this way.

Area of Interest - you can define an area as a polygon or a circle. The polygon can have up to 18 vertices (minimum 3). A circle is defined by a centre coordinate and a diameter. Latitude and longitude values should be given in degrees and minutes (coordinate ranges: eastings 0 to 360 degrees, northings -90 to +90 degrees). Circle diameter should be given in km (range: 10 to 2000 km).

Date range - you define the period of interest for acquisitions or production relative to the repeat period of the satellite's orbit. The maximum coverage available for an area of interest is limited to the coverage possible in one full cycle of the satellite's orbit. This coverage can be repeated in subsequent cycles.

Initially you need to identify the image or images in one cycle which satisfy your requirements. You then define the start and end dates of the period. To repeat images in the next cycle, give an interval equal to the repeat period of the orbit. The total number of repeats determines the total number of images. For example, an area imaged during the 35-day repeat orbit could be imaged again in exactly the same way at multiples of 35 days. So, for a repeat of a specific image every 70 days, the request would be defined by the date of the image in the first 35-day period, a repeat period of 70 days, and, say, 3 repeats for a total of 3 images. You can further limit requests by restricting the selection of images to just ascending or descending passes.

4.4.1.2 Orbit and Frame Number

Defining an order for SAR images by orbit and frame number is more suitable for past images already acquired, planned or archived. The software tool Display ERS-1 SAR Coverage (DESC) and the SAR Reference Maps for Phase C are indispensable for Users taking this approach, with the former providing graphical plots and lists of images which can be submitted with an order with SAR images identified by orbit and frame numbers. The orbit number uniquely defines the date and path of the acquisition, while the frame number defines the pass type (i.e. ascending or descending) and latitude of the scene. These two parameters alone are sufficient to define a request for an image. However, if you provide the date and area of interest to the Order Desk as additional information with an order, you will have further confidence that the order details have been correctly understood. Once orders presented in this way have been accepted by the Order Desk, the order will appear in the CUS as a User Request. This will define the order as a location and period of interest, but will also contain the orbit and frame numbers, as appears in the User Request Detail Report (see Section 4.6).

You should sumit any request for planning of future acquisitions **at least four weeks before** the date of acquisition. ESA attempts to make the best use of available satellite resources through a policy of SAR baseline planning. However, if no specific request is received for a future acquisition, ESA provides no guarantee that the image will be acquired, even in cases where the image has previously been planned in the baseline.

Other Constraints

- generation of products from data acquired by non-ESA stations can be delayed by several weeks or more. In some cases the risk of acquisition failure is significant
- the terrain corrected geocoded product ERS.SAR.GTC01 is available only over Central Europe, and with some delay
- Fast Delivery SAR products (ERS.SAR.UI16) are only available for the ESA stations of Kiruna and Fucino, which transmit them to the Nominated Centres via the BDDN. The transfer of ERS.SAR.UI16 products from the BDDN receiving station to you is to be agreed between you and the Nominated Centre.

4.4.2 Low Bit Rate

The operation of the LBR instruments is nominally continuous, and is only constrained in that SAR Wave Mode and Wind Scatterometer can only operate in the absence of a SAR Image Mode operation. For these reasons the LBR instruments do not require planning. So, all low bit-rate products, with the exception of image-based ATSR products, are global data sets. They can be ordered on the basis of a standard period of time, generally one month, or one cycle in the case of the 35-day repeat orbit. An order for such products is defined by the product type, period of interest and medium. You should submit orders for these products to the Order Desks, from whom information on LBR product availability can also be obtained.

4.4.3 User Requests

The User Request is the representation of your order within the CUS system. From a User Request the CUS is able to direct the ERS Ground Segment to take appropriate actions to satisfy your order.

Figure 4.1 shows the flow of events which take place to satisfy a User Request. If data is already available which satisfies a User Request, product orders are issued by the CUS. These orders trigger the generation of the products and their shipment to you. However, if data is not already available, the User Request must first be incorporated into the satellite payload plan. Acquisition, and if applicable, Fast Delivery processing and distribution is scheduled. For off-line products, the CUS generates product orders once acquisition and archiving of the raw data is complete. The PAF generates the product and dispatches it to you.

The User Request can be defined on your behalf by the Order Desk, or you can define it yourself. In the latter case, you should seek the support of the Order Desk until you have sufficient confidence to define User Requests in detail. In all cases, the User Request is checked for completeness by the Order Desk, which will contact you should further information be required.

4.4.3.1 User Request Components

The User Request is composed of the following parts:

- User Request Details
- User Request Area
- Sensor/Product Information
- Observation Set
- Sensing Orders and Orbit Selections
- Product Journals.

Initially you need only provide the first three items for a User Request to be initiated. Only when you have considerable experience of defining User Requests with the assistance of the Order Desk should you consider the latter three items — the observation set, sensing orders and orbit selections and product journals. In case of any doubt, or need for help, do not hesitate to contact the Order Desk.

User Request Details (defined by you)

The User Request Details give information about the User Request such as the period of interest for the request, whether or not the request is a standing order (one which should be repeated regularly after a fixed number of days over a certain period), and the target delivery date. The User Request Details always appear in a User Request.

User Request Area (defined by you)

The User Request Area is the geographic area of interest for which the request should be satisfied. The User Request Area is always present in a User Request.

Sensor/Product Information (defined by you)

The Sensor/Product Information defines which sensors are requested, and which products are to be generated for each sensor requested. At least one sensor must be specified, so the sensor/product information is always present in a User Request.

Observation Set (generated by you or the Order Desk)

An observation set is the set of selected catalogue entries that satisfies the User Request. The entries contained in the observation set may be entries that have been previously acquired or archived, or they may be entries which are planned to be acquired in the future.

If there is no data in the catalogue that can satisfy a User Request, then there is no observation set associated with the User Request. The User Request will be referred to the Mission Planner so that it can be scheduled for acquisition.

Sensing orders and orbit selections (generated by the Mission Planner and CUS)
Sensing orders represent parts of ground tracks that have been identified to satisfy a particular User Request. More than one ground track may be identified to satisfy one User Request. The User Request Area is used to identify potential sensing orders which would fulfil the User Request.

Orbit selections are specific orbit paths that have been selected to fulfil a sensing order. There may be more than one orbit selection for a sensing order if the User Request is a standing order. Each subsequent orbit selection is for an observation of the same sensing order (i.e. the same path in subsequent cycles).

If the User Request is not a standing order then there is only one orbit selection for each sensing order.

If planning is not required, then the User Request will not contain any associated sensing orders or orbit selections.

When a User Request has an associated observation set with planned acquisitions, then planning is still required implicitly, and there will be associated sensing orders. The CUS system will automatically generate sensing orders and orbit selections corresponding to the future observation set entries once the Order Desk has accepted the User Request.

Product Journals (generated by CUS)
The product journal records the production history of the User Request. For each series of products there is a record in the product journal. During production the product journal contains the specific status of each series of products being created by the ERS Ground Segment. This includes both Fast Delivery products and off-line products.

In the case of sensing only requests, product journals are used to record the history of which 'unprocessed products' were received by the ERS Ground Segment.

4.4.3.2 User Request Status
The User Request has a particular state depending on its progress within the ERS-1 Ground Segment. The following states are associated with the User Request:

- pending
- submitted
- planning (i.e. awaiting planning, partially planned, planned)
- production (i.e. awaiting production, in production)
- completed
- cancelled
- rejected.

When a User Request is first entered into the CUS, it enters the 'pending' state. Once the User Request is specified to your satisfaction, it is submitted to the Order Desk. It then enters the 'submitted' state.

Once in the submitted state, you pass control of the User Request to the Order Desk, and it will move through the remaining states as the appropriate processing takes place within the ERS Ground Segment.

While still in the pending or submitted state, you can elect to have the User Request cancelled. No further system processing will occur for a cancelled User Request.

4.4.3.3 Observation/Candidate Set Structure
The observation set contains catalogue entries structured in a manner to enable you to manage the potentially large number of individual entries.

Following your search of the Catalogue based on the User Request Area, the entries found in the Catalogue are returned and placed in a candidate set. They are 'candidates' from

which you can select the entries which best satisfy your requirements. The entries identified as best matching your requirements are entered into the observation set.

Within an individual observation, the catalogue entries are organized by paths. The path numbers uniquely identify an orbit's ground coverage.

Within each path, the catalogue entries are organized by acquisition series. Acquisition series are a contiguous set of unprocessed (or raw) data frames for the same specific orbit.

Each acquisition series is composed of individual acquisition frames. Acquisition frames are the individual unprocessed catalogue entries.

Each acquisition series has associated with it a set of product series. These are contiguous sets of processed data products that have been produced from the parent acquisition series.

Each product series is composed of individual product frames. Product frames are the individual processed product catalogue entries.

4.5. User Interface for User Requests

In the Normal User Menu (see Figure 3.1) the option '1. User Request (Including Catalogue Search)' accesses the User Request Query/Summary Form.

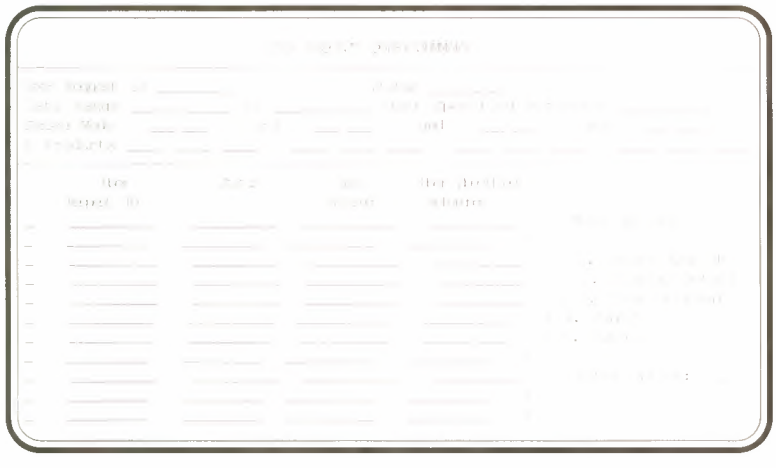


Figure 4.2. User Request Query/Summary Form

Within the User Request Query/Summary Form you can create, query, display, submit and cancel User Requests. By pressing the <FIND> key (see Section 3.3.3) when the form first appears, you can list all of your existing User Requests in the summary area. By selecting a User Request, you can review or edit the details of the following parts of the User Request:

- User Request Details
- User Request Area
- Sensor/Product Details
- Observation Set.

(1) Create New User Request

Use this option to enter the detailed information for a new User Request. Selecting this option takes you directly to the User Request Detail Form (see Figure 4.3). If you have selected a User Request from the summary area before choosing this menu option, then the selected User Request details are used as the basis of the new User Request.

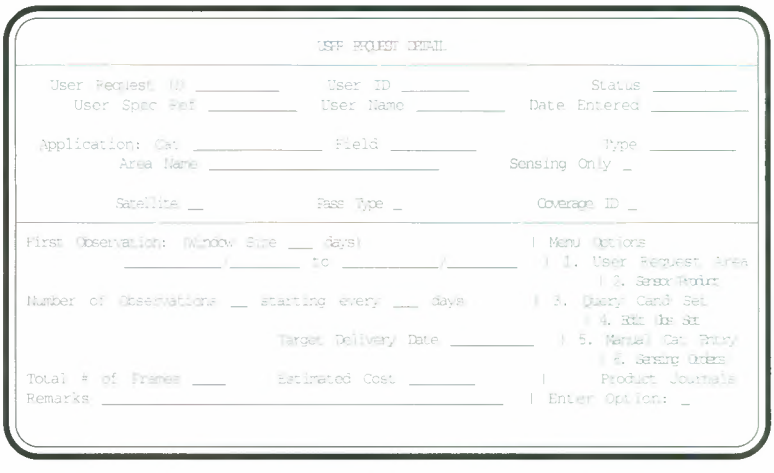
(2) Display Detail

Use this option to display the detailed information of the selected User Request. The User Request details can only be edited for a User Request which has not been submitted.

The details which can be edited are:

- User Request Area
- Sensor/Product Information
- Observation Set
- Sensing Orders
- Product Journals.

Figure 4.3. User Request Detail Form



In the detail area, the User Request details are displayed. They can be used as follows:

You can create a User Request based on an existing request (that you have previously selected on the User Request Query/Summary Form) or simply by entering new data. Most fields will contain default values. The area name and the observation window (i.e. start and end date, which must lie within one cycle for a standing order) must be entered, and you must choose the Sensor/Product menu option and enter at least one sensor before the User Request is considered complete.

If you enter an area name, it must be an existing private area, global geographic area, or a new area name. Press the [List Field Values] key to review a list of all the existing global areas. Private area names are not included in the list but may be entered manually.

The observation window must lie within a single phase of the satellite mission.

The menu area provides options to edit or display the details of the User Request geographic area, sensor/product information, and the observation set. Options are available to search the Catalogue for candidates to satisfy the User Request, or to manually select Catalogue entries to satisfy the User Request. Finally, information can be obtained to determine the detailed status of the User Request by viewing the sensing orders and product journals.

Select the User Request Area option, if you have entered the name of an area which does not exist in the database, or if you wish to customise the named area for the purposes of this User Request. Note that a new version of the named area is always associated exclusively with the User Request, so any changes made using the Geographic Area Query/Summary and Geographic Area Detail forms after the creation of the User Request will not affect the User Request Area.

If you are referencing an area which is not present in your private database, you will be asked if you want to make a copy of it for future reference.

The Query Cand(idate) Set and Edit Obs(ervation) Set options deal with automatic generation of the candidate set, and selection of the observation set. You can enter an observation set manually by specifying individual catalogue frames with Manual

Cat(alogue) Entry. You should only use these options if you have extensive experience in the creation of User Requests, and in consultation with the Order Desk.

The Sensing Orders/Product Journals option allows you to view the sensing order and product journal information associated with the User Request.

Geographic Area Detail Form
The Geographic Area Detail form allows you to create, edit and view User Request geographic areas. This form can only be accessed from the User Request Detail Form.

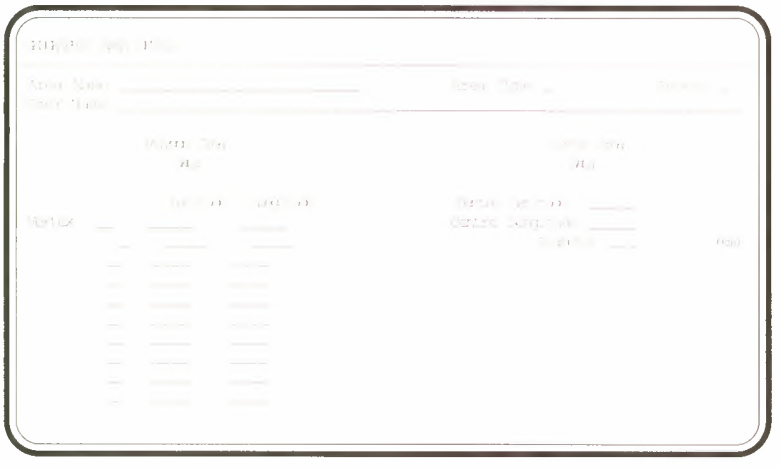


Figure 4.4. Geographic Area Detail Form

In the detail area, the form will appear with a geographic area name, access (U for User Request specific) and User name already defined. If a known geographic area name is supplied on the User Request Detail form, the area type and circle or polygon details will also appear. If the name is not found in the private or global database, you must enter the area type of 'P' for polygon or 'C' for circle.

When selecting the User Request Area option from the User Request Detail form after an observation set has been identified, or when viewing the original version of a User Request, you will be prevented from making any changes to the area specification. If you have selected a circular area, the cursor will be placed on the access field. If it is a polygonal area, the cursor will be placed on the first vertex number to allow scrolling through the vertices.

To commit any changes, use the [Exit] key to return to the User Request Detail Form. Then press the [Commit], [Next Record], [Previous Record] or [Exit] keys to save all the information relating to the User Request (i.e. the User Request Details, the sensor/product details and the User Request Area details). If some changes are made to an area which you do not wish to save, use the [Exit] key to leave this form then press [Quit] (i.e. <F11> followed by <PF4>) from the User Request Detail Form.

When creating or editing polygons, add new vertices by pressing [Next Field] repeatedly; the vertices will be numbered automatically. Use the [Create Record] key (which only functions in this section of the form) to add a vertex between two existing vertices. Delete vertices using the [Delete Record] key. Note that you cannot use [Next Record] and [Previous Record] to navigate between vertices.

When creating polygonal areas enclosing the pole, you must add additional points at the pole in order to clarify which pole is to be included in the area. One way to do this is to take the last vertex and add four pole points at 120 degrees longitude intervals. Then duplicate the last vertex point. Note that the order of the pole points is dependent on the definition order of the area's vertices. For example the area defined by (40:00, 10:00), (50:00, 145:00) and (30:00, 220:00) would need the following additional points to enclose

the north pole: (90:00, 220:00), (90:00, 100:00), (90:00, 340:00), (90:00, 220:00) and (30:00, 220:00).

Sensor/Product Detail Form
The sensor/product detail form allows you to create, edit and view sensor product details associated with a User Request.

The form will appear with the cursor on the number of copies field. Uou can enter an observation set manually by specifying the individual Catalogue frame, but this is only recommended if you are experienced, and in consultation with the Order Desk. If the User Request is 'sensing only' or the status is not 'pending', then the cursor will start on the specific ordering parameters field, which is optional. Otherwise, the cursor will start on the number of copies field, which has a default value of 1.

You must enter at least one sensor for a User Request to be complete. If you require products (i.e. the User Request is not a sensing-only request), at least one product type (and associated medium) must be entered for each sensor. If the User Request is sensing only, products cannot be specified.

Add sets of sensor/product details by pressing [Next Field] repeatedly. If the second or third product type is not specified for a sensor, the cursor will automatically move to the next set of details. Delete a set of sensor/product details using the [Delete Record] key. This function can also be used if you inadvertently move to a blank set of details that you do not wish to enter. Note that you cannot use [Next Record] and [Previous Record] to navigate between sets of details.

If a Fast Delivery product is entered and the number of copies field has a value other than 1, a warning message will indicate that the number of copies must be 1 for Fast Delivery products. This message will appear each time the Fast Delivery product field is passed. The number of copies will be reset to 1 when committing the data, as long as Fast Delivery products are requested.

When selecting the Sensor/Product menu option from the User Request Detail Form after an observation set has been identified or while viewing the original version of a User Request, the cursor will be kept on the specific ordering parameters field and you will be prevented from making any changes to the sensor/product details.

To commit any changes, use the [Exit] key to return to the User Request Detail Form. Then use [Commit], [Next Record], [Previous Record] or [Exit] to save all the information relating to the User Request (i.e. the User Request details, the sensor/product details and the User Request Area details). If some changes are made to sensor/product details which you do not wish to save, use the [Exit] key to leave this form then press [Quit] (i.e. <F11> followed by <PF4>) from the User Request Detail Form.

(3) View Original
Use this option to view the User Request in the state it was submitted to the Order Desk.

(4) Submit
Use this option to submit a User Request to the Order Desk, and hence to the ERS system for processing.

(5) Cancel
Use this option to change the state of the selected User Requests to 'cancelled'. No further processing of the User Request will take place within the CUS system.

4.6 Product Detail Reports

The product detail report is sent to you once a User Request has been accepted by the Order Desk. It reports the User Request Details as they appeared in the User Request, as well as Sensing Orders and Product Journal Entries.

The example User Request Detail Report which appears below was generated on 29 June 1993, while the User Request was accepted on 22 June 1993. The User Request concerns two SAR images, one in the past and one in the future. The User Request is not a standing order for regular repeat coverage on the same paths every cycle; there is no repeat period given for the observation. The Remarks field notes that the original order was placed by the User using the Display ERS-1 SAR Coverage (DESC) software tool.

