ERS/ENVISAT ASAR Data Products and Services

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Business Manager

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What is Eurimage?

- Founded in 1989
- Current shareholders:
  - Telespazio
  - Astrium
- Since 1989 Commercial Partner of the European Space Agency (ESA)
- Premises: Rome
- Staff: approx. 30
Data Distribution Rights

- **QuickBird**
  - Exclusive distributor of QuickBird products in Europe (except Italy) and the Mediterranean Basin
- **Landsat**
  - World-wide exclusive commercial distributor of Landsat data from ESA stations and part of the Business Partner Program with USGS
- **IRS**
  - Distribution rights in Europe for data from Euromap archive
- **Radarsat**
  - Distribution rights for EU countries
- **ASTER**
  - Distribution rights in Europe
- **NOAA / AVHRR**
  - Distribution rights of ESA archive
- **JERS**
  - Distribution rights of European archive
- **Ad-hoc agreements with other missions/centers**
ERS-ENVISAT Distribution Rights

- ESA appointed Distributing Entity for global commercialisation and distribution of ERS & ENVISAT data and services

- Partners and Roles
  - Master Distributor: Eurimage
  - Value Adders: ASI, Astrium Gmbh, DLR, Infoterra Ltd, QinetiQ, Telespazio
  - Ground Stations: DLR, QinetiQ, Telespazio
EMMA Roles: Master Distributor

- Standard Products Distribution, Marketing and Promotion
- Contracts for direct reception and access to ERS/ENVISAT satellites
- Interface with ESA
- Setup & co-ordination of distribution network and Int. Ground Station contracts
- Access to Data Archives and Satellite Planning requests collection
- Catalogues: Einet and DESCW
ERS-1 & 2

- The first orbiting SAR sensor. Initially for R&D, but has kicked-off many commercial and operational applications
- Largest SAR data archive, since 1991
  - Continuous and routine global acquisitions without the need of specific programming
- Advantages of SAR for any application
  - Day/Night Imaging
  - Cloud Cover Penetration
  - Good Data Availability on a global scale
## ERS-1 & 2


### Satellite Orbital Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orbit</td>
<td>Sun-synchronous</td>
</tr>
<tr>
<td>Altitude</td>
<td>785 Km</td>
</tr>
<tr>
<td>Inclination</td>
<td>(98.52°)</td>
</tr>
<tr>
<td>Orbit per Day</td>
<td>14.3</td>
</tr>
<tr>
<td>Repeat Cycle</td>
<td>35 days</td>
</tr>
<tr>
<td>Tandem Mode</td>
<td>ERS-1 24hrs prior to ERS-2</td>
</tr>
</tbody>
</table>

- Subsequent acquisitions since launch of ERS-2, 1995)
ERS SAR

- **ERS-1 & 2 SAR**
  - Spatial resolution: 25 m
  - Area coverage: 10,000 km²
  - Frequency: 5.3 GHz (C-band)
  - Polarisation: Linear-Vertical (VV)
- **14 Years Data Archive:**
  - ERS-2: 1.0 Mil. Frames (since 1995)
- **Over 100,000 Products Generated amongst over 10,000 Users**
- **All-weather Data Availability**
- **ERS SAR Standard Products:** RAW, SLC, PRI, GEC, GTC
The ENVISAT Mission

Launch Date: March 2002

- **Dimensions**
  - Launch configuration:
    - length 10.5 m
    - diameter 4.6 m
  - In-Orbit configuration:
    - 26m x 10m x 5m

- **Mass**
  - Total satellite 8140 Kg
  - Payload 2050 Kg

- **Launch vehicle**
  - Ariane 5

- **Orbit**: 800 km as ERS
  - sun-synchronous
  - 10:00, i.e. 30 min. before ERS-2

All sensors performing well
• Provision of long-term data sets; continuity with ERS data characteristics
• Two Solid State Recorders (70 Gbit of data each) for on-board recording when outside of ESA station mask
• Ability to transmit to the ARTEMIS relay-satellite when ENVISAT is out of sight of any ESA ground station
• Improved sensor characteristics – ASAR

ENVISAT Improved Characteristics
ENVISAT Ground Segment
Kiruna-Artemis scenario

- 4/5 orbits are received in Kiruna
- 8 orbits in ESRIN (6 via Artemis)
- Matera receives ASAR HR and MERIS FR in direct visibility, data sent to ESRIN within a week
ENVISAT Instruments and Products

