

The Envisat Exploitation Policy

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Building on the ERS achievements

The ERS missions were originally designed to serve the science community and to demonstrate operational capabilities. Shortly after the launch of ERS-1, objectives for meeting operational requirements, in particular from the meteorological services, and for developing commercial distribution and application of the data were added to the mission goals. Accordingly, the ERS Data Policy addressed:

- scientific users
- commercial users, and
- meteorological users, as a particular case of operational use.

The Envisat mission, like its predecessors ERS-1 and ERS-2, is designed to respond equally to scientific, operational and market needs. The satellite's instrumentation, the ground segment and services and the overall exploitation policy, i.e. the high-level operations planning and the Data Policy, are aimed at satisfying all three areas of interest.

ERS scientific use

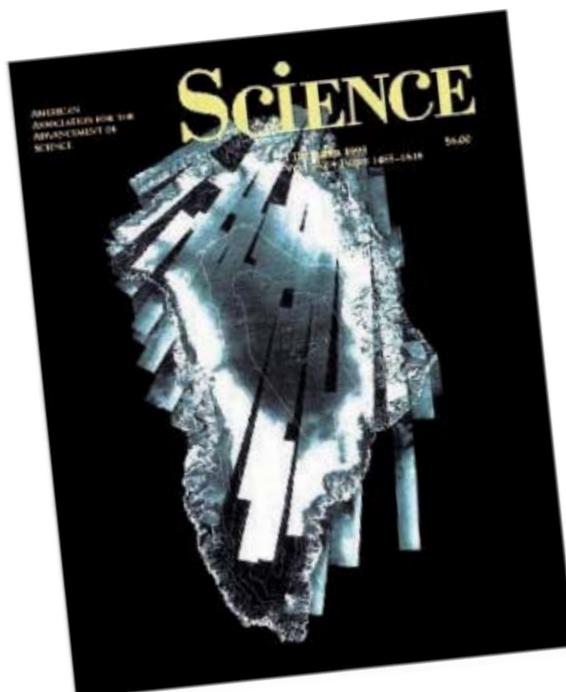
In support of the scientific users, ESA released a series of Announcements of Opportunity (AOs) that were initially aimed at general science and led to the development of new products and services and to application-demonstration projects. Data provision to the scientific users was complemented through agreements with receiving stations and research entities, which directly served the national science communities (Fig. 1).

Over the last 10 years, some 72 000 Synthetic-Aperture Radar (SAR) and the global Low Bit Rate (LBR) data products have been distributed by ESA to more than 3500 individual scientists working on more than 1200 projects. Several thousand scientific publications have appeared, not only in journals dedicated specifically to remote sensing, but also in magazines such as *Science* and *Nature*. These publications, as well as the large number of scientists attending the ERS-related ESA Symposia, have served as an impressive demonstration of the achievements of this policy vis-a-vis the scientists.

ERS commercial use

In 1991, ESA appointed a single consortium, consisting of Eurimage, Spot Image and Radarsat International, as its worldwide commercial ERS data distributor. National receiving stations were assigned the distribution rights within their territories for the data that they acquired.

With the ERS Data Policy, applicable from 1991 to 1999, ESA fixed the prices to be charged to end users, allocating a percentage of the revenue to the distributors. These prices depended on the processing level, the product type and the delivery medium, and ranged from 250 Euro for a medium-resolution SAR scene, to more than 2000 Euro for a terrain-corrected, geo-coded SAR product covering an area of 100 km x 100 km (Fig. 2).



In 1994, in order to foster better cooperation with the science community, ESA and the commercial distributors introduced an additional 'research' price scheme for the data, which was about 30 to 50 % of the commercial price. This scheme led to a steady increase in the commercial sales of ERS data, starting from less than 3% in 1992 and reaching some 15% today.

ERS operational Low-Bit-Rate services

Under the former ERS Data Policy, special conditions were granted to WMO-associated meteorological services. These organisations received the ERS Fast-Delivery Low-Bit-Rate (FD-LBR) products from the Wind Scatterometer, the Radar Altimeter and the SAR Wave Mode free of charge, on the understanding that these products were used only for forecasting purposes. This service was implemented by direct delivery of the ERS UWI, UWA and URA products into the Meteorological GTS Network. In recent years, this arrangement no longer provided sufficient transparency concerning the ultimate use of the data. Therefore, the fast-delivery products from the ATSR and GOME instruments are now being made available for downloading to all users, including the meteorological services, via password-protected servers.