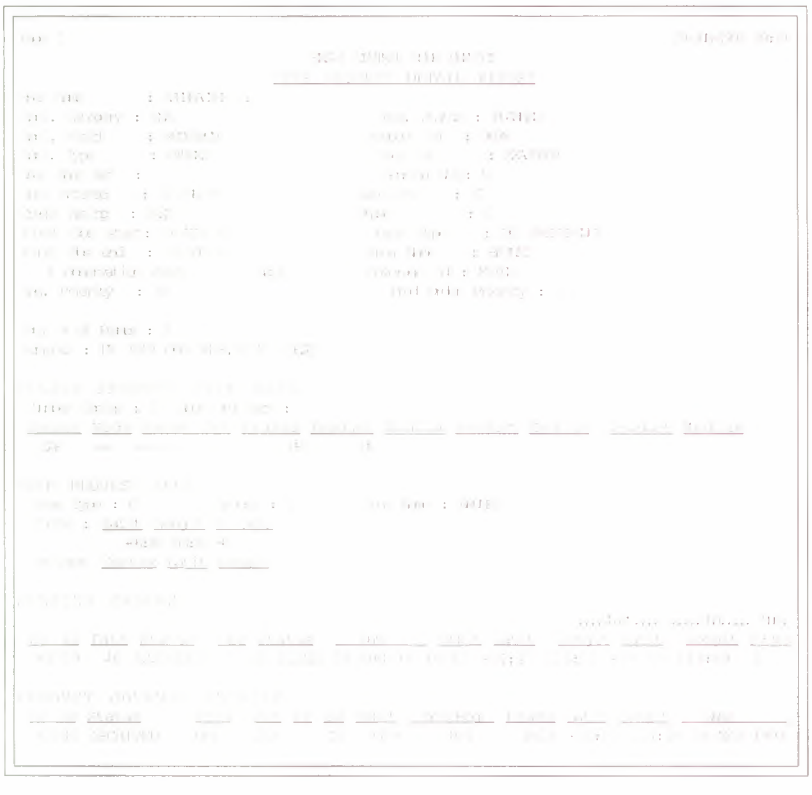
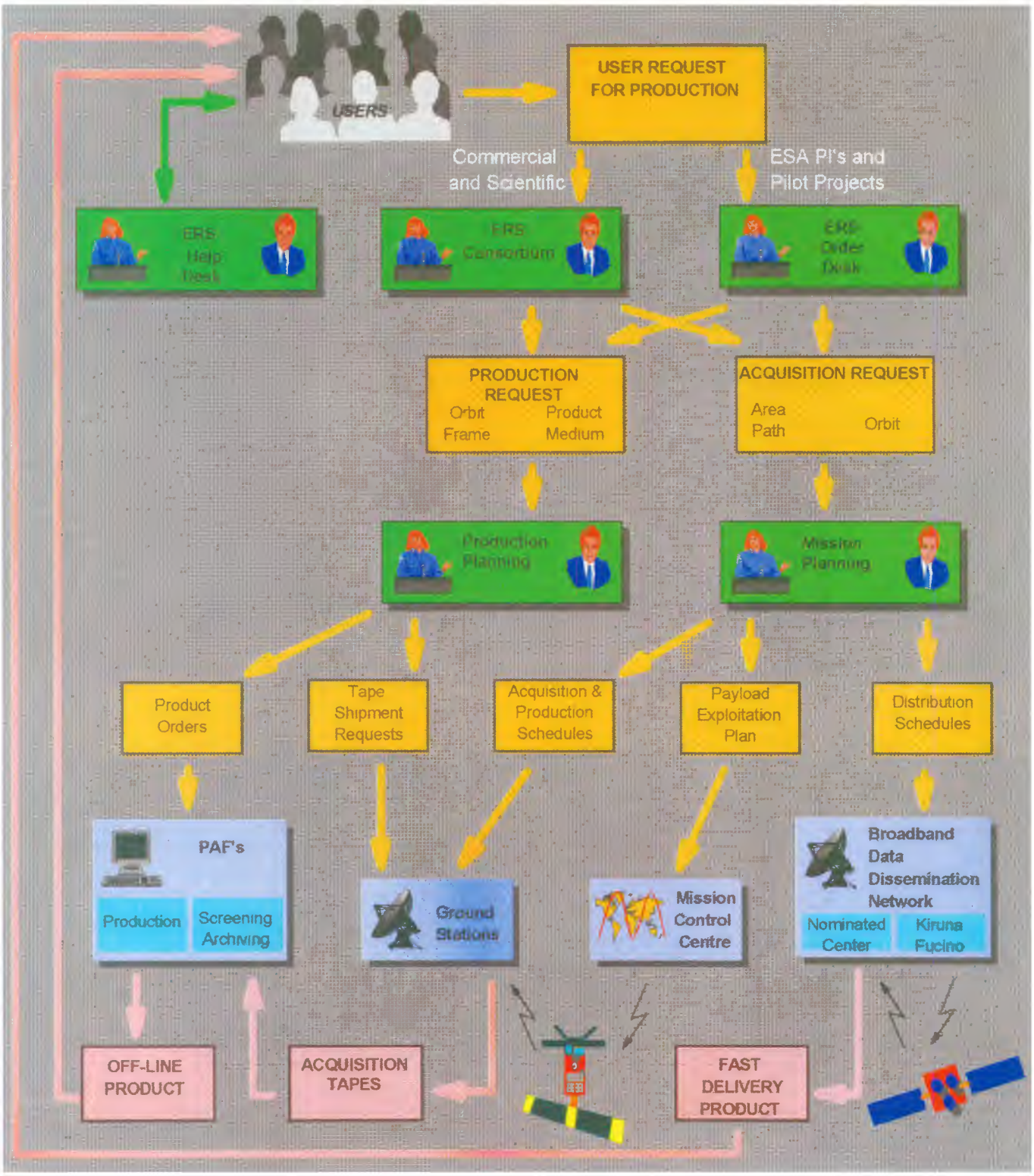


Figure 4.5. Sensor/Product Detail Report

The SAR data in the Product Journal Entry acquired on 6 May 1993 by the Bangkok station (TH) is reported as archived. Since no processing facility is given for this scene, it is clear that the archived entry has been set automatically to ARCHIVED since it is a Foreign ground station. A shipment request for the data will have been sent to the station requesting HDDT shipment to an ESA Processing and Archiving Facility.

The Sensing Order is for an acquisition on 3 August 1993. The orbit number and the latitude and longitude of the **satellite's ground track** for the acquisition segment are given. The orbit 10712 corresponds to path 46 in the 35-day cycle, as appears in the report.

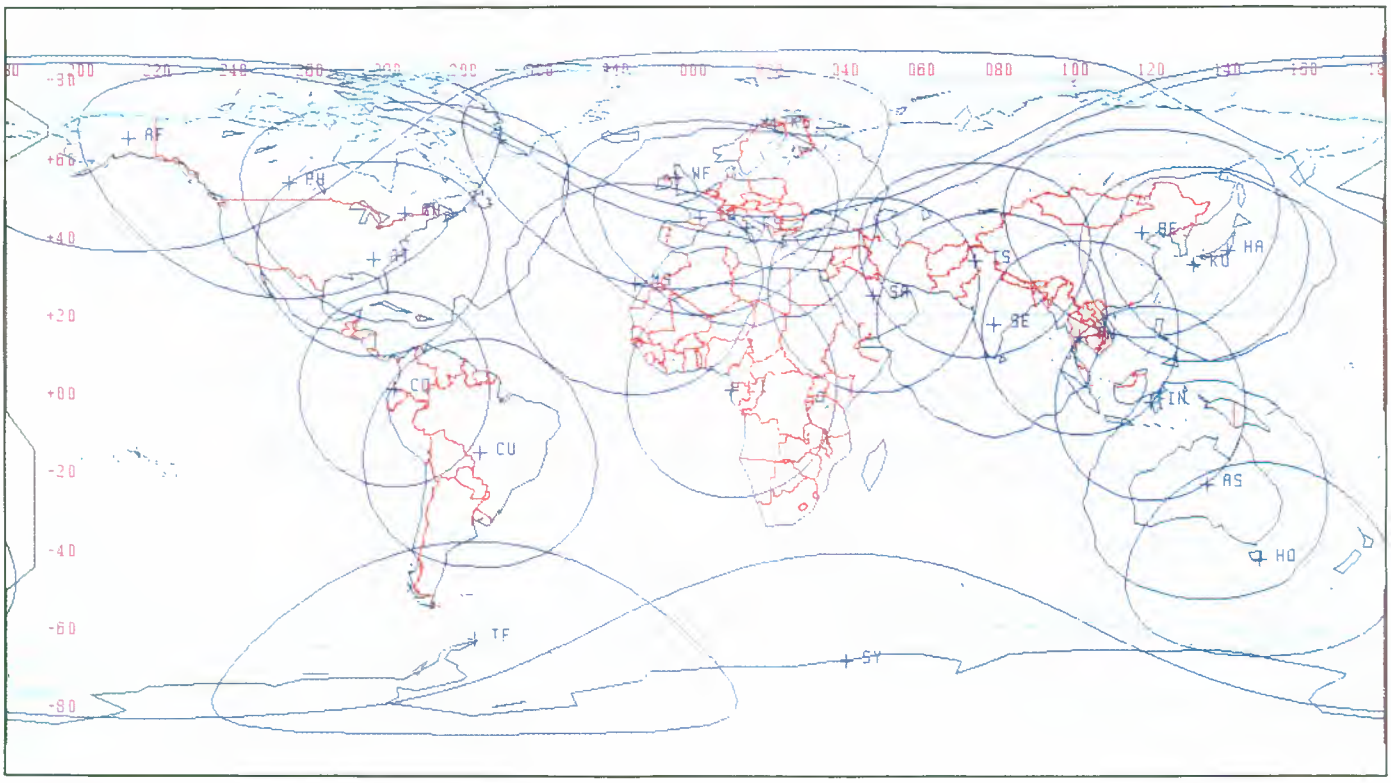
Figure 4.6 A User Request Life Cycle



5. SAR GROUND COVE

** 3

Figure 5.1. Visibility zones for operational and planned ERS ground stations.



Key:

ESA Stations

KS	Kiruna, Sweden	FS	Fucino, Italy
MS	Maspalomas, Spain	GS	Gatineau Low Rate, Canada
PS	Prince Albert Low Rate, Canada		

National Stations

GH	Gatineau High Rate, Canada	PH	Prince Albert High Rate, Canada
TO	Aussaguel, France	TF	O'Higgins (Antarctica), Germany
TS	Tromsø, Norway	WF	West Freugh, UK
LI	Libreville, Gabon (German Transportable Station)		

Foreign Stations

AF	Fairbanks, USA	AS	Alice Springs, Australia
AT	Atlanta Test Site, USA	BE	Beijing, China
CO	Cotopaxi, Equador	CU	Cuiaba, Brazil
HA	Hatoyama, Japan	HO	Hobart, Australia
IN	Pare-pare, Indonesia	IS	Islamabad, Pakistan
KU	Kumamoto, Japan	SA	Riyadh, Saudi Arabia
SE	Hyderabad, India	SY	Syowa (Antarctica), Japan
TH	Bangkok, Thailand		

5. SAR GROUND COVERAGE MAPS

5.1 Introduction

The data rate for SAR Image Mode is too high for recording on-board and therefore imagery is only available for areas within the reception zones of the ERS ground stations. The map on the facing page shows these zones for the currently operational and some of the planned ground stations. The remainder of the maps in this chapter show the regional ground coverage of the SAR data acquired during the Commissioning, First Ice and Multidisciplinary phases.

An index to the maps is given in Section 5.2.

For the 3-day cycles of the Commissioning and Ice Phases, the maps show the real coverage, which is limited to several swaths of ascending and descending orbits acquired at least once during the respective phases. For the 35-day repeat cycle Multidisciplinary Phase, the coverage is largely complete for land areas within the station visibility limits for at least one acquisition. Note that the maps only give an overview of the acquired SAR data. Similar maps with more detailed information can be obtained using the Display ERS-1 SAR Coverage (DESC) software (see Chapter 3).

5.2. Page Index to SAR Coverage Maps

	Commissioning Phase	First Ice Phase	Roll-Tilt Mode Phase	Multidisciplinary Phase
Europe	78	79	98	-
Southern Europe and Northern Africa	80	81	-	-
India and South-East Asia	82	83	-	-
Japan and Eastern Asia	84	85	-	-
Australia	86	87	-	-
Central North America	88	89	100	-
Latin America	90	91	101	-
North American Arctic	92	93	99	103
Greenland and European Arctic	94	95	99	103
Antarctica	96	97	-	104
The World	-	-	-	102

Figure 5.2. Europe
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

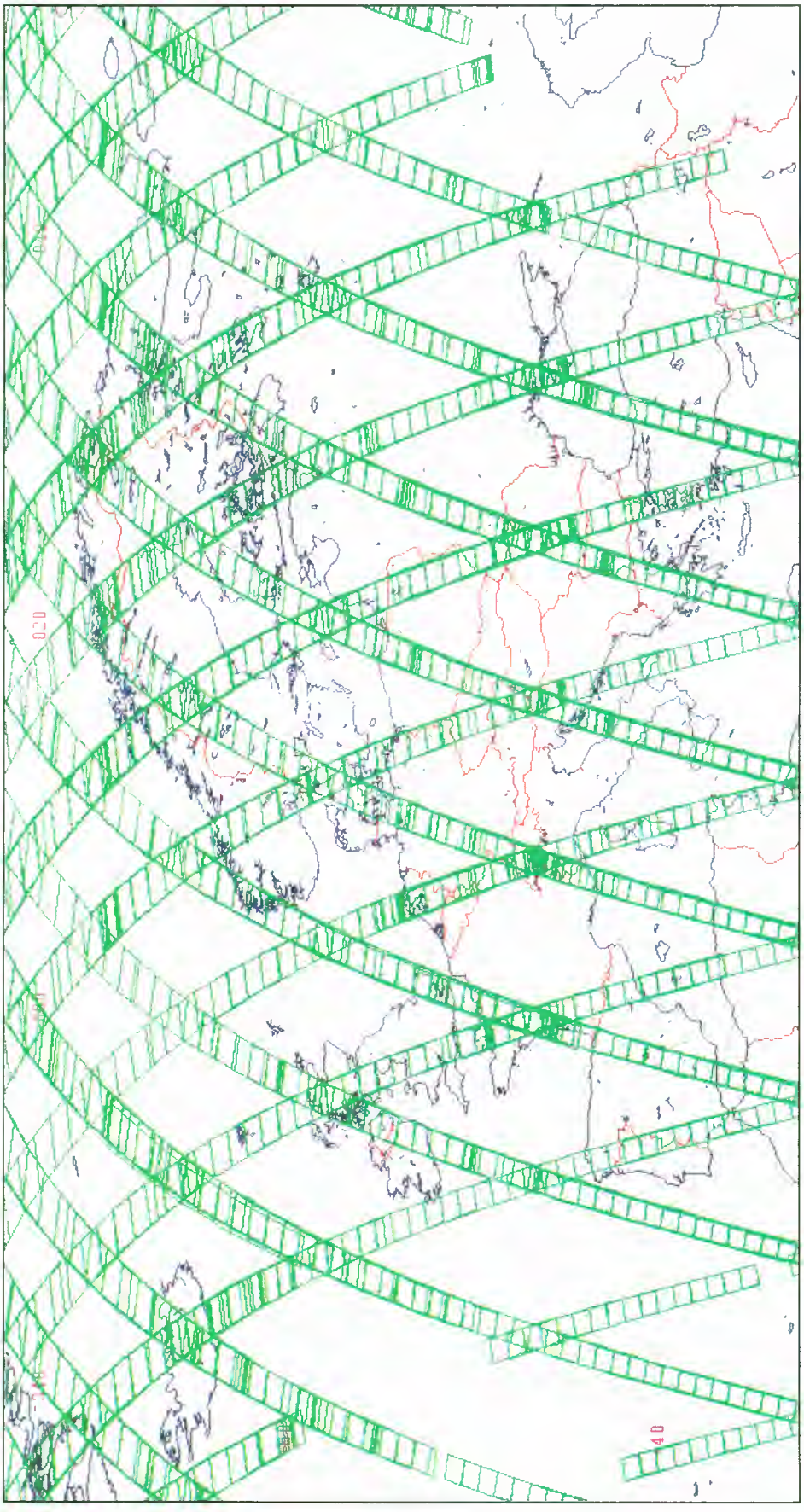


Figure 5.3. Europe
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

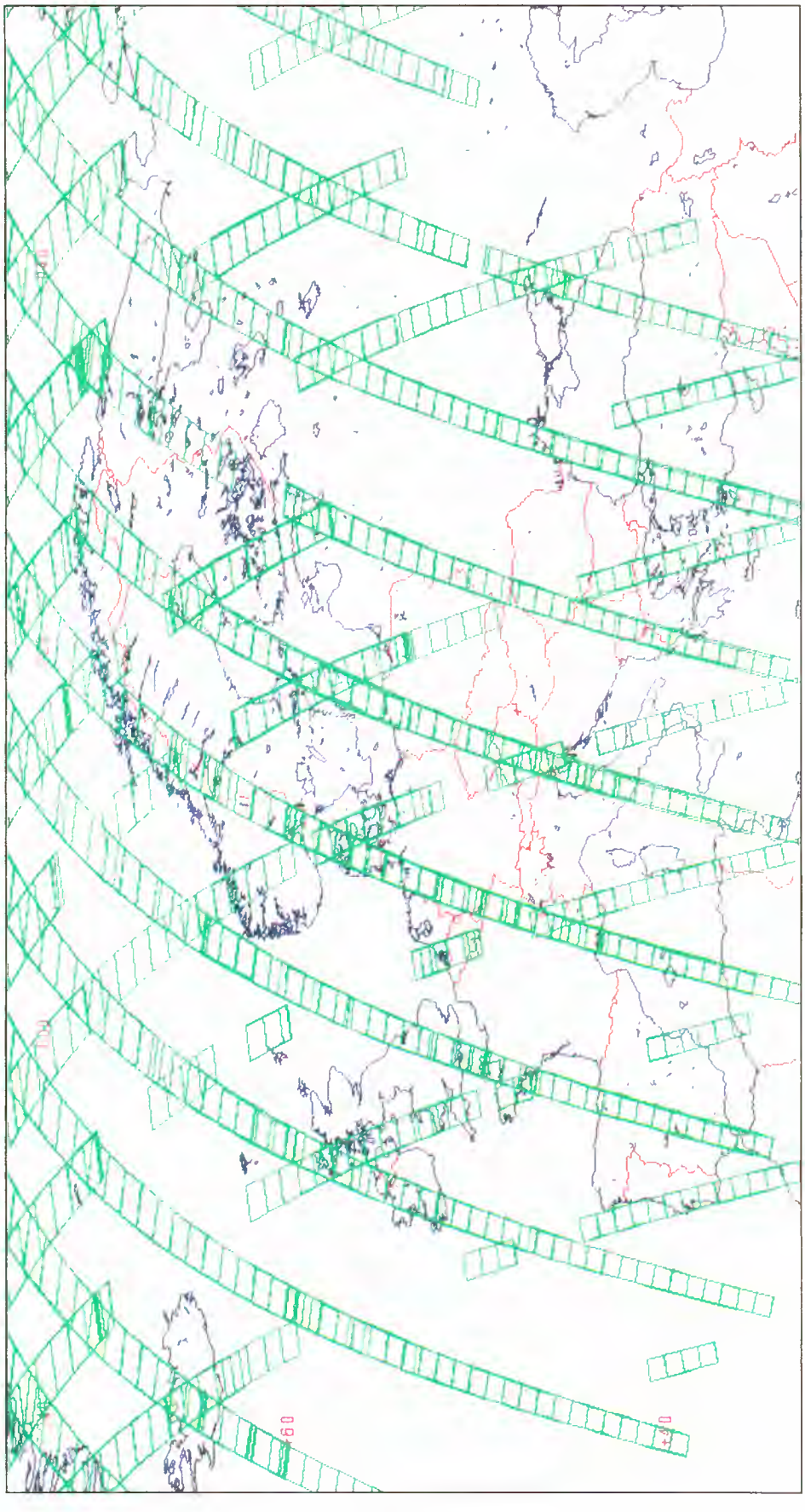


Figure 5.4. Southern Europe and Northern Africa
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