- ASAR – Advanced Synthetic Aperture Radar
How ASAR works

- ASAR has five mutually exclusive modes of operation:
  - Image mode
  - Alternate Polarisation
  - Wide Swath
  - Wave
  - Global Monitoring

- Image Mode, 30 m resolution, similar to ERS SAR.
  - 7 possible mutual exclusive swaths
  - 2 possible mutual exclusive polarisation (VV or HH)

- Alternate Pol. Mode, 30 m resolution
  - 7 possible mutual exclusive swaths
  - 3 possible mutual exclusive polarisation (HH/VV, HH/HV or VV/VH)

- Wide Swath Mode, 150 m resolution
  - 1 unique swath (405 km)
  - 2 possible mutual exclusive polarisation (VV or HH)
ENVISAT ASAR Operation Modes

ASAR has 39 mutually exclusive modes of Acquisitions

- **Global Monitoring**: VV or HH, 1000m resolution, 405 km swath width
- **Wide Swath**: VV or HH, 150m resolution, 405 km swath width, SLC, ES image format
- **Image VV or HH**: < 30m resolution, up to 100 km swath, RAW, SLC, PRI, GEC
- **Alternating Polarisation**: VV/HH or VV/VH or HH/HV, 30m resolution, up to 100 km swath, RAW, SLC, PRI, GEC
Applications
The Oil Spill is analyzed and measured by a dedicated software.

Morphological and Physical parameters are computed.

Multivariate analysis and neural network techniques help the operator in the analysis of the object.
Oil Spill Report

is sent by FAX to Coast Guards

Contains all operative information for locate and define the pollution.
Ship Detection and Ship-Wake analysis

An automatic algorithm detects ships visible in the SAR image.

Ships responsible of the pollution are indicated.
Off-Shore Exploration

ENVISAT Improvements
• Greater coverage (Wide Swath and image Mode VV)
• Deep water exploration outside of station mask with SSR and Artemis
German Flooding 2002

[Map of flooded areas with labels such as WITTENBERGE, TANGERMUNDE, BURG, DESSAU, WITTENBERG, and 25 Km and 5 Km scales.]

Image Mode, IS4, HH, 19 August 22:53

(C) ESA 2002
Subsidence Monitoring

Seismic Faults in Los Angeles Basin:
1. San Jose Fault
2. Raymond Fault
3. Whittier Fault
4. El Modeno and Peralta Hills Faults
5. Los Alamitos Fault
6. Newport - Inglewood Fault
7. Palos Verdes and Cabrillo Faults
8. Elysian Park Blind Thrust (?)
9. Coyote Hills Blind Thrust (?)
10. Santa Fe Spring Blind Thrust (?)

Subsidence Phenomena:
- Oil & Gas Fields
- Water Pumping

LOS Velocity Field [mm/yr]
Forward in time from May 1992 to September 2000
Lineaments and feature Mapping
Optical data: mapping of visible lineaments.
Radar allows the accurate mapping of all lineaments

- Accurate mapping of residual
- Identification of buried objects

Map showing radar mapping with lineaments and buried objects.
Geological Structure Mapping

Data Fusion with optical imagery
Commercial and Operational Overview
Products and Services; Prices

QuickBird - the world’s highest resolution commercial remote sensing satellite

Landsat - the longest running commercial mission provides decades of data at medium resolution

Envisat - continuity with ERS, with new, advanced sensors for environmental monitoring

ERS -1 & 2 - all-weather synthetic aperture radar and other advanced sensors from these European Space Agency missions

IRS - flexibility in medium-resolution optical data

Radarsat - synthetic aperture radar data from Canadian satellite

NOAA - low-resolution data since 1978

ASTER - medium resolution data

Eurimage Missions

Eurimage documentation (pdf)
Complete Eurimage Products and Services Guide (4.1 MByte) Chapters for single missions are available through the mission pages at left

Eurimage Price List

Order Forms:

QuickBird Order Forms
QuickBird Order Guide

Landsat
Envisat/ERS-1 & 2
ASTER
Other Missions (IRS, NOAA, RADARSAT, 1-ERS)

*interactive forms - may be completed on screen
Products and Prices – Archive Data