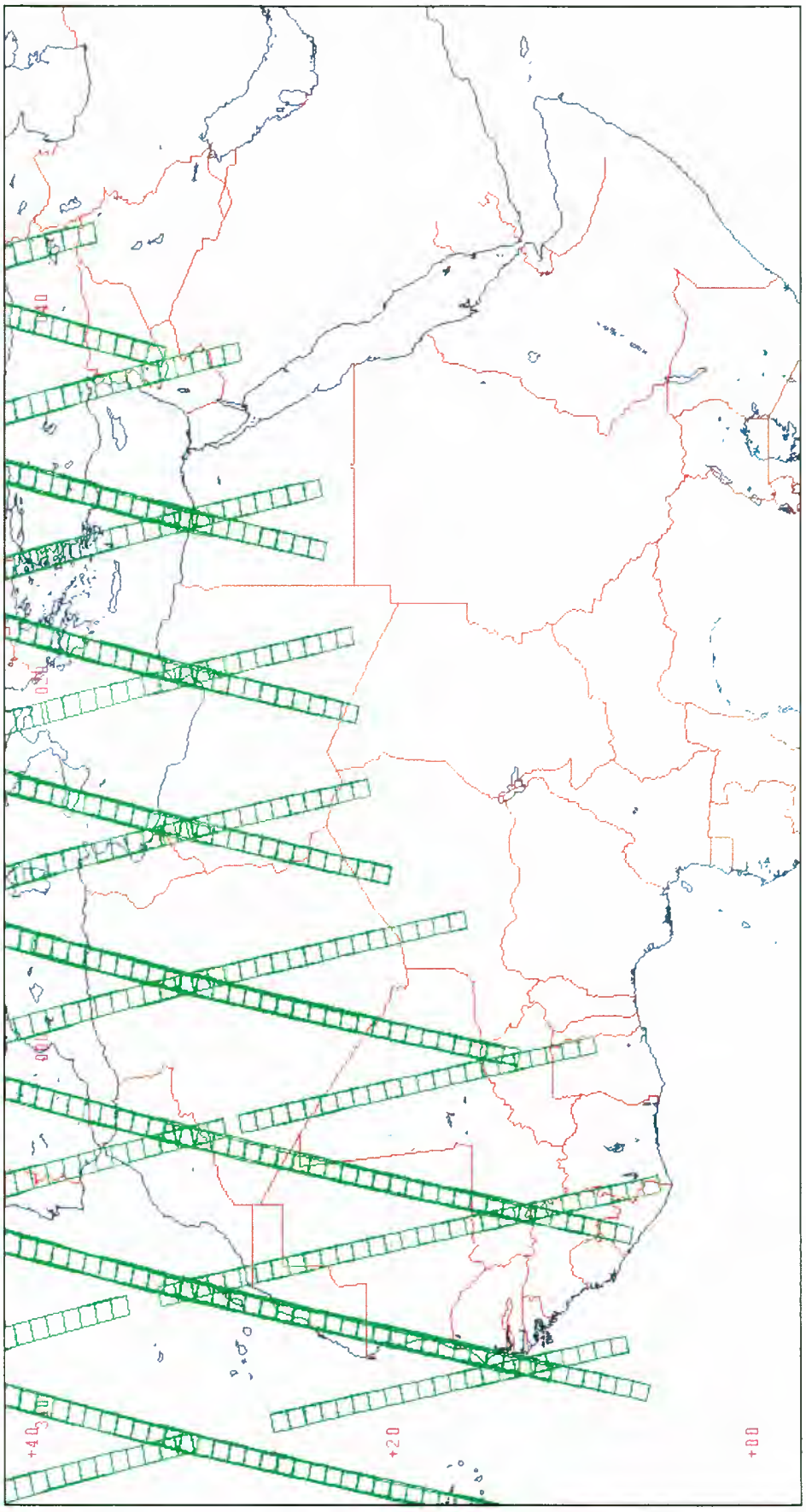


Figure 5.5. Southern Europe and Northern Africa
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

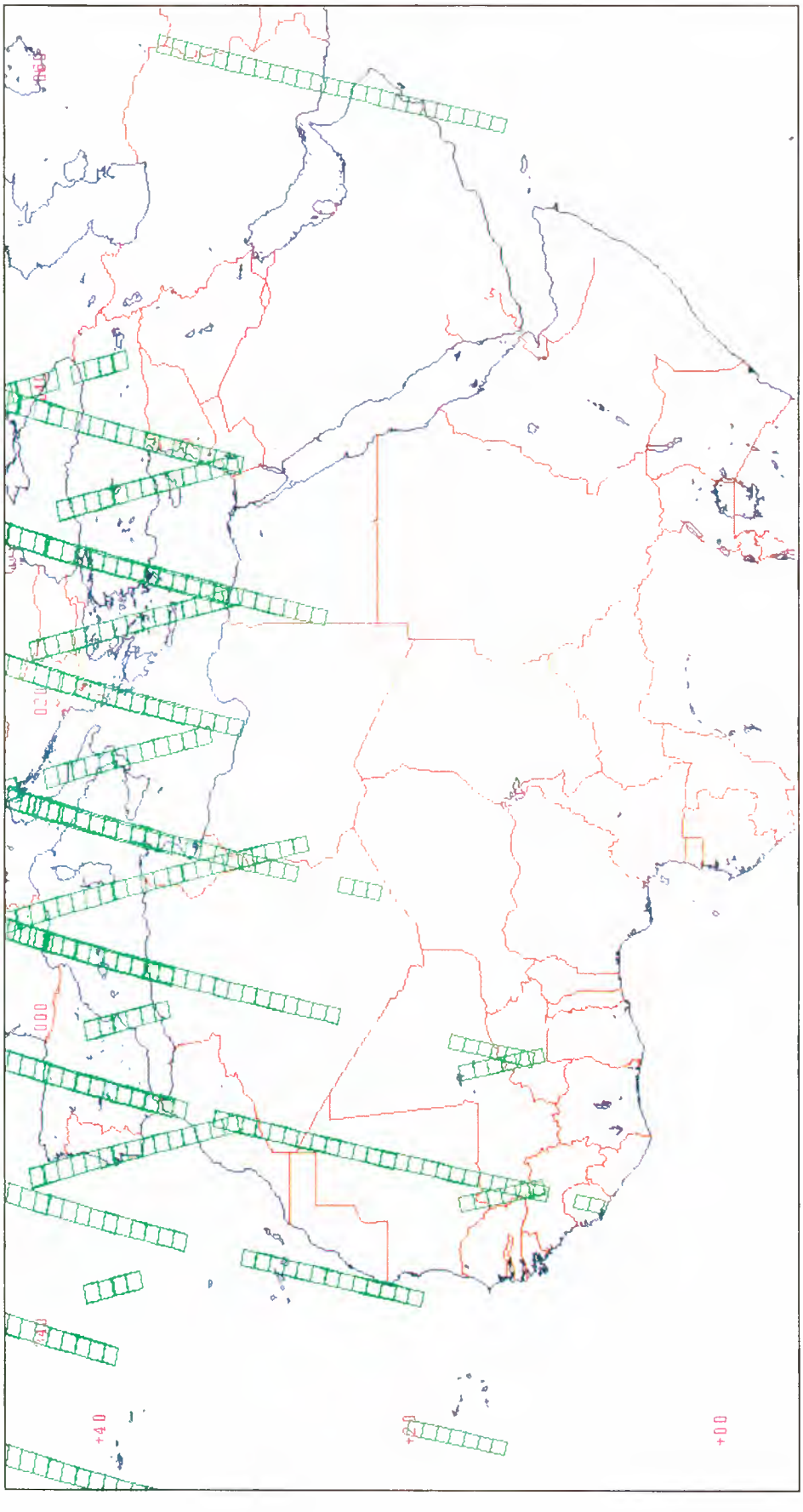


Figure 5.6. India and South-East Asia
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

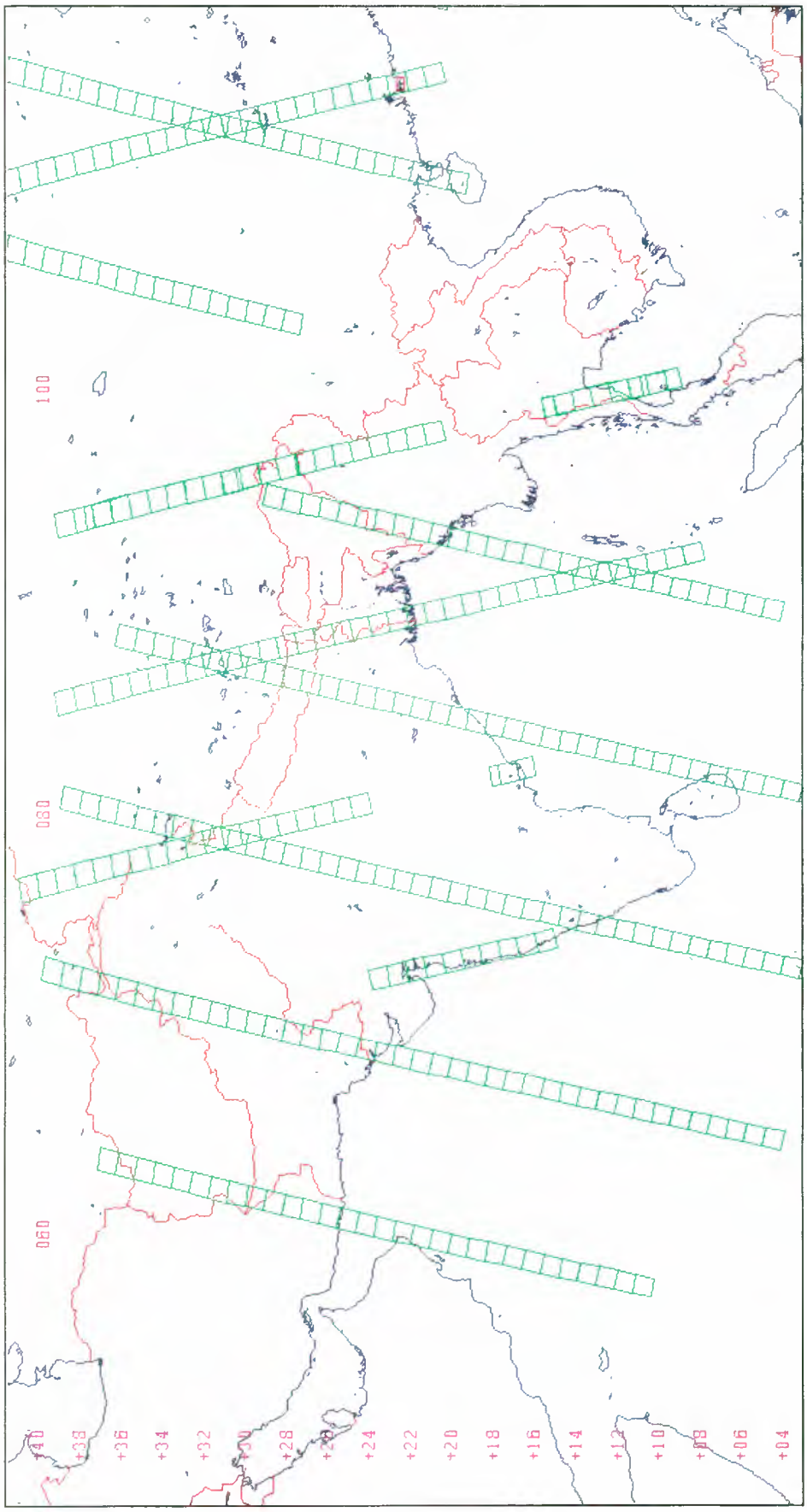


Figure 5.7. India and South-East Asia
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

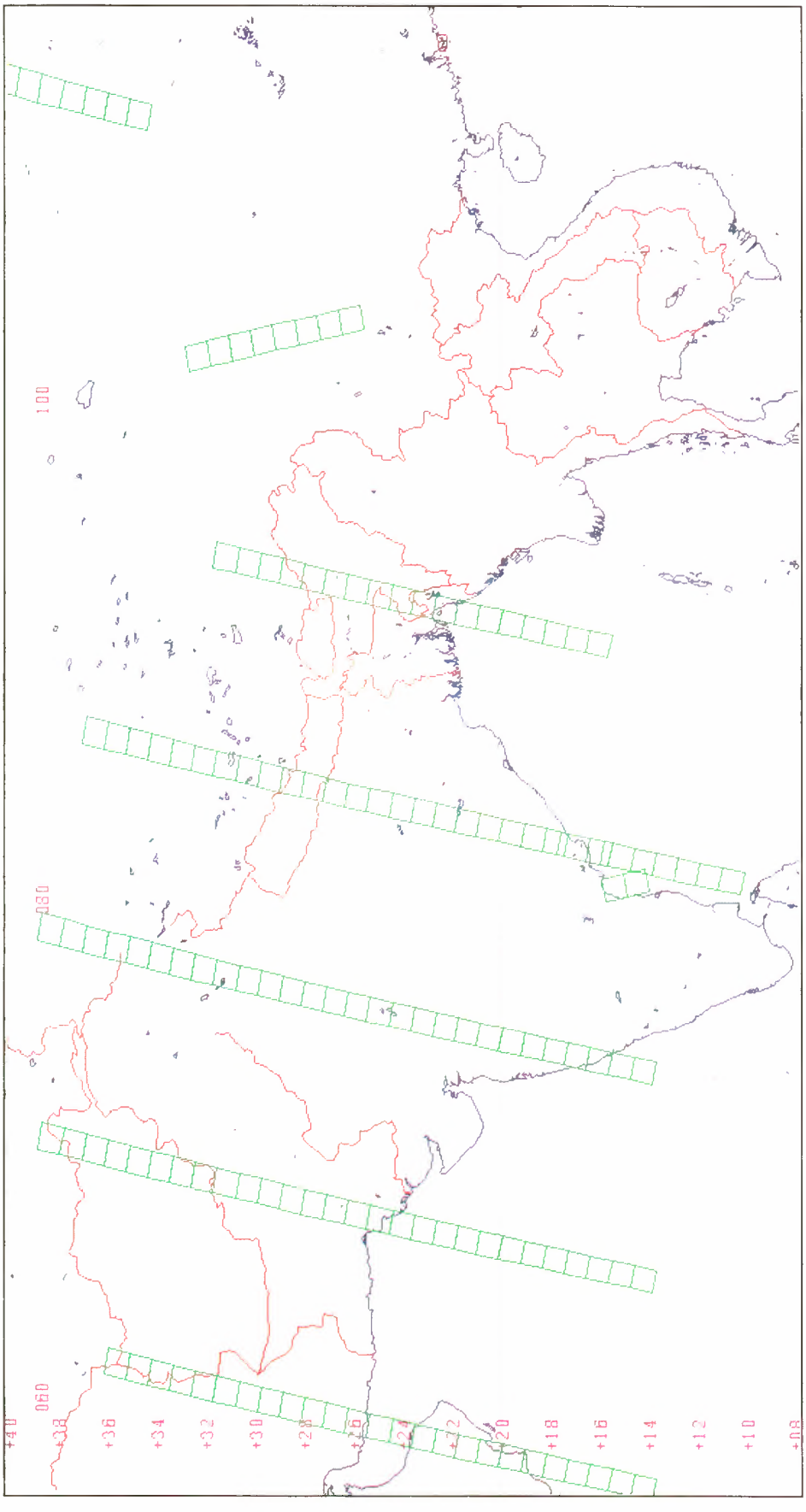


Figure 5.8. Japan and Eastern Asia
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

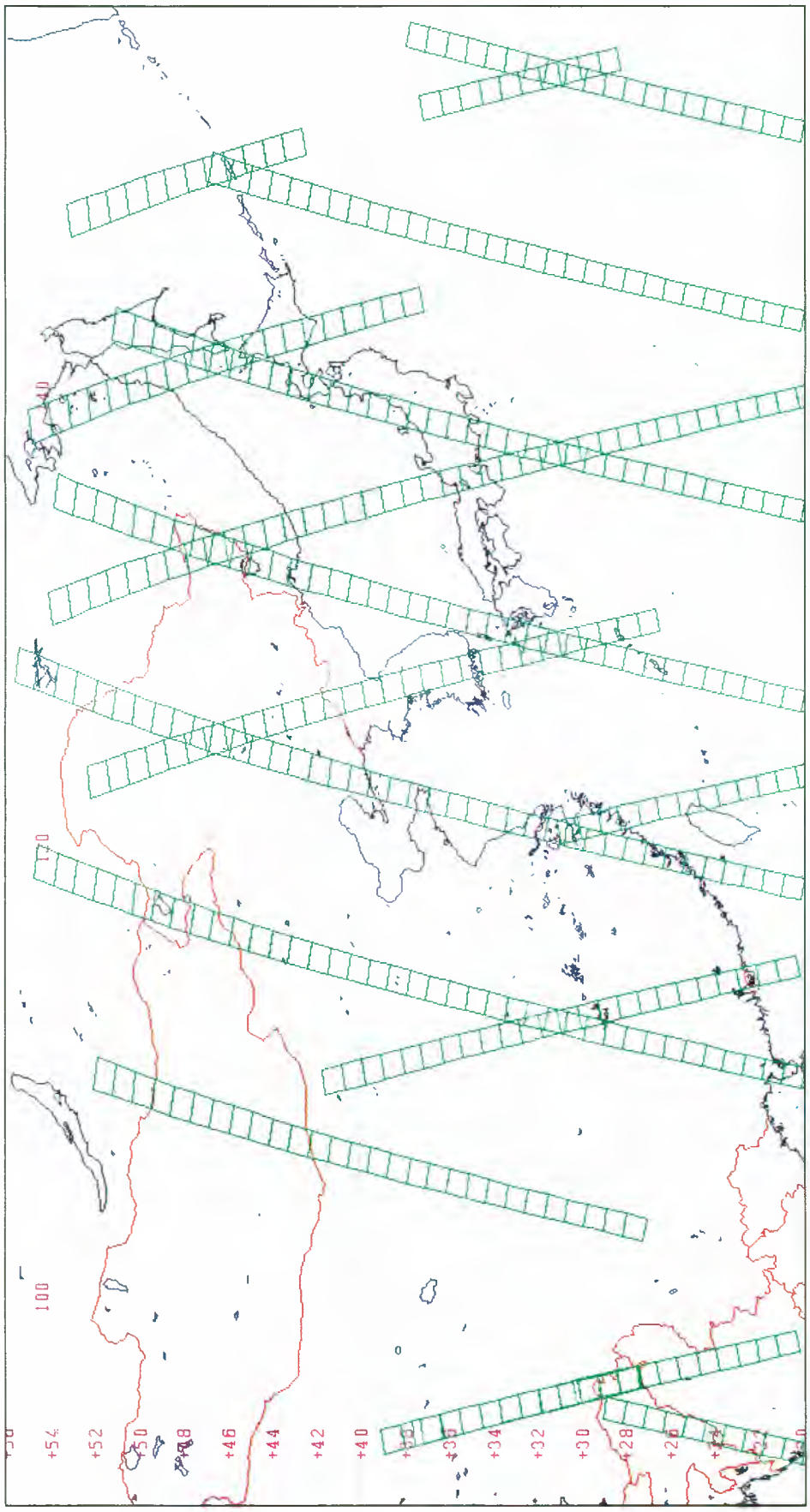


Figure 5.9. Japan and Eastern Asia
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