ERS–1/2; Envisat

SAR; ASAR

Products

- SAR and ASAR Narrow Swath products are available as either Full Resolution Imagery or Medium Resolution Imagery (MRI)
- Scenes may be shifted along track at no extra cost
- For data from non-ESA facilities, product availability, prices, formats and media may vary
- Production / processing time from International Ground Stations may be longer than from ESA facilities
- For Envisat data only, acquisitions outside ESA station coverage are available through the on-board recorder and the ARTEMIS data relay satellite
- ASAR Beam and Sensing Modes are mutually exclusive
- ASAR Narrow Swath products are available as IS1 to IS7 (56–100x100 Km swath)
- ASAR Narrow Swath and Wide Swath products are available as either H/H or V/V polarization
- ASAR Narrow Swath Alternating Polarization products are available as either HH/VV or VV/VH or HH/HV
- ERS Images are available as V/V polarization
- MRI available from Archive for Envisat ASAR only. MRI new acquisitions available for global Envisat ASAR and ERS SAR data acquired at Matera (Italy) Ground Station
- Available processing levels: RAW, SLC, PRI, GEC
- Detailed descriptions of all products are in the EuriImage Product and Services Guide
- Contact EuriImage Help Desk and Customer Service for further information on these points

Archive Products

<table>
<thead>
<tr>
<th>Product</th>
<th>Acquisition Mode</th>
<th>Price (€)</th>
<th>Media</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERS</td>
<td>Narrow Swath</td>
<td>400</td>
<td>CD</td>
</tr>
<tr>
<td>ENVISAT</td>
<td>Narrow Swath or Wide Swath</td>
<td>400</td>
<td>CD, ftp</td>
</tr>
<tr>
<td>ENVISAT MRI</td>
<td>Narrow Swath</td>
<td>75</td>
<td>CD, ftp</td>
</tr>
</tbody>
</table>
Future Acquisitions

ERS-1/2; Envisat
SAR; ASAR

New Acquisitions

- Fulfillment of a New Acquisition request is subject to feasibility, to be confirmed by ESA through Eurimage Customer Service
- Available world-wide for all products
- Envisat Standard programming requests must be submitted at least 15 days before acquisition date
- Envisat Rush programming requests must be submitted at least 8 working days before acquisition date
- Envisat Emergency programming requests must be submitted at least 3 working days before acquisition date. Contact Eurimage Customer Service for more urgent needs
- Price in € per scene, including Programming Fee and Product Price
- MRI products are discounted by 25% vs Full Resolution products

<table>
<thead>
<tr>
<th>Satellite</th>
<th>Description</th>
<th>Programming type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>ERS SAR</td>
<td>1 Narrow Swath Scene</td>
<td>500</td>
</tr>
<tr>
<td>ERS SAR</td>
<td>Subsequent contiguous Narrow Swath Scenes (max 3) along the same orbit</td>
<td>400</td>
</tr>
<tr>
<td>ERS SAR</td>
<td>Additional contiguous Narrow Swath Scenes (from 5th) along the same orbit segment</td>
<td>425</td>
</tr>
<tr>
<td>ENVISAT ASAR</td>
<td>1 Narrow Swath or 1 Wide Swath scene</td>
<td>600</td>
</tr>
<tr>
<td>ENVISAT ASAR</td>
<td>Subsequent contiguous Narrow Swath Scenes (max 3) along the same orbit</td>
<td>400</td>
</tr>
<tr>
<td>ENVISAT ASAR</td>
<td>Additional contiguous Narrow Swath Scenes (from 5th) along the same orbit</td>
<td>440</td>
</tr>
</tbody>
</table>

Packages

- Discounts are available for large Multi-temporal and Interferometry data sets and for volume orders.
  Please contact Eurimage for details
Satellite Planning

ERS-1/2; Envisat
SAR; ASAR

On-request services

Programming Fee

- Fulfilment of programming requests is subject to feasibility, to be confirmed by ESA through Eurimage Customer Service
- Available world-wide for all products
- Envisat Standard programming requests must be submitted at least 15 days before acquisition date
- Envisat Rush programming requests must be submitted at least 8 working days before acquisition date
- Envisat Emergency programming requests must be submitted at least 3 working days before acquisition date. Contact Eurimage Customer Service for more urgent needs
- An Envisat segment is the total number of contiguous images programmed along the same orbit
- Fees due in case of programming requests only, not combined with production requests