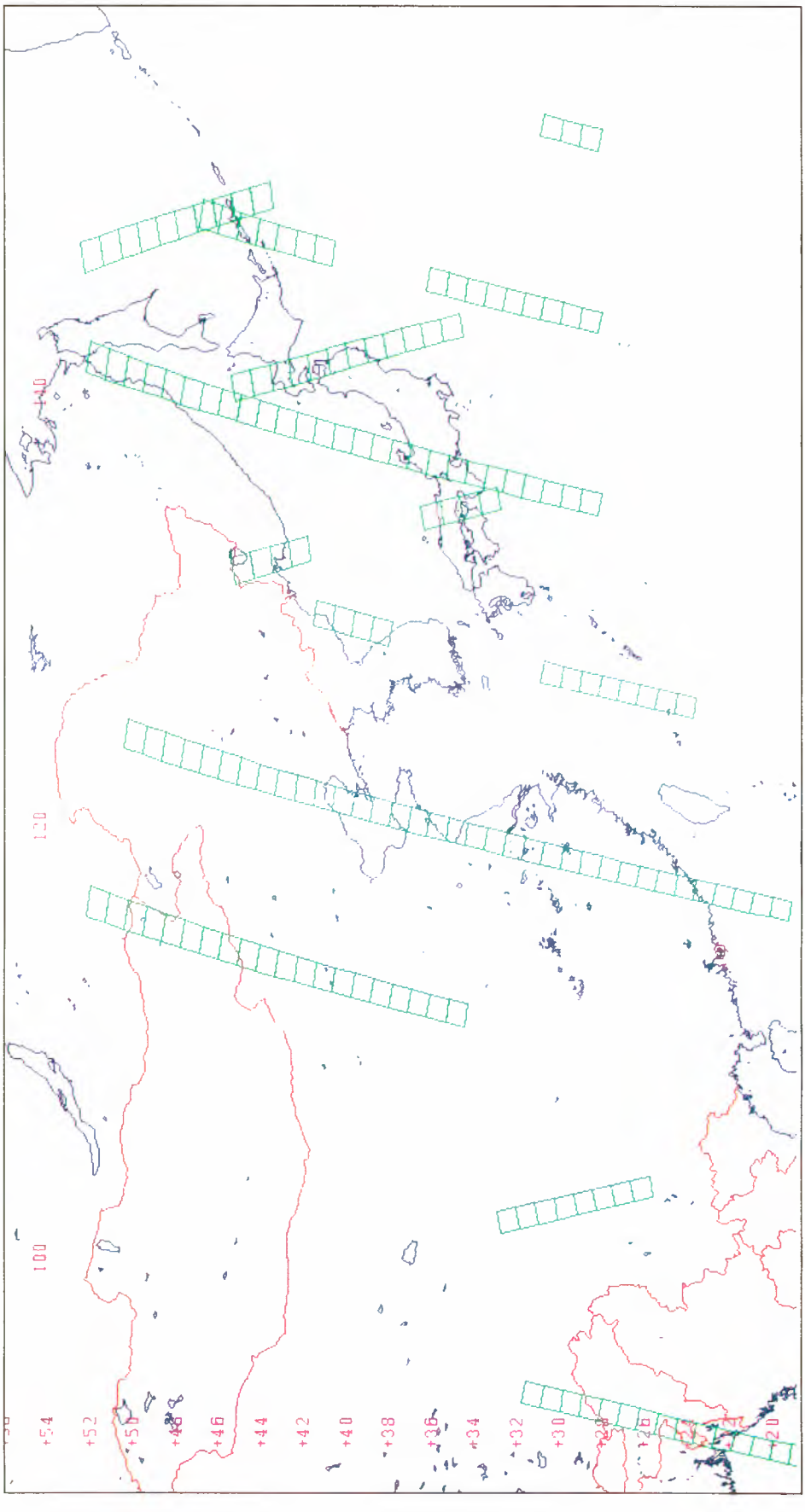


Figure 5.10. Australia
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

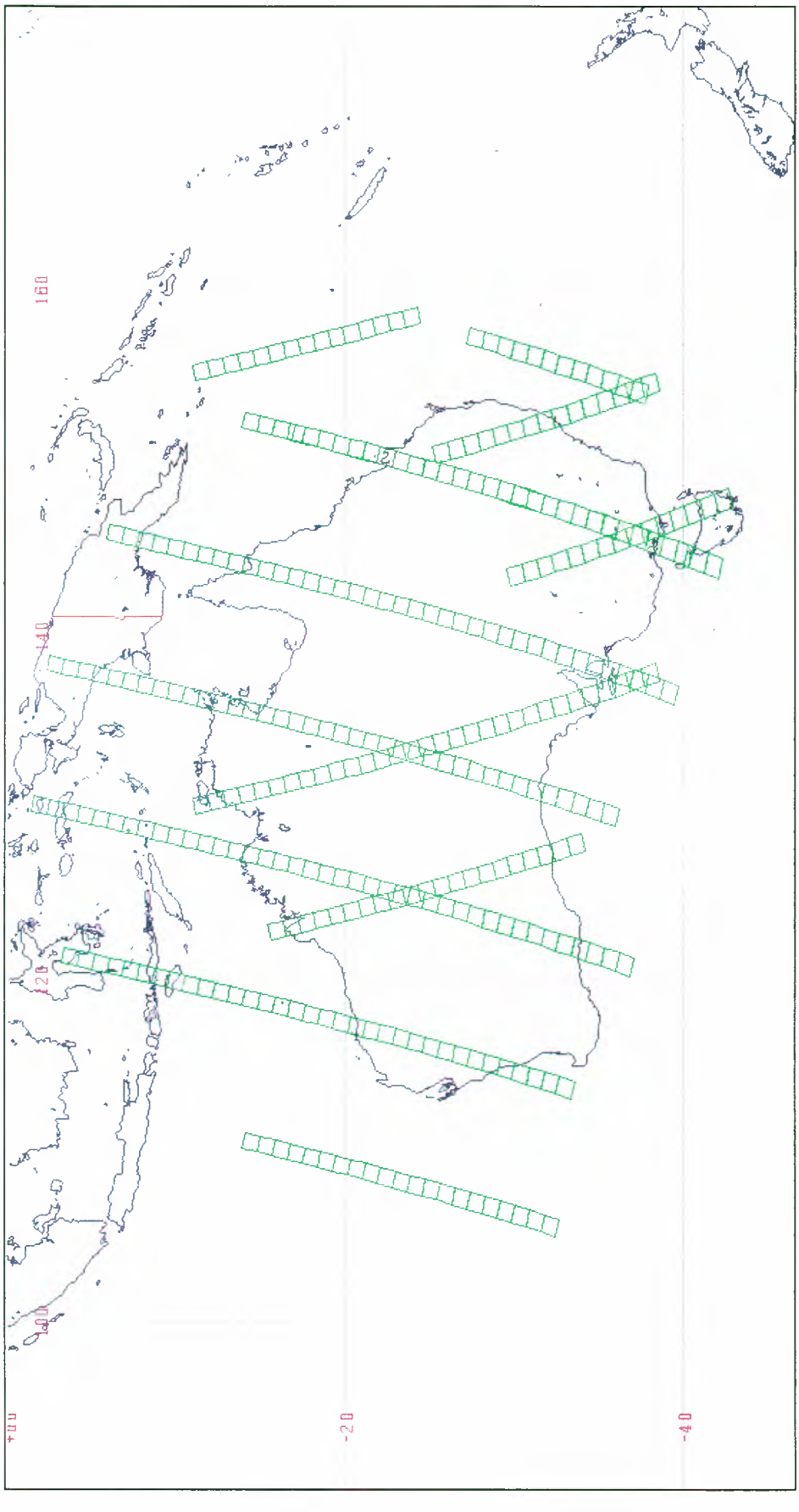


Figure 5.11. Australia
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

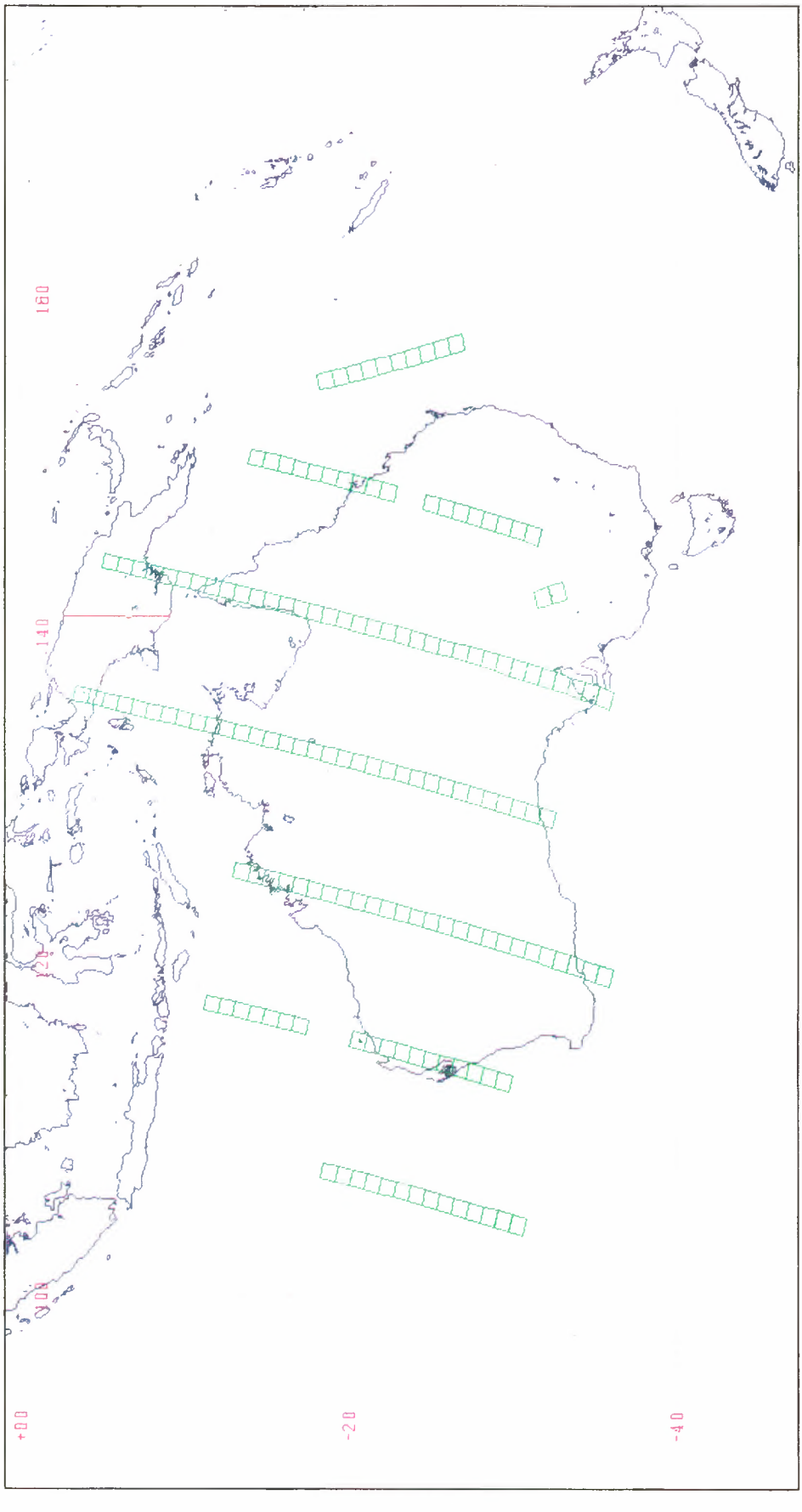
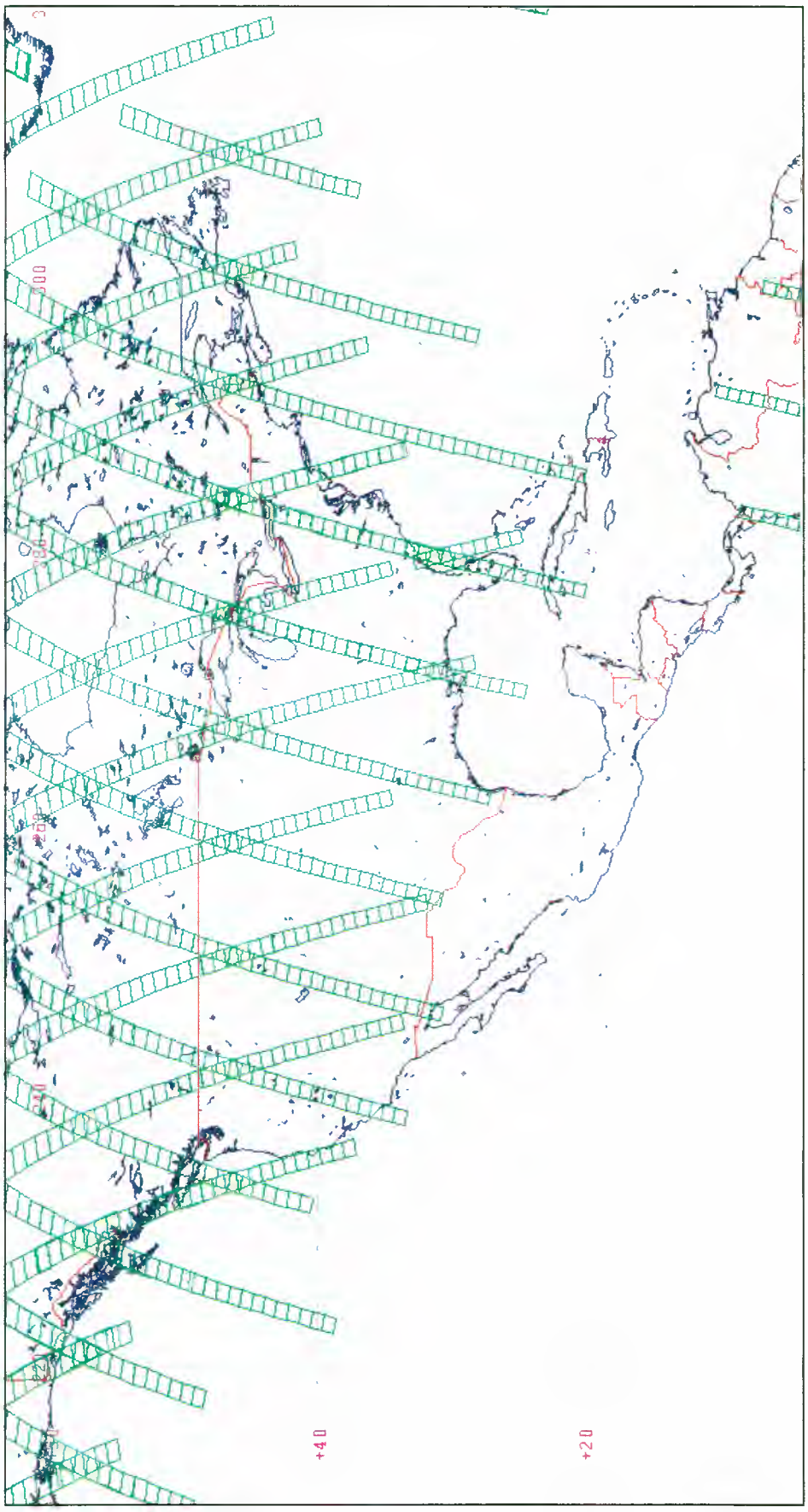


Figure 5.12. Central North America
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)



Figue 5.13. Central North America
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