<table>
<thead>
<tr>
<th>Satellite</th>
<th>Type</th>
<th>Note</th>
<th>Price (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERS SAR</td>
<td>Standard</td>
<td>First 4 contiguous scenes along the same orbit</td>
<td>100</td>
</tr>
<tr>
<td>ERS SAR</td>
<td>Standard</td>
<td>Additional contiguous scene along the same orbit</td>
<td>25</td>
</tr>
<tr>
<td>ENVISAT ASAR</td>
<td>Standard</td>
<td>First 4 contiguous Narrow Swath scenes, or one Wide Swath scene, along the same orbit</td>
<td>200</td>
</tr>
<tr>
<td>ENVISAT ASAR</td>
<td>Standard</td>
<td>Additional contiguous Narrow Swath scene along the same orbit</td>
<td>40</td>
</tr>
<tr>
<td>ENVISAT ASAR</td>
<td>Rush*</td>
<td>Per each programmed segment</td>
<td>300</td>
</tr>
<tr>
<td>ENVISAT ASAR</td>
<td>Emergency*</td>
<td>Per each programmed segment</td>
<td>1,000</td>
</tr>
</tbody>
</table>

*Fee to be added to the total Standard Programming Fee
# Data Ordering

**Order Cover Form**

**Billing Address**

<table>
<thead>
<tr>
<th>Contact Person (responsible for payment)</th>
<th>Company</th>
<th>Street address</th>
<th>Postal code</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Tel</th>
<th>Fax</th>
<th>Email</th>
<th>VAT number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Credit Card Details**

<table>
<thead>
<tr>
<th>Eucard</th>
<th>Master Card</th>
<th>Visa</th>
<th>Number</th>
<th>Card holder</th>
<th>Expiration date</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

**Shipping Address (if different from billing address)**

<table>
<thead>
<tr>
<th>Contact Person</th>
<th>Technical Contact Person</th>
<th>Company</th>
<th>Street address</th>
<th>Postal code</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>City</th>
<th>Country</th>
<th>Tel</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**End User (if different from billing address)**

<table>
<thead>
<tr>
<th>Contact Person</th>
<th>Company</th>
<th>Street address</th>
<th>Postal code</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Country</th>
<th>Tel</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Application:**

- [ ] Agriculture
- [ ] Cartography
- [ ] Risk Management
- [ ] Telecom
- [ ] Geology & Exploration
- [ ] Environment
- [ ] Forestry
- [ ] Security
- [ ] Utilities
- [ ] Marine & Coastal
- [ ] Media & Consumer

**Description or other**

[ ]

**Your reference**

[ ]

**Customer Signature:**

[ ]
# Data Production Parameters

## Radar Order Form 4

**Envisat ASAR**

<table>
<thead>
<tr>
<th>Orbit Number</th>
<th>Acquisition Date</th>
<th>Acquisition Start Time</th>
<th>Acquisition Stop Time</th>
<th>Centre Latitude</th>
<th>Centre Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Swath</th>
<th>Polarization</th>
<th>Level</th>
<th>Processing Type</th>
<th>Order Type</th>
<th>Swath number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide (W2)</td>
<td></td>
<td></td>
<td>H/H</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>V/V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>HR Level 0 (RAW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>Wide Swath Image</td>
<td>Planning only</td>
<td></td>
</tr>
</tbody>
</table>

| Standard     | Image Mode (IM)  |       | H/H                      | Planning & production |
|--------------|------------------|-------|V/V                      | Production from archive |
| Alternating Polarization (AP) | VV/HH |       | VV/VH                   |                         |
|              |                  | 1     | HR Level 0 (RAW)         |                         |
|              |                  |       | Precision Image (PRI)    |                         |
|              |                  |       | Single Look Complex (SLC)|                         |
|              |                  |       | Geocoded Image (GEC)     |                         |
|              |                  |       | Medium Resolution (MR)   |                         |

**Envisat CS only**

- ISS 1
- ISS 2
- ISS 3
- ISS 4
- ISS 5
- ISS 6
- ISS 7

Customer agrees to the following clauses of the Envisat Standard Terms and Conditions of License:
- 3.5 (Limitation of Liability)
- 4.2 (Terms of Payment)
- 5. (Term Termination)
- 6. (Governing Law and Jurisdiction)
- 7. (Miscellaneous)

Date: ___________  Customer Signature: (a) ___________  Date: ___________  Customer Signature: (b) ___________
Thank you

Any Questions!

More Information on Envisat:

www.eurimage.com

www.envisat.esa.int