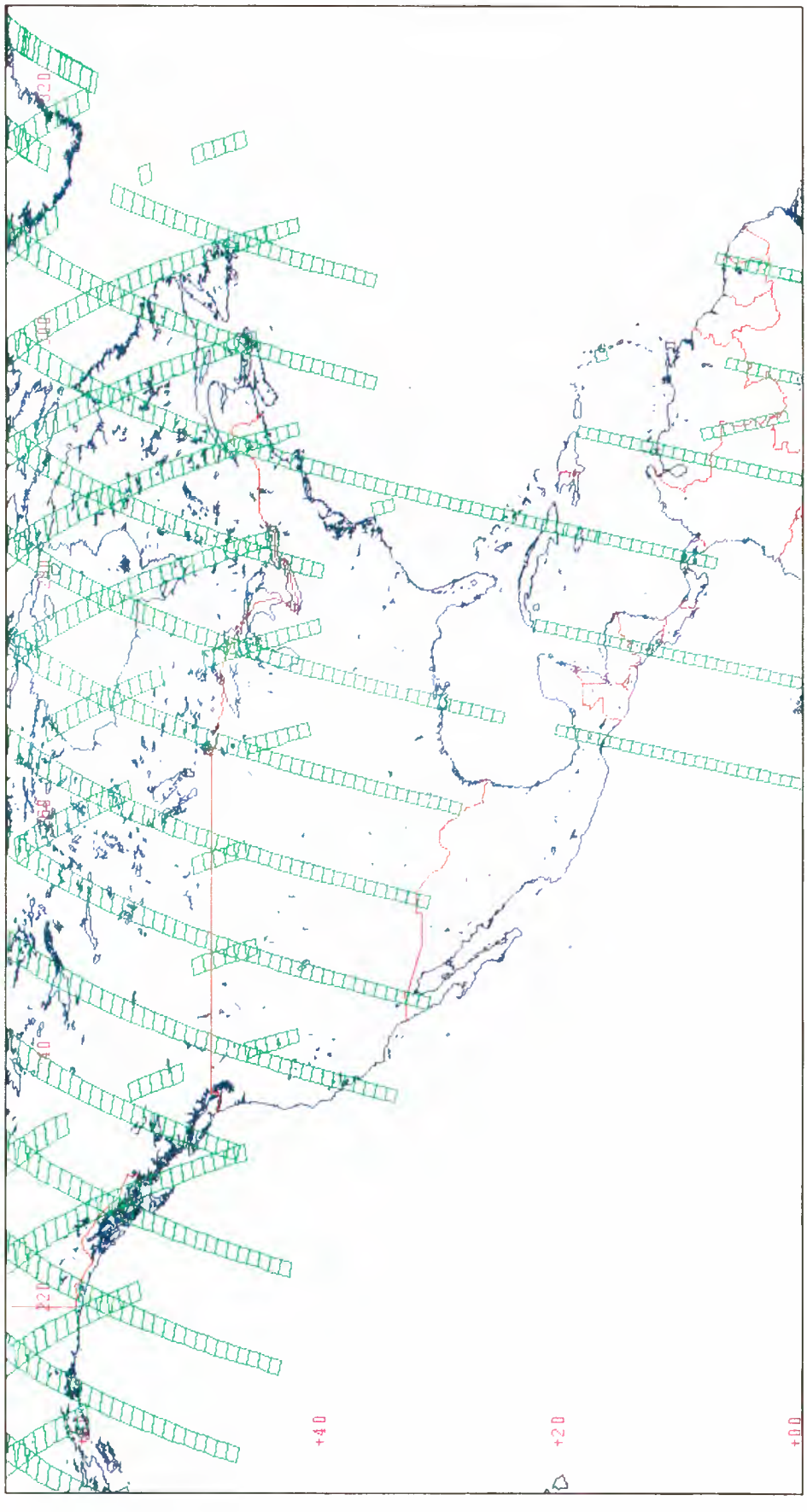


Figure 5.14. Latin America
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

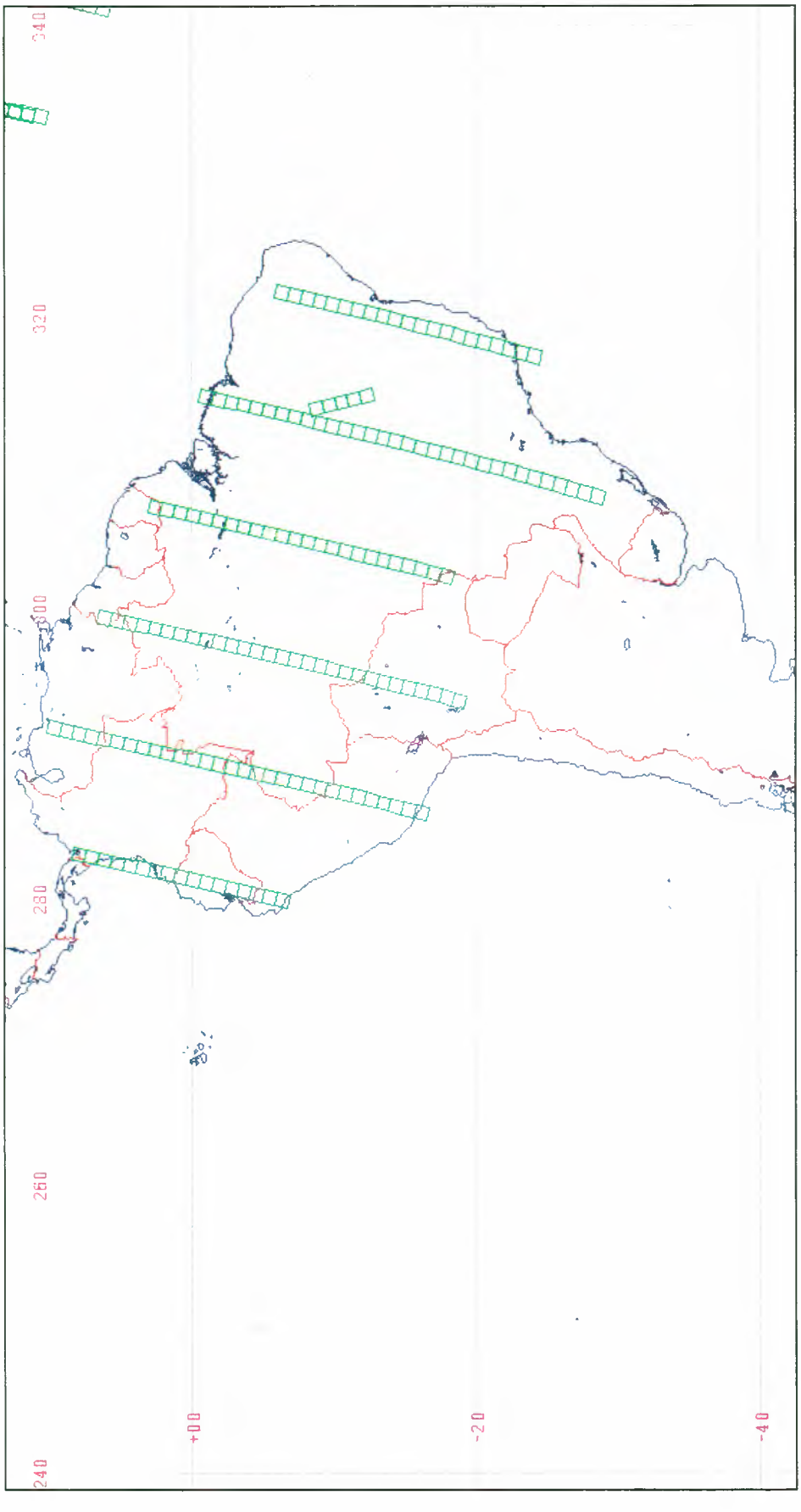


Figure 5.15. Latin America
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

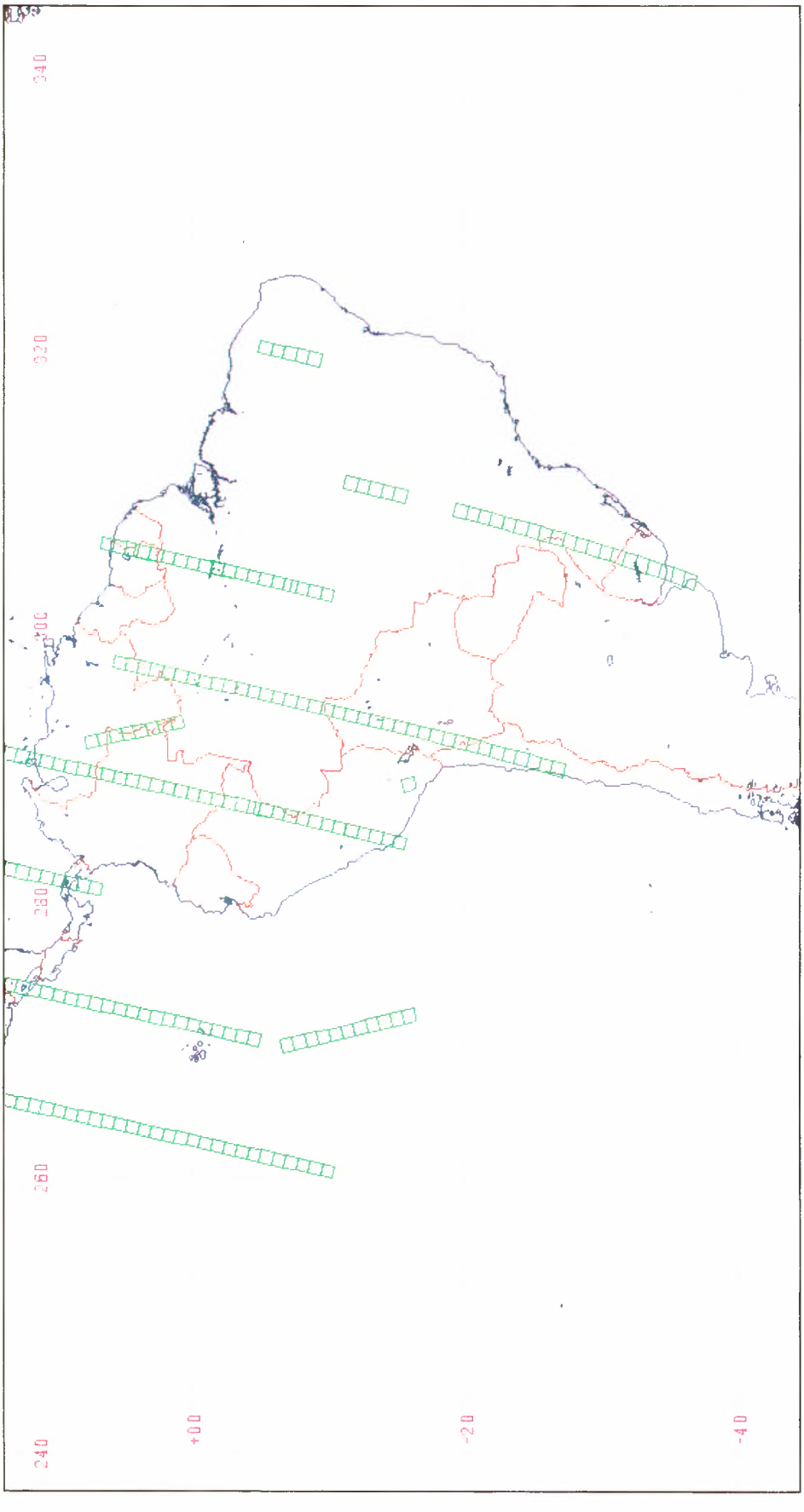


Figure 5.16. North American Arctic
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

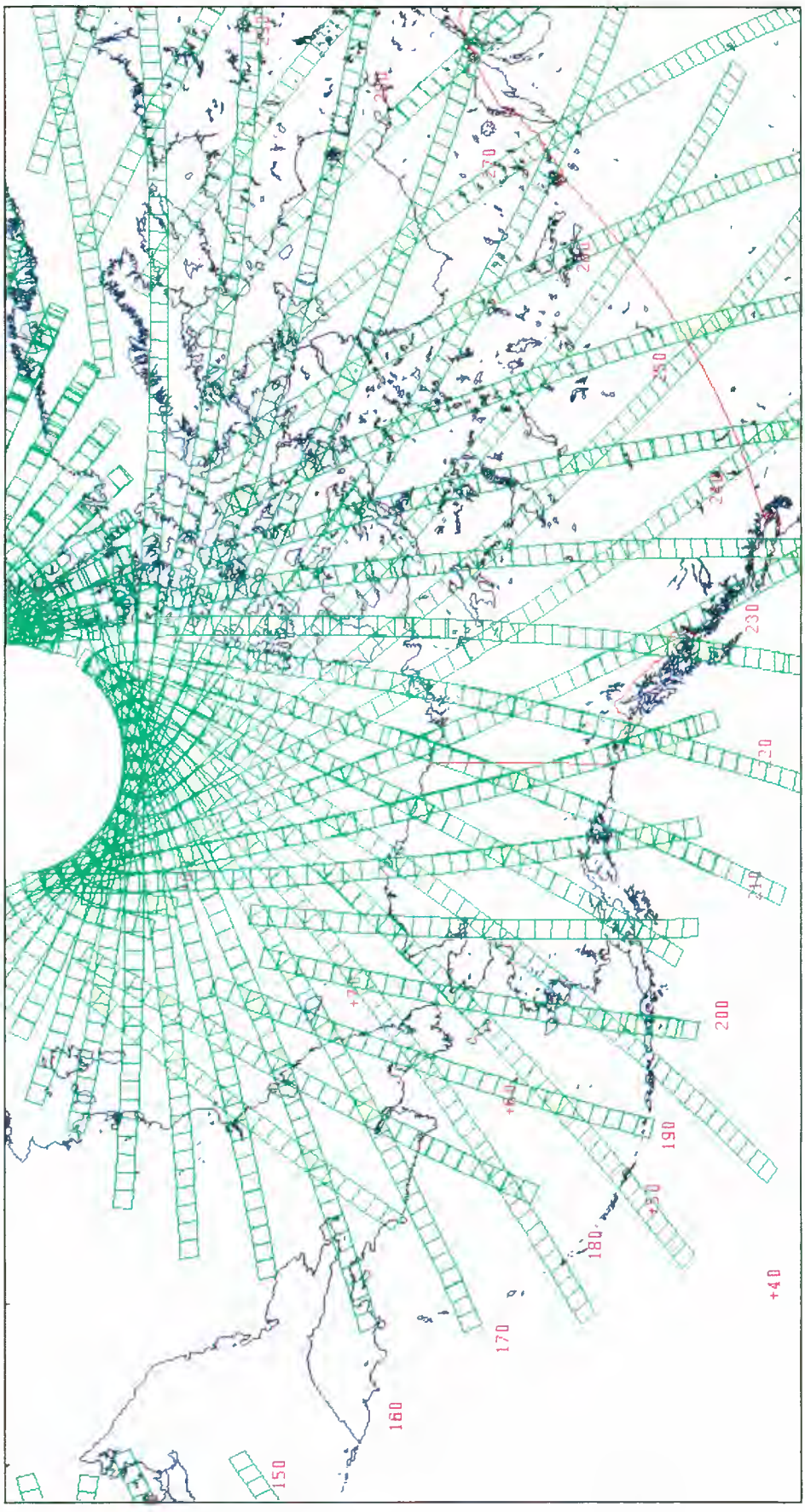


Figure 5.17. North American Arctic
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

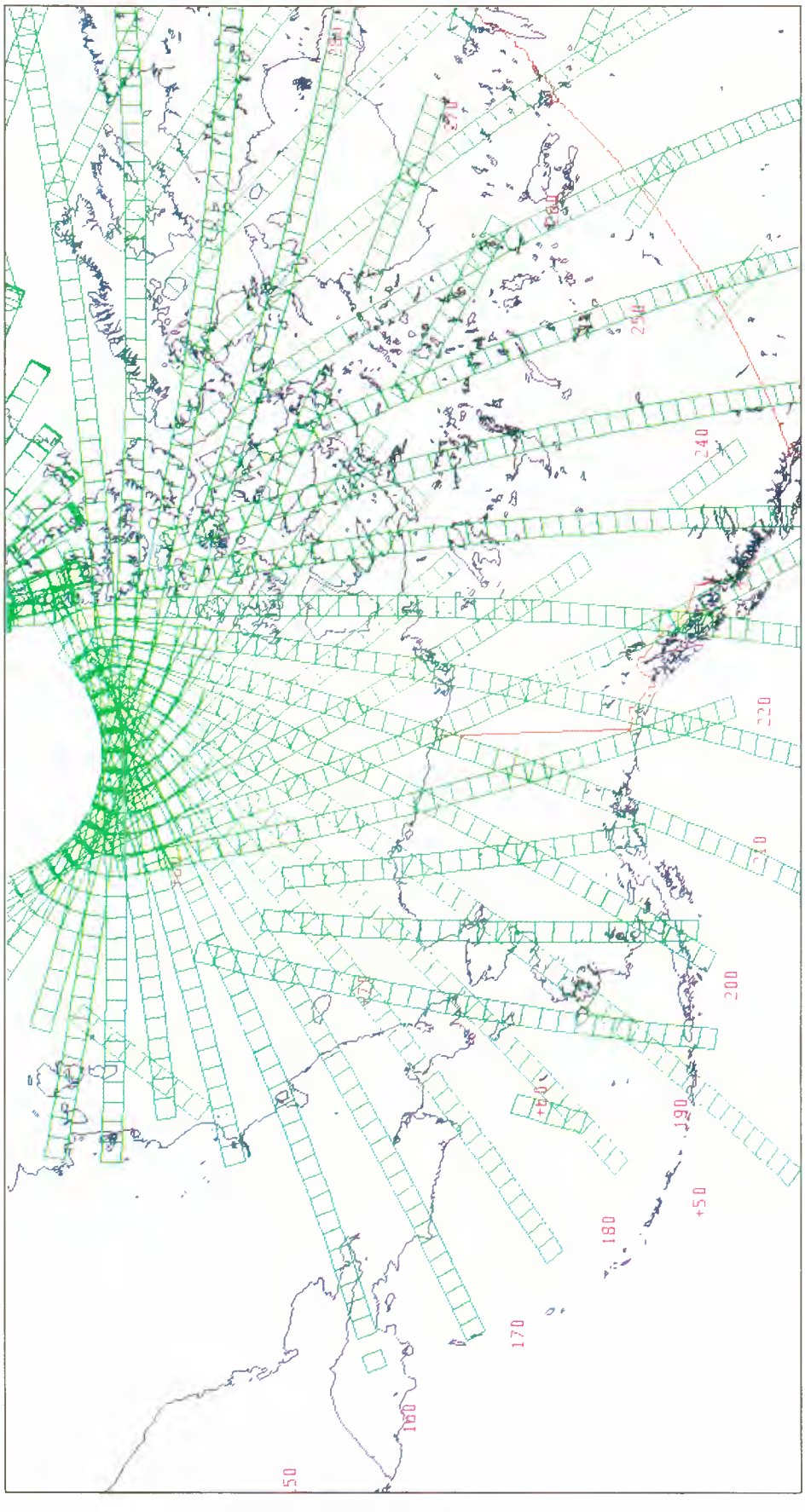


Figure 5.18. Greenland and European Arctic
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

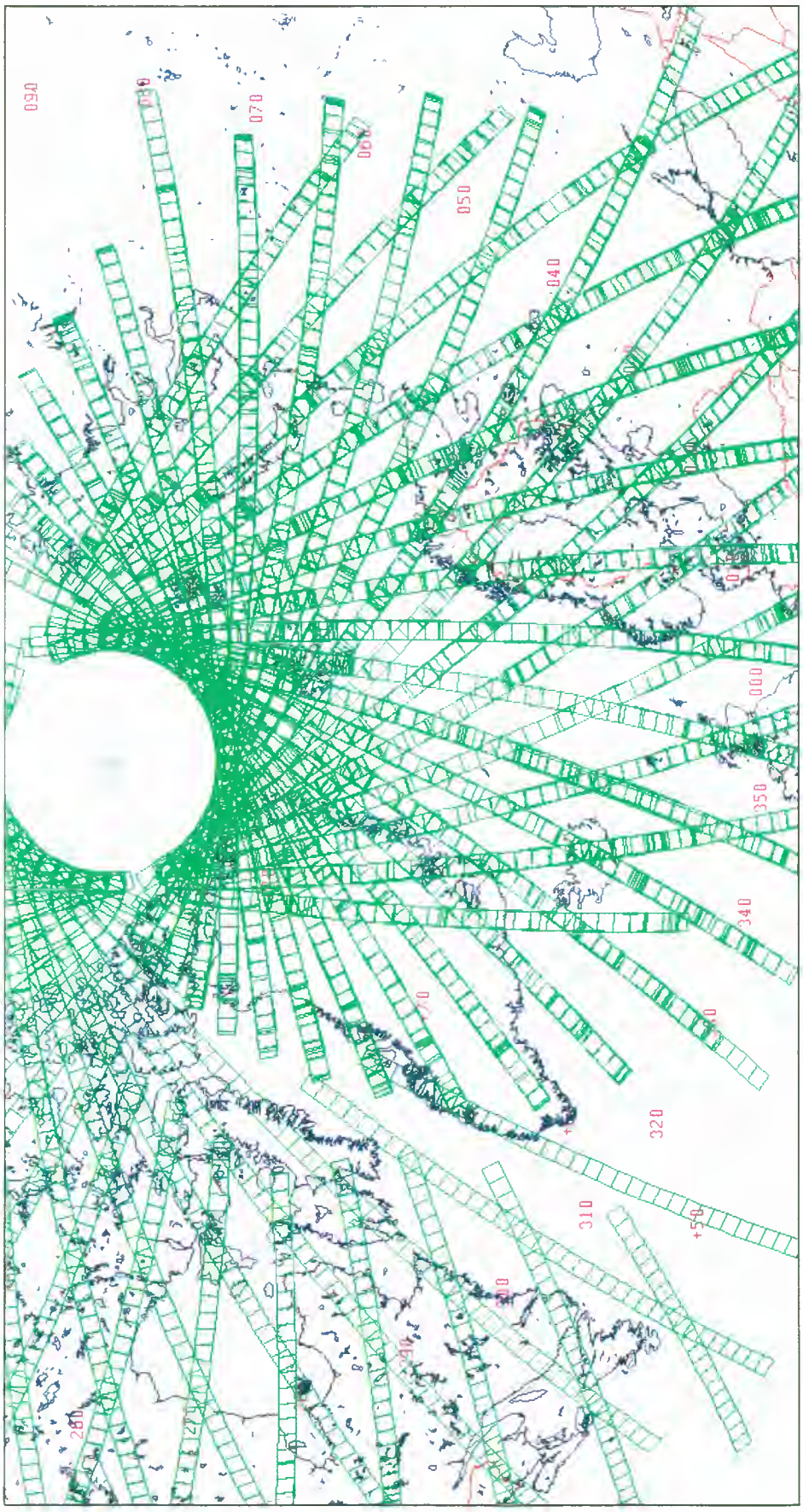


Figure 5.19. Greenland and European Arctic
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

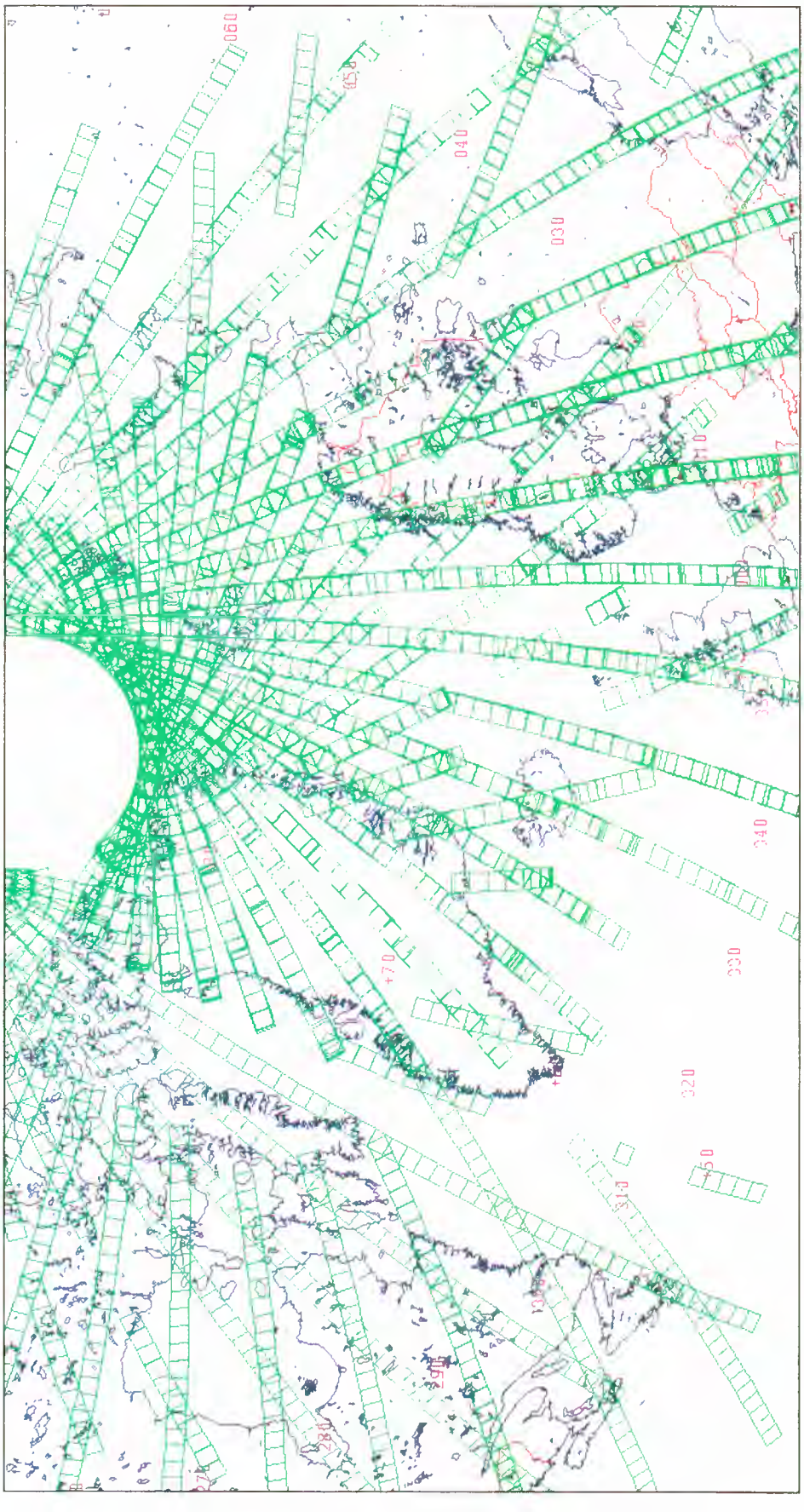


Figure 5.20. Antarctica
SAR Coverage – Commissioning Phase (25 July 1991 to 10 December 1991)

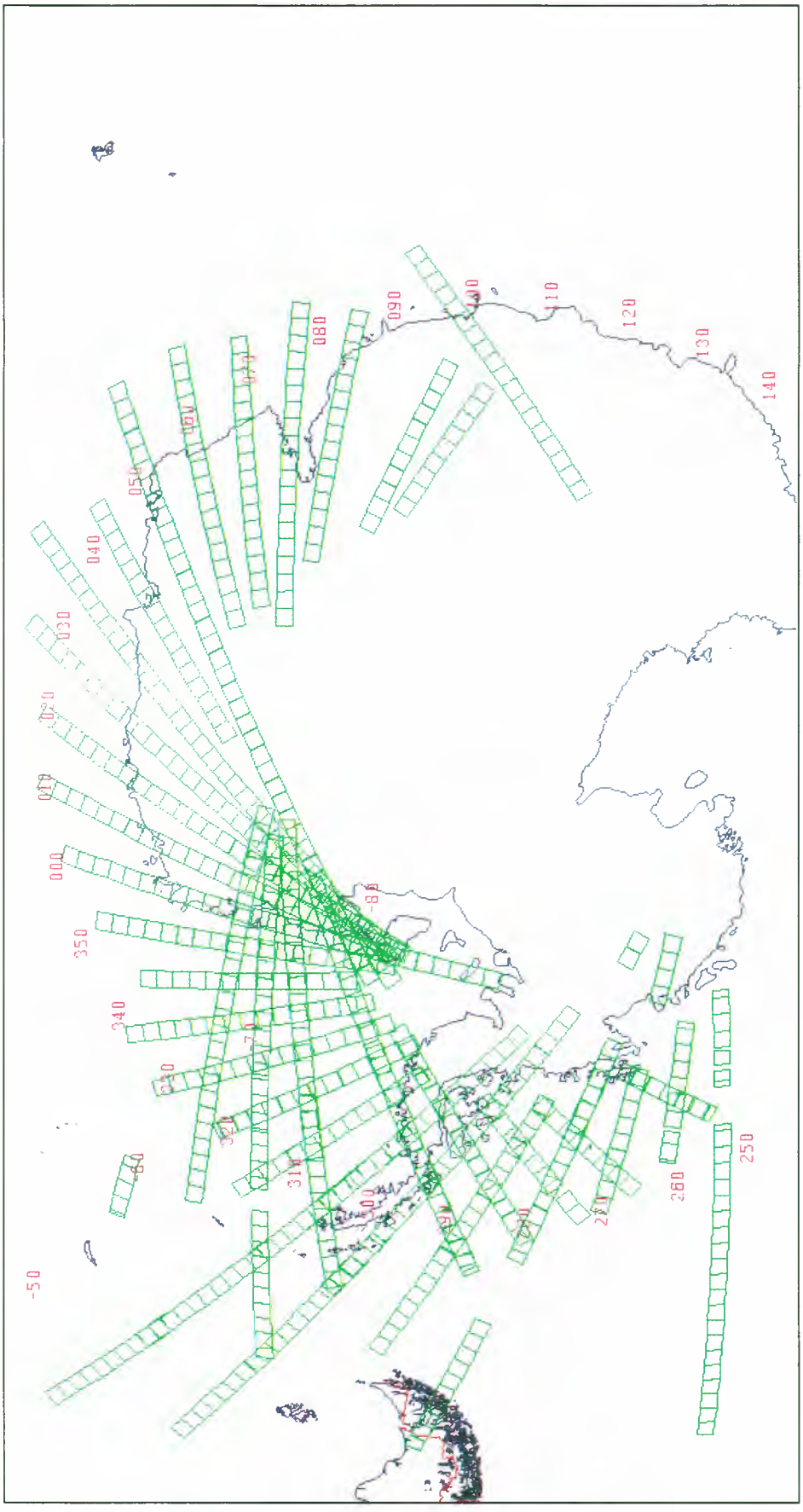


Figure 5.21. Antarctica
SAR Coverage – First Ice Phase (28 December 1991 to 1 April 1992)

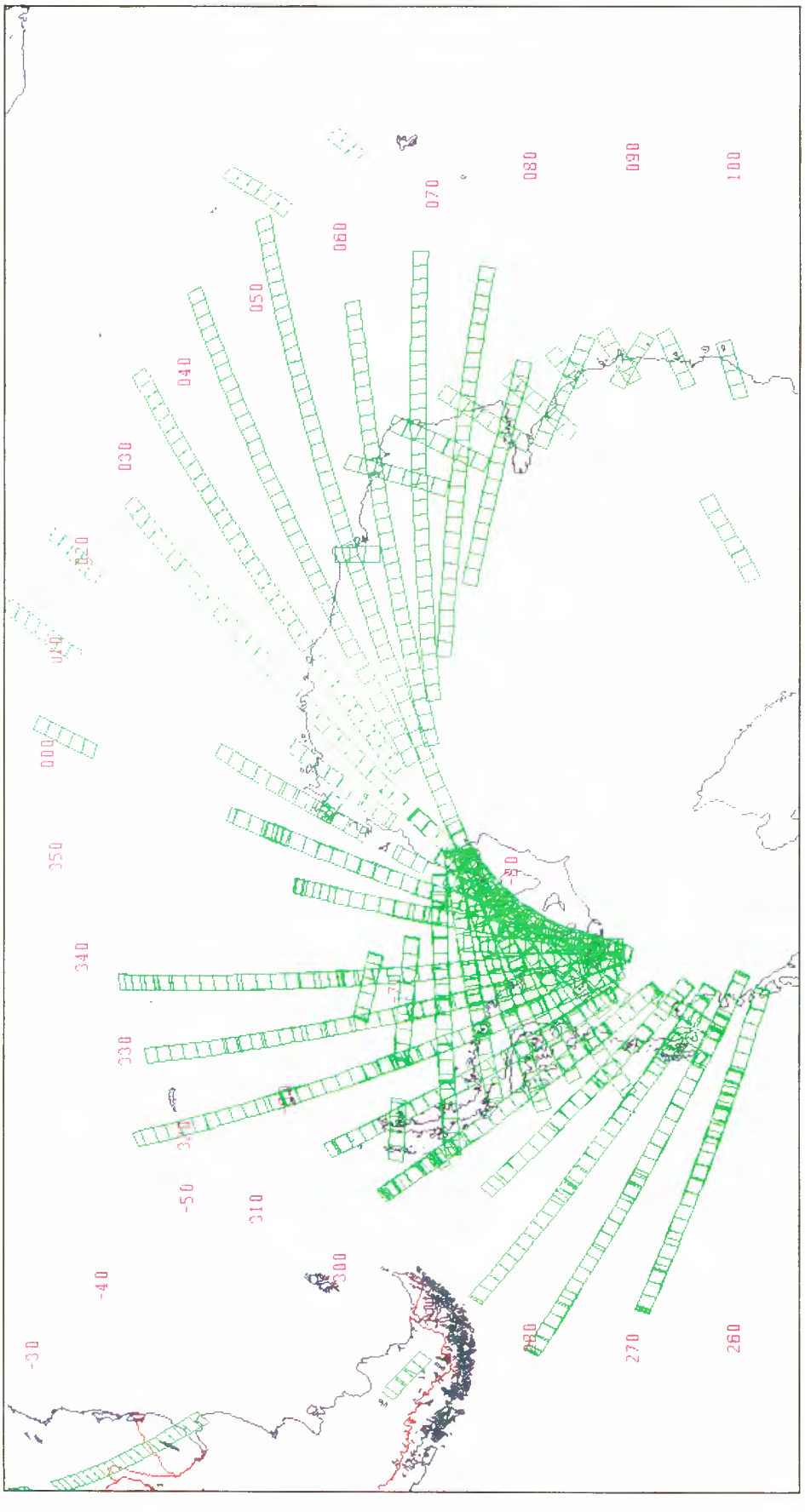


Figure 5.22. Europe
SAR Coverage – Roll-Tilt Mode Phase (2 April 1992 to 14 April 1992)

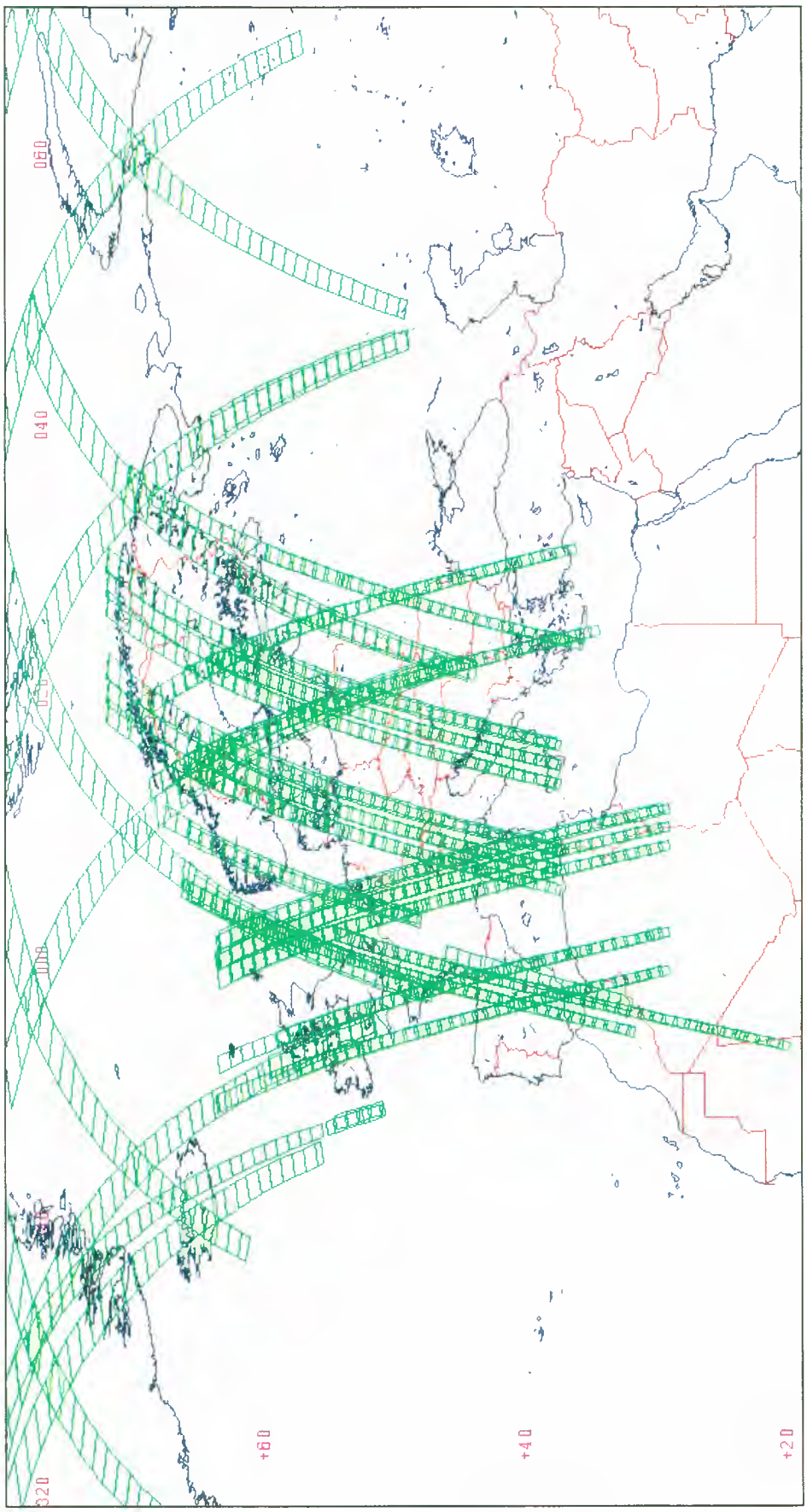


Figure 5.23. The Arctic
SAR Coverage – Roll-Tilt Mode Phase (2 April 1992 to 14 April 1992)

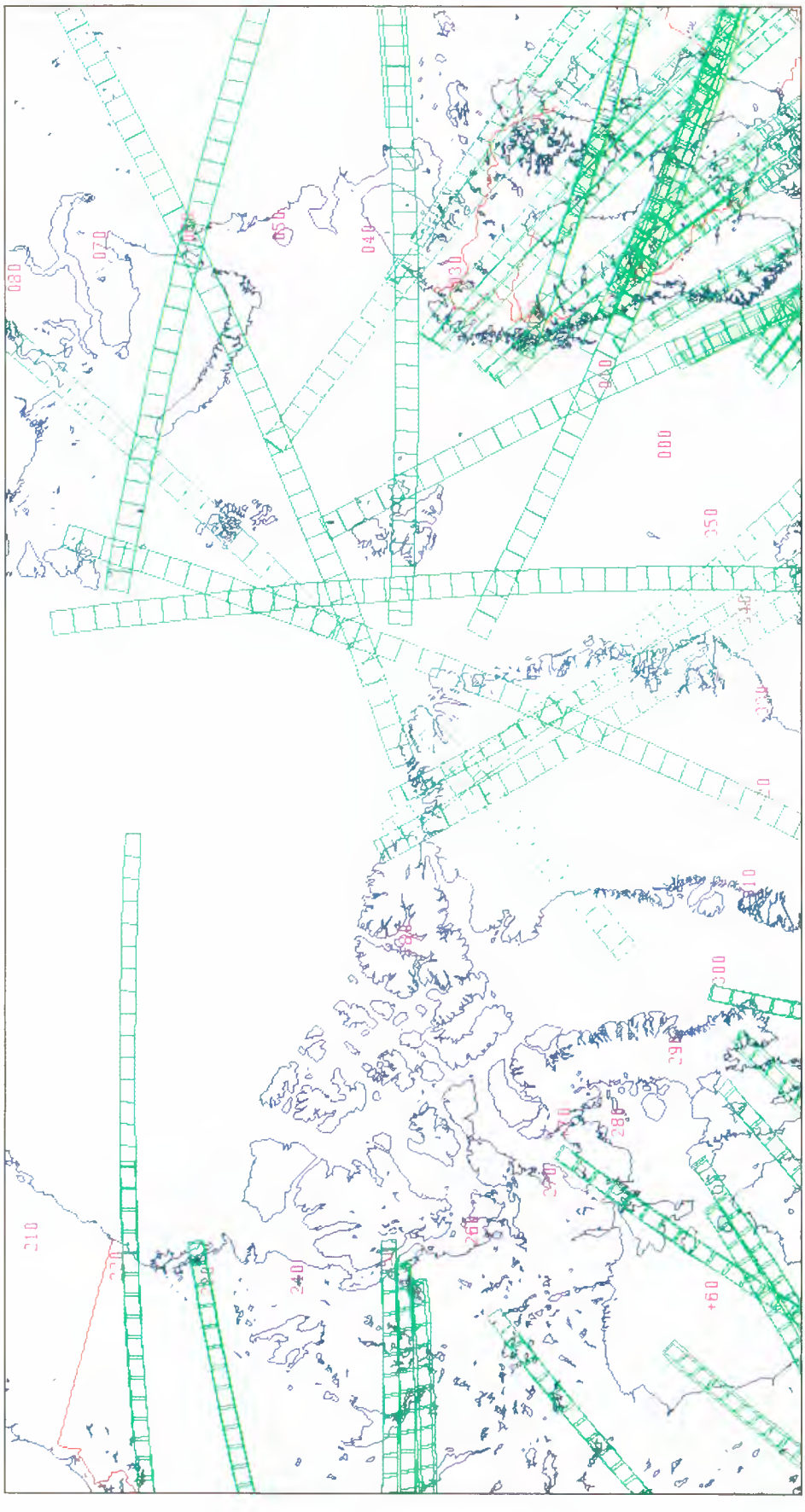


Figure 5.24. North America
SAR Coverage – Roll-Tilt Mode Phase (2 April 1992 to 14 April 1992)

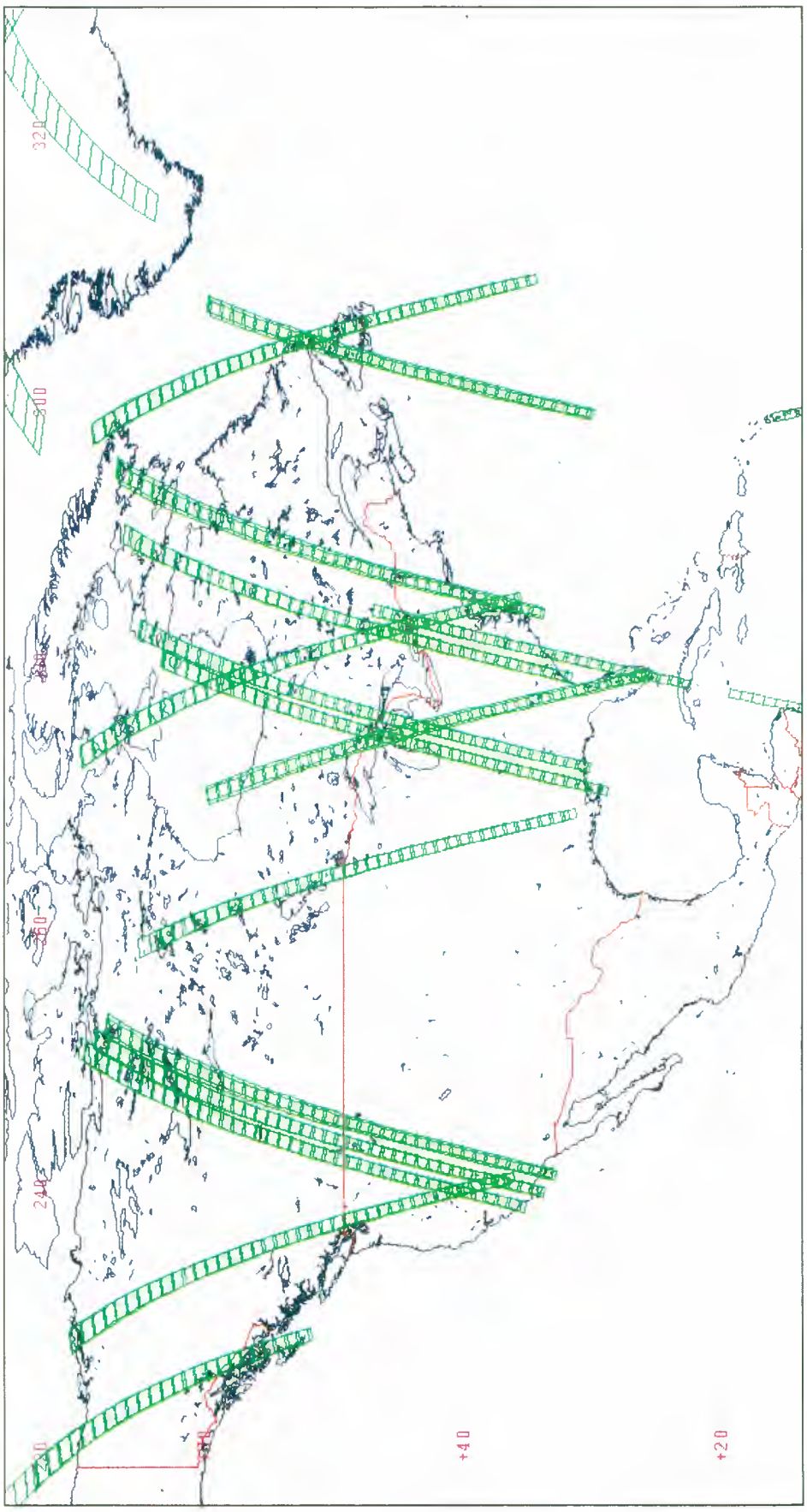


Figure 5.25. Latin America
SAR Coverage – Roll-Tilt Mode Phase (2 April 1992 to 14 April 1992)

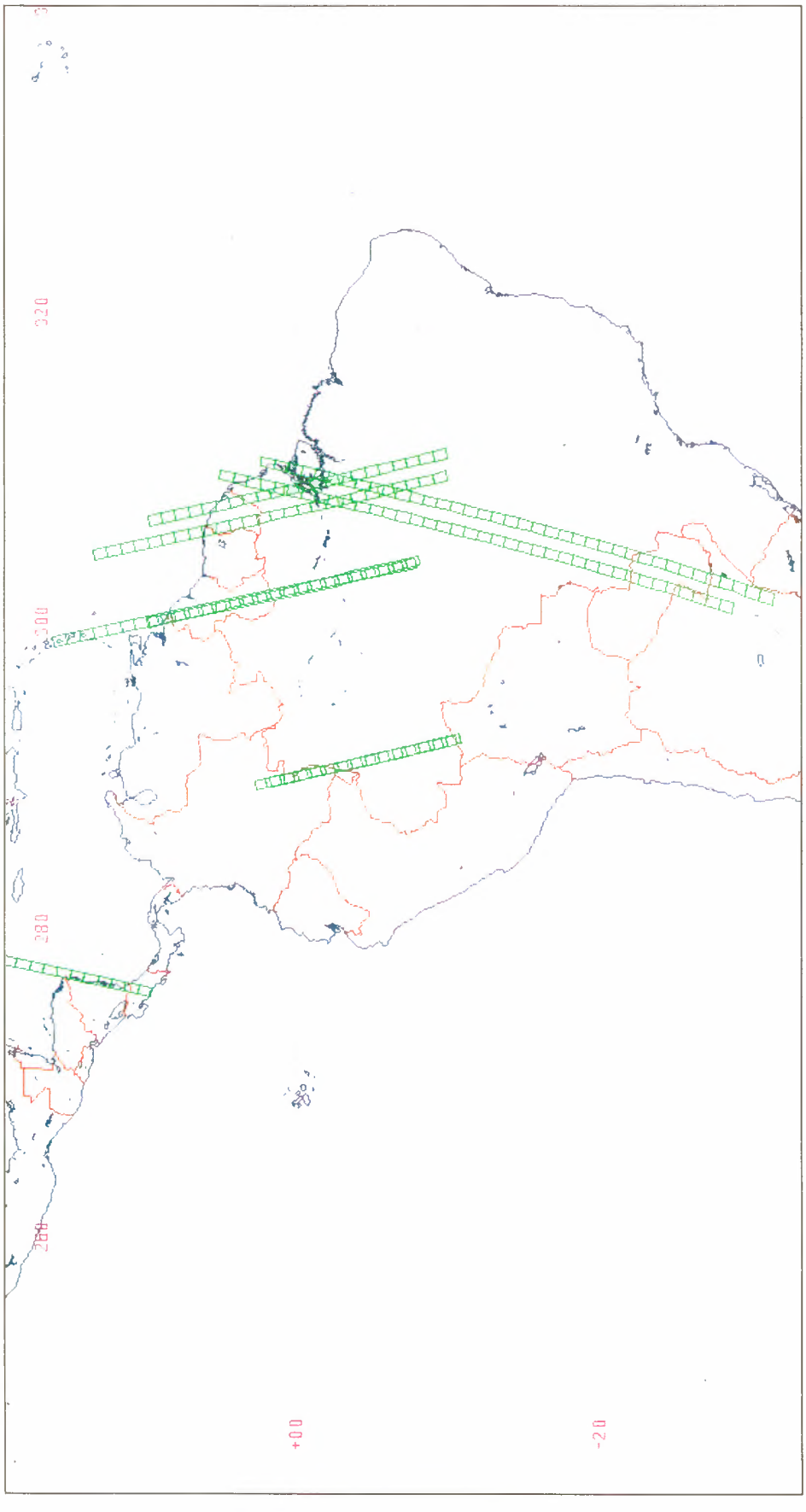


Figure 5.26. The World
SAR Coverage – Multidisciplinary Phase (14 April 1992 to 21 December 1993)

Figure 5.27. The Arctic
SAR Coverage – Multidisciplinary Phase (14 April 1992 to 21 December 1993)

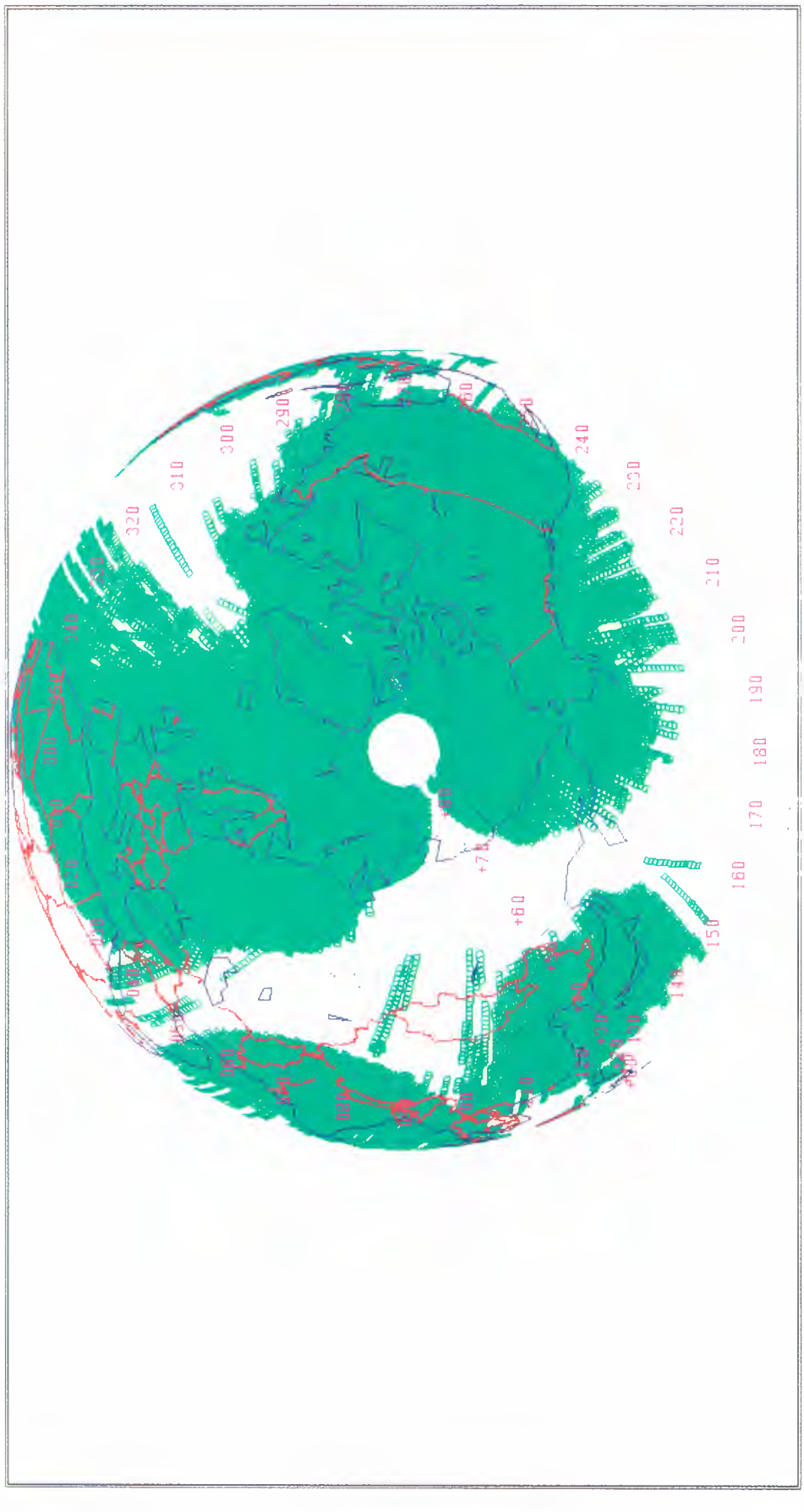
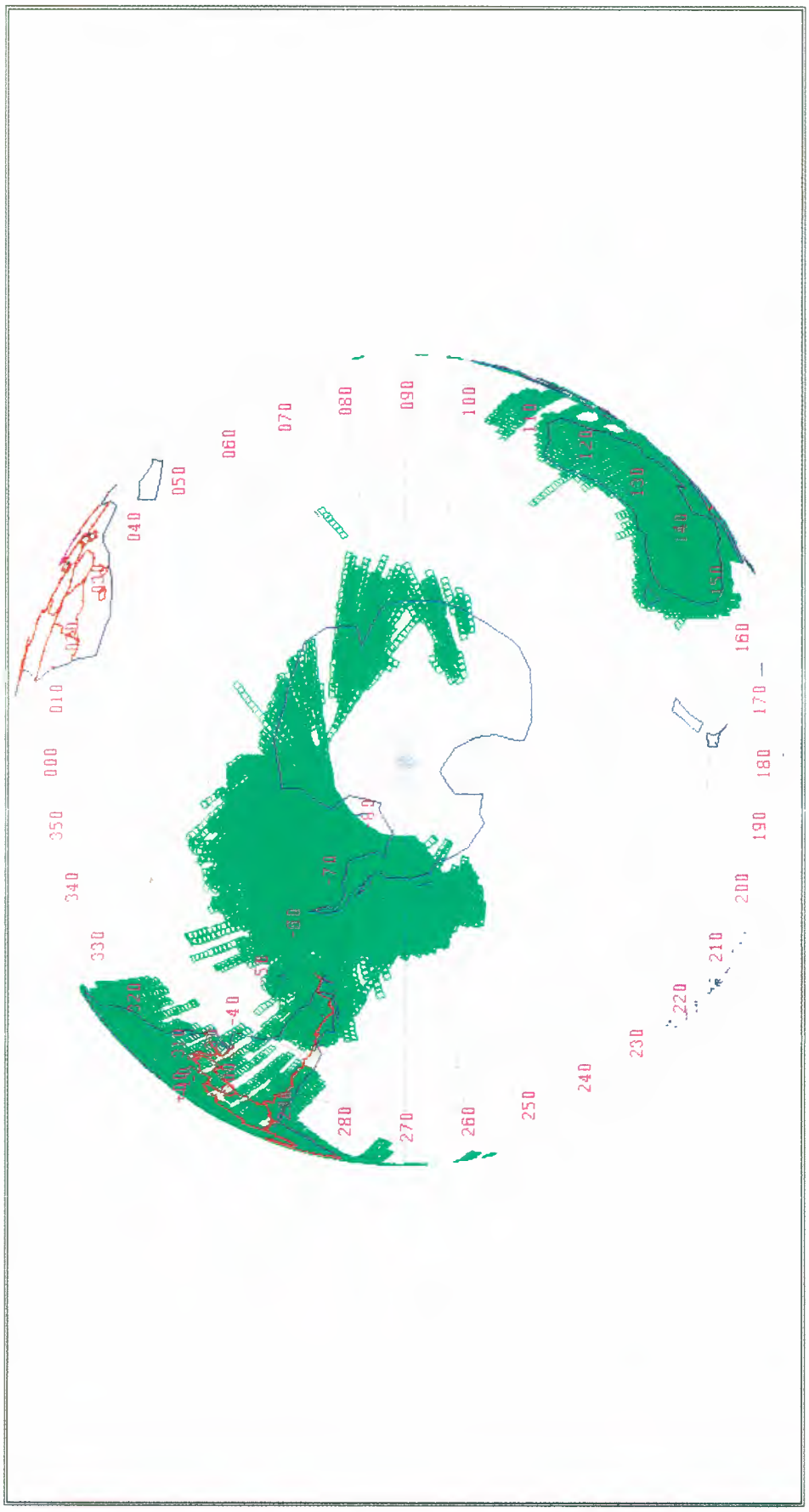


Figure 5.28. Antarctica
SAR Coverage – Multidisciplinary Phase (14 April 1992 to 21 December 1993)



APPENDICES

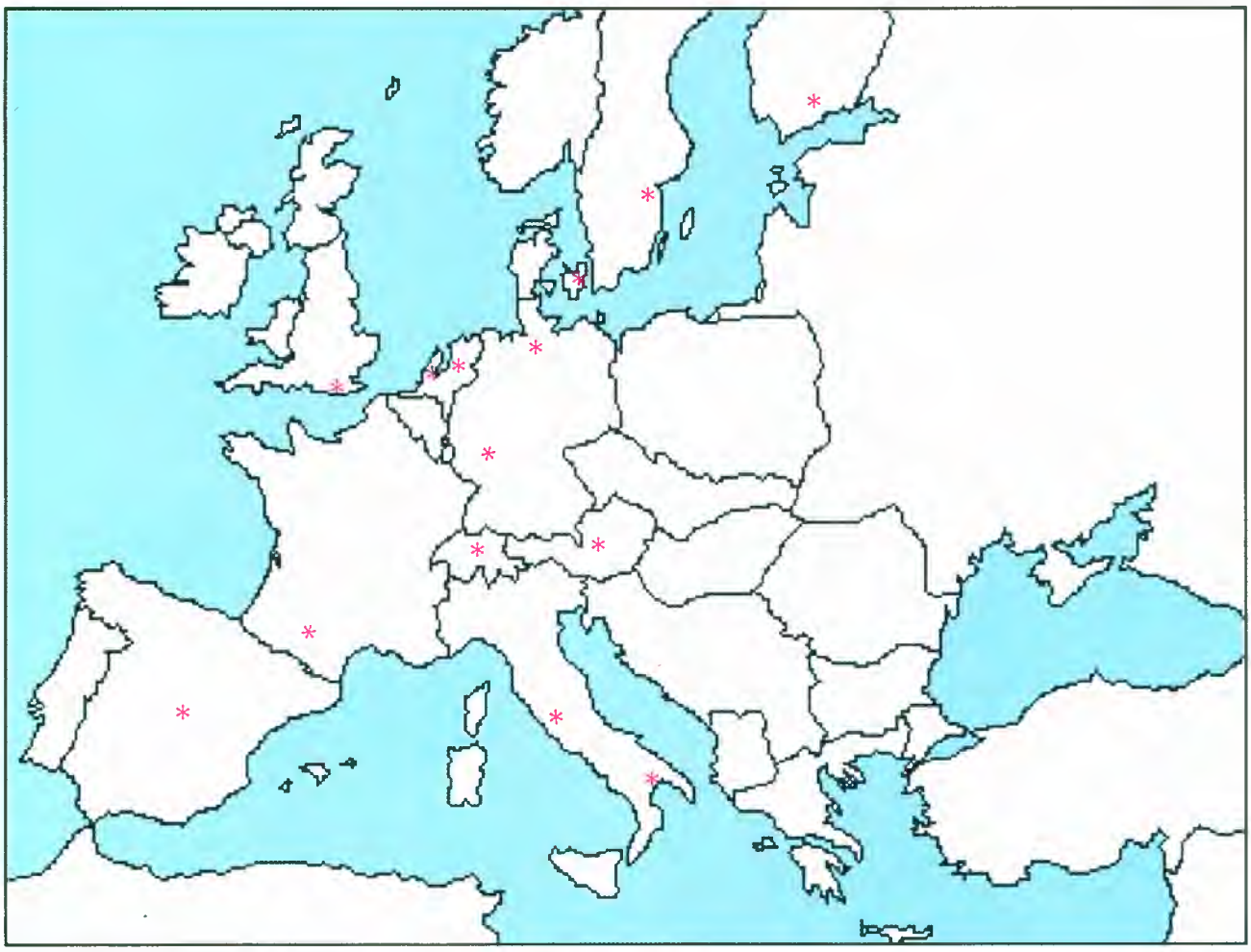
APPENDIX A - Dates of ERS-1 Mission Phases

Phase		Mission Orbits	Start	End	Repeat Cycle
Commissioning	Phase A	126 to 2103	25 July 1991	10 December 91	43 orbits = 3 days
First Ice	Phase B	2354 to 3695	28 December 1991	1 April 1992	43 orbits = 3 days
Roll-Tilt Mode	Phase R	3735 to 3900	2 April 1992	14 April 1992	501 orbits = 35 days
Multidisciplinary	Phase C	3901 to 12725	14 April 1992	21 December 1993	501 orbits = 35 days
Second Ice*	Phase D	12754 to 14147	23 December 1994	30 March 1994	43 orbits = 3 days
Geodetic*	Phase E		1 April 1994	mission end	2411 orbits = 168 days

* Nominal dates; actual dates will be available two months before these dates.

Transition manoeuvres will take place between phases.

APPENDIX B - SAR FD Nominated Centres



Austria, Bad Ischl
Denmark, Copenhagen
Finland, Espoo
France, Toulouse
Germany, Hamburg and Darmstadt (ESOC)
Italy, Matera and Frascati (ESRIN)
Norway, Tromsø *
Spain, Madrid
Sweden, Norrköping
Switzerland, Zurich
The Netherlands, Emmeloord and Noordwijk (ESTEC)
United Kingdom, Farnborough

(Centres marked with * are not shown on the map)

APPENDIX C - LBR FD Nominated Centres

Canada, Downsview / Toronto *
Denmark, Copenhagen
France, Toulouse
Germany, Oberpfaffenhofen (D-PAF)
Italy, Rome
The Netherlands, De Bilt and Emmeloord
Norway, Oslo and Tromso *
Spain, Madrid
Sweden, Solna and Kiruna *
Switzerland, Zurich
United Kingdom, Bracknell and Farnborough

United States, Washington*

(Centres marked with * are not shown on the map)

APPENDIX D - Items Available from the ERS Help Desk

DOCUMENTATION

General

ERS-1 System	ESA-SP-1146
ERS-1 User Handbook	ESA-SP-1148
ERS-1 Product Specifications	ESA-SP-1149
ERS-1 Ground Station Products Specifications for Users	ER-IS-EPO-GS-0204
Proceedings of the Second ERS-1 Symposium, Hamburg Oct '93	–
DDN Value Added Services at ESRIN, Quick Guide	–

SAR

DESC User Guide	ER-MA-EEU-GU-2301
AMI Unavailability Periods Since Launch	EX/E/92-10-002
ERS-1 SAR Products CCT Format Specifications	ER-IS-EPO-GS-0506
Annex A. ERS-1 SAR.RAW Product CCT Format Specifications	ER-IS-EPO-GS-0506.1
Annex B. ERS-1 SAR.FDC Product CCT Format Specifications	ER-IS-EPO-GS-0506.2
Annex C. ERS-1 SAR.SLC Product CCT Format Specifications	ER-IS-EPO-GS-0506.3
Annex D. ERS-1 SAR.PRI Product CCT Format Specifications	ER-IS-EPO-GS-0506.4
Annex E. ERS-1 SAR.GEC Product CCT Format Specifications	ER-IS-EPO-GS-0506.5
Annex F. ERS-1 SAR.GTC Product CCT Format Specifications	ER-IS-EPO-GS-0506.6
ERS-1 SAR Low Resolution Product Specification	ER-TN-ESA-GS-0207
ERS-1 SAR Calibration – Derivation of Backscattering Coefficient in ERS-1.SAR.PRI Products	–
ERS-1 SAR Radiometric Calibration (CEOS SAR Calibration Workshop)	ESA WPP-048
Proceedings of the First SAR Interferometry Working Group, Frascati Oct '92	–

Low Bit Rate

RA Unavailability Periods Since Launch	DEX/E/92-10-002
ATSR Unavailability Periods Since Launch	DEX/E/93-01-002
ERS-1 LBR Products CCT Format Specifications	ER-IS-EPO-GS-0502
Altimeter Products User Manual	C1-EX-MUT-A21-01-CN
ERS-1 ALT Products CCT Format Specifications	ER-IS-EPO-GS-0503
Annex A. ERS-1 ALT.RAW Product CCT Format Specifications	ER-IS-EPO-GS-0503.1
Annex B. ERS-1 ALT.FDC Product CCT Format Specifications	ER-IS-EPO-GS-0503.2
Annex D. ERS-1 ALT.OPR Product CCT Format Specifications	ER-IS-EPO-GS-0503.4
ERS-1 WSC.FDC Product CCT Format Specifications	ER-IS-EPO-GS-0504.2
ERS-1 WSC.DWP Product CCT Format Specifications	ER-IS-EPO-GS-0504.7
ERS-1 SWM.FDC Product CCT Format Specifications	ER-IS-EPO-GS-0505.2
CMOD3 Model Description	ER-TN-ESA-JP-0016
CMOD4 Model Description	ER-TN-ESA-GP-1120
A First Evaluation of ERS-1 ALT Ocean Products	–
Information Concerning the Second Release of ERS-1.ALT.OPR02 Products	–
Information Concerning the Fourth Release of ERS-1.ALT.OPR02 Products	ER/ALT/OPR/IN/JB/004
Quick-Look Ocean Product Records Product (ALT.QLOPR) Description	–
ERS-1 D-PAF Global Products Manual	–

SOFTWARE TOOLS
Display ERS-1 SAR Coverage (DESC) Software
CEOS Reader Software for Low Bit-Rate Products *
CEOS Reader Software for SAR Products *

COMPACT DISKS
The CD Guide to ERS-1
The ERS-1 SAR Reference Coverage CD-ROM (DESC, Braque)

OTHERS
ERS-1 SAR Reference Maps for Phase C (Europe, Northern and West Africa)

*** Indicates ERS software for CEOS formatted product ingestion**

All ESA ERS digital products are written to media using the international CEOS (Committee on Earth Observation Satellites) format standard. This format provides compatibility between products in terms of volume, file and record structures. Such compatibility allows software to be developed for the ingestion and subsequent processing of ERS products, secure in the knowledge that the format has been defined around a standard. Consequently, changes to the internal content of the product should not affect any of the fundamental operations that can be performed on ERS data products.

The ingestion programs are written in 'C' and the software is portable between all Unix-based systems. The release of software for use by Users who do not have a workstation/Unix-C environment will shortly be available. Format specifications for all the ESA ERS products are available.

APPENDIX E - ERS Ground Receiving Stations

Station	Operational
Alice Springs, Australia	24 August 1991
Aussaguel, France	April 1992 (end 30 September 1992)
Bangkok, Thailand	March 1993
Cotopaxi, Ecuador	1 September 1991
Cuiaba, Brazil	27 August 1991
Fairbanks, Alaska, USA	6 August 1991
Fucino, Italy	26 July 1991
Gatineau, Canada	6 August 1991
Hatoyama, Japan	15 August 1991
Hyderabad, India	30 October 1991
Kiruna, Sweden	26 July 1991
Kumamoto, Japan	15 August 1991
Libreville, Gabon (German Transportable Station)	late 1993
Maspalomas, Canary Islands, Spain	26 July 1991
O'Higgins (Antarctica), Germany	during campaigns only
Pare-pare, Indonesia	1994
Prince Albert, Canada	6 August 1991
Syowa (Antarctica), Japan	during campaigns only
Tromsø, Norway	3 August 1991
West Freugh, UK	8 August 1991

Contacts have been made between ESA and the following countries with a view to establishing further ground stations in:

- China (Beijing)
- Israel
- Pakistan (Islamabad)
- Saudi Arabia (Riyadh)
- Singapore
- South Africa
- Taiwan

APPENDIX F - Access Networks and Protocols

F.1 Introduction

You can access the EECF on-line facilities via the following Networks:

- the Scientific Internet Network using TCP/IP protocol and TELNET application
- public Packet-Switched Public Data Network (PSPDN) using X.29 interactive access.

F.2 Internet Network Access

Your terminal will have a permanent link to a network running IP protocol in your own country, either directly or through a mainframe computer at your site.

F.2.1 Connection Pre-requisites

For access to the EECF system via Internet connection, you or your Institution may need to be an Internet subscriber. In this case you will need to contact your System Manager or the Network Information Center (see address below) in order to obtain an Internet Address.
For more information about how to get Internet Access contact:

DDN Network Information Center
SRI International
333 Ravenswood Avenue
Menlo Park, California 94025
Tel. (+1-800) 235-3155 or (+1-415) 859-3695
Network mail: HOSTMASTER@NIC.DDN.MIL

F.2.2 Equipment Requirements

The Internet host must be set-up to allow Internet TELNET connection. This means that the TCP/IP software should be installed with its internal installation procedures.

F.2.3 Connection Cost

No cost is charged to you for using the Internet Network. Your Institution will be charged only for the physical telecommunication medium (leased line to connect with the nearest Internet node in your own country) when Internet Access is set-up.

F.3 PSPDN Access

Use one of the following methods for connecting to the PSPDN in your country:

- a fixed connection to the PSPDN where your terminal will have a permanent link to a network running the CCITT X.25 protocol, either directly or through a mainframe computer at the your site

- a dial-up connection to the PSPDN in which a dial-up modem is used to establish a link to the local network access point for the duration of the call to the EECF.

F.3.1 Connection Pre-requisites

To access the EECF system via dial-up connection into the PSPDN, you may need to be a subscriber to the national PSPDN. In this case you will need to contact your System Manager or the PTT's administrator in order to obtain a Network User Identifier (NUI). See Table 1 for the PSPDN pre-requisites for each country.

F.3.2 Equipment Requirements

X.25 telecommunications software on the terminal interface should be set for:

- 8 bit data, 1 stop bit and no parity
- full duplex communication.

For PSPDN Dial-up Connection special attention to modem set-up is needed. The modem used should be compatible with the standards supported by the access point. Normally the following are supported - V21, V22, V22bis and V23 (with or without the MNP error correction protocol). The interface should also be set at a speed compatible with the modem being used. The usual internal procedure for activating the modem should be used before following the log-on procedures given in Table 3.

F.3.3 Connection Cost

In some countries, particularly those where no personal NUI is required, 'reverse charge' arrangements have been established so that you do not have to pay for the use of the public network to reach the EECF in Italy. You will be charged only for the telephone call to the local network access point. See Table 1 for the situation in each country.

F.4 EECF On-line Access Authorisation

Before being able to access the EECF system, you must apply for an EECF Username and Password, by contacting the appropriate Order Desk (details in Chapter 4).

The Username and Password will be sent to you as soon as the registration has been approved. It is suggested that you change your EECF Password after the first log-in to the EECF system by selecting option 2 in the first EECF menu, 'ISS Main Menu'.

F.5 Terminal Set-up

The interface to the EECF requires a VT-200 compatible terminal or a local VT-200 emulation program. While VT-100 compatible terminals can also be used, some specific functions keys will not be supported.

F.6 Logging-On Procedure

The logging-on procedure differs according to the type of connection.

F.6.1 Internet Connection

Table 2 describes the logging-on procedures to access the EECF from an Internet network.

F.6.2 PSPDN Dial-up Connection

The logging-on procedure varies from country to country and Table 1 indicates which of the procedures defined in Table 3 should be followed for each country. Table 1 also lists the NUAs to be used in each country and the access telephone numbers needed to make a dial-up connection.

F.6.3 PSPDN Fixed Connection

Table 4 describes the logging-on procedures to access the EECF from a PSPDN network. These require the use of the appropriate command from your computer plus the NUA Number specified in Table 1 (e.g.: if a VAX computer is being used from Italy the command to be entered is "SET HOST/X29 2641017480").

Note: Specific literal values that you have to enter are shown in the tables enclosed in double quotes (e.g. "ESADDN"). You do NOT enter the double quotes, just the text between them.

F. 7 Dealing with Problems

If you encounter a problem before the NUA or Internal address and Username has been entered, consult the local system manager or national network administrator to check if there are local computer or network problems.

If you enter the Address (Internet or NUA) and the message "EECF is not currently available" is received, try making the connection again later.

If you encounter a problem after the EECF Username has been entered, the ERS- I Help Desk can be contacted.

In order to speed up the identification of the problem you should be ready to supply your EECF Username, a description of the problem (including any error messages that appeared on the terminal) and the time of its occurrence.

Table 1. X.25 PSPDN Remote Access, Situation by Country

Country	Dial-up connection			NUA	Log-on procedure
	PSPDN pre-requisites	PSPDN charges	Access telephone number		
Italy	-	Reverse charge available	1421	2641017480	1
France	-	Reverse charge available	36062424	17500039480	2
U.K.	-	Reverse charge available	See Table 5	A21920115680	3
Germany	NUI (from Bundespost)	Reverse charge not available	See Table 6	45050369080	4
Austria	-	Reverse charge available	22250142 or 22250143	2618108080	3
Belgium	-	Reverse charge available	1721 (V21) 1722 (V22) 1723 (V23)	221044380	2
Finland	-	Reverse charge available	92921 (V21/V23) 92922 (V22 and V22 bis)	N4N5982-20407680	2
Norway	-	Reverse charge available	0165	N027311ESAIRS-A11062780	2
Sweden	-	Reverse charge available	020910037	2403710401680	5
Netherlands	-	Reverse charge available	067111	ESA (return) R-129017680	6
Denmark	-	Reverse charge available	171	con0106384180	7
Ireland	NUI (from EIRPAC)	Reverse charge not available	18010300 (V21) 18011275 (V23) 18011200 (V22) 18012400 (V22 bis)	3605922280	8
Spain	-	Reverse charge available	Any of the IBERPAC public accesses	21406232180	8
Canada	-	Reverse charge available	Any of the DATAPAC public accesses	8580145880	5
Others	NUI (from PSPDN)	Reverse charge not available	-	2222641017480	8

Table 2. INTERNET Remote Access and Log-on Procedures

What to do	What you see	Notes
Main Procedure		
Execute a TELNET connection to: ersiss.esrin.esa.it (IP address 192.106.252.207)	A message is displayed indicating the on-going connection. The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.
Alternative Procedure (to be used only as a backup)		
Execute a TELNET connection to: esrin.esa.it (IP address 192.106.252.1)	Some messages are displayed indicating the on-going connection. A Menu offers several services in a list.	
	The prompt '?' is displayed.	The ESRIN Services Menu asks for the ESRIN Data Dissemination Network Service to be selected.
Type "EECF" and press RETURN.	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.

Table 3. PSPDN Dial-Up Log-on Procedures

What to do	What you see	Notes
Procedure 1		
Dial access telephone number.	A telephone connection with your local network access point is established and a 'connect' message is given.	
Press RETURN twice.	A message from the PSPDN is displayed.	The message terminates with an asterisk.
At the asterisk		
## Type NUA number and press RETURN.	The word 'COM' is displayed.	COM confirms that you have a successful connection.
	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.
Procedure 2		
Dial access telephone number.	A telephone connection with your local network access point is established.	
## Type NUA number and press RETURN.	The word 'COM' is displayed.	COM confirms that you have a successful connection.
	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.

What to do	What you see	Notes
Procedure 3		
Dial access telephone number.	A telephone connection with your local network access point is established.	
	A welcome message is displayed.	
	You are prompted for the access point password.	
Type "ESADDN" (or "ESA" for Austria).	A menu of available services is displayed.	
Choose EECF from the menu.		
## Type NUA number and press RETURN.		This number is the NUA and does not need to be entered if the dial-up method is being used.
	The word 'COM' is displayed.	COM confirms that you have a successful connection.
	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.
Procedure 4		
Dial access telephone number.	A telephone connection with your local network access point is established.	
Type "." (a point/period/full stop)	You are prompted for your NUI.	
Type your Teil 1 and press RETURN.		
Type your Teil 2 and press RETURN.		
## Type NUA number and press RETURN.	The word 'COM' is displayed.	COM confirms that you have a successful connection.
	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.

What to do	What you see	Notes
Procedure 5		
Dial access telephone number.	A telephone connection with your local network access point is established.	
Type "..." (3 points/periods/full stops)	You are prompted for the access point NUA.	
## Type NUA number and press RETURN.	The word 'COM' is displayed.	COM confirms that you have a successful connection.
	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.
Procedure 6		
Dial access telephone number.	You are prompted with the word 'TER'.	
Enter "A"	You are prompted to enter a choice.	
## Type NUA number and press RETURN.	The word 'COM' is displayed.	COM confirms that you have a successful connection.
	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.

What to do	What you see	Notes
Procedure 7		
Dial access telephone number.	A telephone connection with your local network access point is established.	
Press RETURN.		
Type "G0" ("G-zero", not "GO") and press RETURN.	A welcome message is displayed.	
	You are prompted for your NUI.	
Type "K0101154ESAIRS" and press RETURN.	You are prompted with asn asterisk.	
## Type NUA number and press RETURN.	The word 'COM' is displayed.	COM confirms that you have a successful connection.
	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.
Procedure 8		
Dial access telephone number.	A telephone connection with your local network access point is established.	
Type your NUI Number.		
## Type NUA number and press RETURN.	The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.

Table 4. PSPDN Fixed Connection Log-on Procedures

What to do	What you see	Notes
Execute an X.29 connection using the appropriate command for your computer and the NUA Number from Table 1. (e.g. from a VAX computer in France the command would be: "SET HOST/X29 17500039480")	A message is displayed indicating the on-going connection. The banner from the EECF system is displayed.	
	The word 'Username:' is displayed.	The EECF system is asking for your EECF Username.
Type your EECF Username and press RETURN.	The word 'Password:' is displayed.	The EECF system is asking for your EECF Password.
Type your EECF Password and press RETURN.	The top-level menu of ISS is displayed.	You have now logged-in to the EECF system.

Table 5. PSS Dialplus Network Access Points.

City or Town	UK Phone Number	City or Town	UK Phone Number
Aberdeen	0224 210701	Ayr	0292 611822
Belfast	0232 331284	Benbecula	0870 2657
Birmingham	021-633 3474	Brecon	0874 3151
Brighton	0273 550045	Bristol	0272 211545
Cambridge	0223 460127	Campbeltown	0586 52298
Canterbury	0227 762950	Cardiff	0222 344184
Carlisle	0228 512621	Chelmsford	0245 491323
Cheltenham	0242 227547	Crewe	0270 588531
Dalmally	08382 410	Dundee	0382 22452
Dunoon	0369 2210	Edinburgh	031-313 2137
Elgin	0343 543890	Exeter	0392 421565
Glasgow	041-204 1722	Golspic	0483 3021
Grimsby	0472 353550	Guilford	0483 38632
Halifax	0422 349224	Hastings	0424 722788
Huntly	0466 3653	Invergarry	08093 406
Inverness	0463 711940	Ipswich	0473 210212
Kings Lynn	0553 691090	Kingussie	05402 661078
Kinross	0577 63111	Kirkwall	0856 6004
Leamington	0926 451419	Leeds	0532 440024
Leicester	0533 628092	Lerwick	0595 6211
Lincoln	0522 532398	Liverpool	051-255 0230
Llandrindod Wells	0597 825881	Llandudno	0492 860500
Lochcarron	05202 598	Lochgilphead	0546 3717
Lochinver	05714 548	London (Monument)	071-283 9123
London (Clerkenwell)	071-490 2200	London (Colindale)	081-905 9099
London (Croydon)	081-681 5040	Luton	0582 481818
Machynlleth	0654 703560	Mallaig	0687 2728
Manchester	061-834 5533	Melvich	06413 364
Middlesbrough	0642 245464	Mintlaw	0771 24560
Neath	0639 641650	Newcastle	091 261 6858
Northampton	0604 33395	Norwich	0603 763165
Nottingham	0602 506005	Oban	0631 63111
Oxford	0865 798949	Petersfield	0730 65098
Peterborough	0733 555705	Plymouth	0752 603302
Poole	0202 666461	Port Ellen	0496 2143
Portree	0478 3208	Preston	0772 204405
Reading	0734 500722	Rotherham	0709 820402
Rugeley	0889 576610	Sedgwick	0539 561263
Sevenoaks	0732 740966	Shrewsbury	0743 231027
Southampton	0703 634530	Stornoway	0851 6111
Strathdon	09756 51396	Swindon	0793 541620
Taunton	0823 335667	Tobermory	0688 2060
Truro	0872 223864	Warminster	0985 846091
Wick	0955 4537	York	0904 625625

Table 6. Datex-P Network Access Points.

City	Prefix	Number according to speed			
		V21	V22	V23	V22 Bis
Augsburg	0821	36791	36781	36761	-
Berlin	030	240001	240081	240061	240211
Bielefeld	0521	59011	59021	59041	-
Bremen	0421	170131	14291	15077	-
Dortmund	0231	57011	52011	52081	-
Düsseldorf	0211	329318	8631	320748	134533
Essen	0201	787051	791021	793003	-
Frankfurt	069	20281	20291	20201	20251
Hamburg	040	441231	441261	441281	441291
Hannover	0511	326651	327481	327591	548181
Karlsruhe	0721	60241	60381	60581	-
Köln	0221	2911	2931	2951	2971
Mannheim	0621	409085	39941	39951	-
München	089	228730	228630	228758	299978
Nürnberg	0911	20571	20541	20501	66051
Saarbrücken	0681	810011	810031	810061	810081
Stuttgart	0711	299171	299061	299291	870321
Wiesbaden	0611	36011	36041	36081	-

APPENDIX G - Acronyms and Abbreviations

A		
	ALT	Radar Altimeter
	AMI	Active Microwave Instrumentation
	ASI	Agenzia Spaziale Italiana
	ATSR	Along Track Scanning Radiometer
B		
	BDDN	Broadband Data Dissemination Network
	bpi	bits per inch
C		
	CCT	Computer Compatible Tapes
	CEOS	Committee on Earth Observation Satellites
	CPMF	Central Processing and Management Facility
	CP	Central Processing and Management Facility
	CUS	Central User Service
D		
	DDN	Data Dissemination Network
	DESC	Display ERS-1 SAR Coverage software
	DLR	Deutsche Forschungsanstalt für Luft- und Raumfahrt
	DMOP	Detailed Mission Operation Plan
	D-PAF	German Processing and Archiving Facility
	DP	German Processing and Archiving Facility
	DRA	Defence Research Agency
	DWP	De-aliased Wind Field and Pressure Field (product)
E		
	EECF	ESRIN ERS-1 Central Facility
	ERS-1	The first European Remote Sensing Satellite
	ERS-2	The second European Remote Sensing Satellite
	ESA	European Space Agency
	ESOC	European Space Operations Centre
	ESRIN	European Space Research Institute
	ESTEC	European Space Research and Technology Centre
	E2	Exabyte 8200 cassette
F		
	FD	Fast Delivery
	FDC	Fast Delivery Copy
	F-PAF	French Processing and Archiving Facility
	FP	French Processing and Archiving Facility
G		
	GAP	Global Activity Plan
	GEC	SAR Ellipsoid Geocoded Image
	GOME	Global Ozone Monitoring Experiment
	GTC	SAR Terrain Geocoded Image

H

HDDR	High Density Digital Recorder
HDDT	High Density Digital Tape

I

IBM	International Business Machines
IFREMER	Institut Français de Recherche pour l'Exploitation de la Mer
I-PAF	Italian Processing and Archiving Facility
IP	Italian Processing and Archiving Facility
IRR	Infrared Radiometer
ISS	Interface Subsystem

L

LBR	Low Bit Rate
LR	Laser Retroreflector

M

MMCC	Mission Management Control Centre
MWS	Microwave Sounder

O

OBRC	On-Board Range Compression
OGE	Oceanic Geoid (product)
OGRC	On-Ground Range Compression
OPR	Ocean Product

P

PAF	Processing and Archiving Facility
PEP	Preferred Exploitation Plan
PRARE	Precise Range and Range-rate Equipment
PRI	SAR Precision Image
PSPDN	Packet-Switched Public Data Network

R

RA	Radar Altimeter
RAW	Raw Data product

S

SAR	Synthetic Aperture Radar
SLC	SAR Single Look Complex Image (quarter-scene product)
SLCF	SAR Single Look Complex Image (full-scene product)
SSH	Sea-Surface Height (product)
SST	Sea-Surface Temperature
SWM	SAR Wave Mode

T

TOP	Sea Surface Topography (product)

U

UILR	SAR Low Resolution Image
UI16	SAR FD Image
UK-PAF	UK Processing and Archiving Facility
UP	UK Processing and Archiving Facility
UTC	Universal Coordinated Time
UTM	Universal Transverse Mercator
UPS	Universal Polar Stereographic
URA	Altimeter FD Product
UWA	SAR Wave Mode FD Product
UWI	Wind Scatterometer FD Product

W

WGS	World Geodetic System
WSC	Wind Scatterometer

APPENDIX H - Glossary

AMI	Active Microwave Instrument on ERS-1 operating at 5.3 GHz frequency (C-band); consists of 2 separate radars with three modes of operation - SAR for Image and Wave Mode and a three-antenna Scatterometer for wind measurements.
ATSR	Along Track Scanning Radiometer. Consists of two instruments: an Infrared Radiometer (IRR) and a Microwave Sounder (MWS). On ERS-1 the IRR is a 4-channel IR radiometer providing SST and cloud top temperatures. For ERS-2 the ATSR-2 instrument will have a total of 7 visible and infra-red channels (see also Microwave Sounder)
CEOS	Committee on Earth Observation Satellites. Members are current and prospective operators of Earth Observation systems.
Commissioning Phase	The initial phase (A) after the launch of an ERS satellite. This period is used for satellite and payload verification and instrument calibration.
CUS	Central User Service of the EECF, embracing a variety of functions dedicated to providing an interactive interface between the ERS System and its Users.
Cycle	The interval of time between exact repeats of an orbit (e.g. in the 35-day cycle, orbits repeat exactly every 35 days).
ERS	The series of European Remote Sensing Satellites. ERS-1 was launched on 17 July 1991 by an Ariane 4 launcher from Kourou, French Guiana. ERS-2 is planned for launch in late 1994. The satellites have a Sun-synchronous, near-polar, quasi-circular orbit with a mean altitude of 785 km. Instruments - Active Microwave Instrument (AMI), Radar Altimeter (RA), Along Track Scanning Radiometer (ATSR), Precise Range and Range-rate Equipment (PRARE), and Laser Retroreflector. In addition, ERS-2 will carry the Global Ozone Monitoring Experiment (GOME).
ESRIN	ESA Establishment in Frascati, Italy
Fast Delivery products	Products generated and distributed from the ground stations within one day for SAR image mode and 3 hours for LBR data.
GAP	Global Activity Plan. This covers the future operation of the different payload instruments. Sections of the GAP are constantly modified and up-dated based on orders received from Users.
Geodetic Phase	An ERS-1 mission phase (E), with a 168-day repeat cycle, which will operate late in the mission.

Ice Phases	The ERS-1 mission phases (B and D), with a 3-day repeat cycle, which will operate twice during the mission, to ensure highly repetitive coverage of ice zones during Arctic winters.
GOME	The Global Ozone Monitoring Experiment. This instrument is a nadir-viewing Spectrometer measuring a range of atmospheric trace constituents and in particular ozone.
Imagette	10 km x 6 km images located at intervals of 200 km along track, produced by the SAR operating in Wave Mode.
ISS	Interface Subsystem. Element of the EECF which handles all EECF interfaces and the telecommunications links with the other ground segment and User facilities.
Laser Retroreflector	A passive optical device on-board the ERS satellites, operating in the infrared, to permit ranging to the satellites by the use of laser ranging stations.
LBR Data	Low bit-rate data from: SAR operating in Wave Mode, Wind Scatterometer, Radar Altimeter and ATSR.
Microwave Sounder	One of the two instruments which comprise the ATSR . A nadir-viewing passive radiometer providing measurements of the total water content of the atmosphere within a 20 km footprint.
MMCC	Mission Management and Control Centre at ESOC in Darmstadt, Germany.
Multidisciplinary Phase	An ERS-1 mission phase (C), with a 35-day repeat cycle, which will operate for the majority of the mission.
Path	One orbit within a cycle. Equivalent to 'track'.
PRARE	Precise Range and Range-rate Equipment. All-weather microwave ranging system designed to perform high-precision two-way microwave range and range-rate measurements to ground-based transponder stations. Unfortunately non-functional on ERS-1 due to a fatal failure at the beginning of the mission.
Precise Orbit	The most accurate estimate of actual satellite orbit; generated by the German PAF and available a few months after satellite pass.
Preliminary Orbit	The first estimate of the actual satellite orbit; generated by the German PAF and available one week after satellite pass.
Product Assurance	Element of the EECF which is responsible for the tasks associated with monitoring and controlling of ERS-1 product quality, system performance and algorithm development.

Radar Altimeter	A nadir-pointing pulse radar operating in ocean and ice modes. SWH measurements in range 1 to 20 m, to 0.5 m accuracy or 10%, whichever is greater. Altimetric precision to within 10 cm over oceans and smooth ice, and 40 cm over rough ice.
Roll-tilt Mode	ERS-1 operating with a radar mid-swath incidence angle of 35° as opposed to the normal 23°. This incidence angle is of special interest for some land applications.
Track	One orbit within a cycle. Equivalent to 'path'.
User Identifier	A unique identification code provided to the User by the EECF.