The new exploitation policy for Envisat and ERS

Objectives and principles of the new Data Policy

The new Data Policy both for Envisat and ERS is aimed at:

- maximising the beneficial use of ERS and Envisat data
- ensuring accomplishment of the mission objectives defined and agreed by Member States in the programme proposal
- defining the rules for ESA and its partners to serve and support users, in both science and applications.

The definition of the new Policy was based on the experience gained through eight years of ERS exploitation, and was amended and

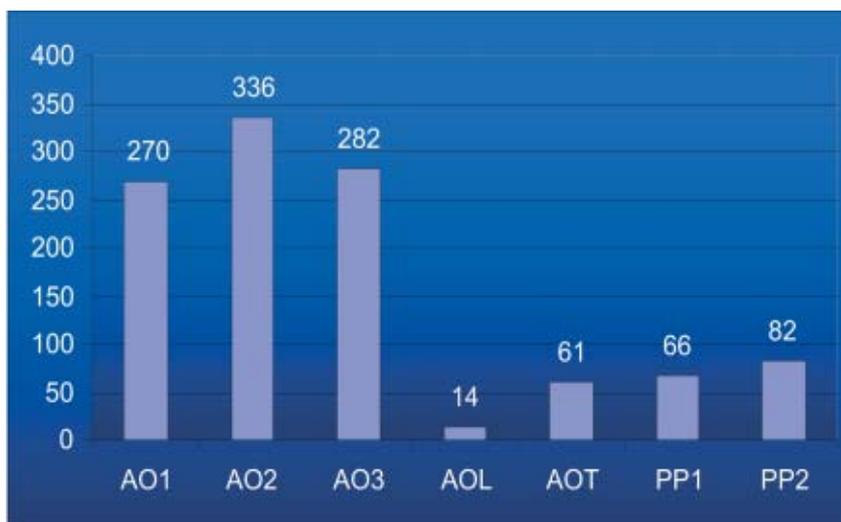


Figure 1. Projects accepted within the framework of ESA ERS Announcements of Opportunity and Pilot Project Schemes since 1991 (not including additional science-oriented projects organised via national activities/stations)

Table 1. Sample prices for SAR products (in Euros) under the original ERS Data Policy

Product description	Commercial price	Research price
Fast-delivery image	500	200
Annotated raw data	1000	200
Reduced-resolution scene	250	125
Single-look complex image	1200	500
SAR precision image	1200	300
SAR geo-coded image	1400	500
SAR terrain geo-coded image	2300	1000
Educational data products	90	90

adapted to the latest ideas for funding Earth-observation missions and their exploitation, and to the policies of other (non-ESA) Earth-observation missions.

Compared to the previous ERS Data Policy, major progress was made in the following areas:

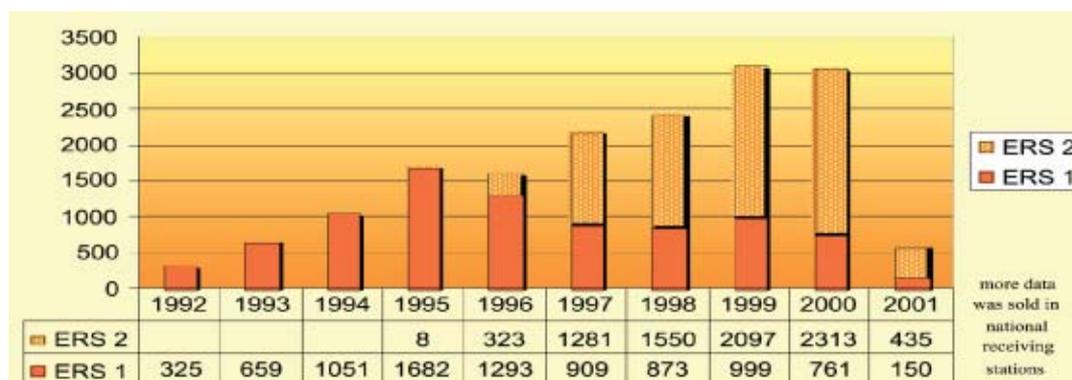


Figure 2. SAR scenes sold since the start of the ERS-1 and ERS-2 missions (commercial and research priced products)

Category-1 Use

'Research and applications development use in support of the mission objectives, including research on long-term issues of Earth system science, research and development in preparation for future operational use, certification of receiving stations as part of the ESA functions, and ESA internal use'

- Ensure continuity with the former AO system
- Rules for identification fixed in Annex C of Data Policy (e.g. Peer Reviews, AOs, Negotiated and approved Agreements with other Space Agencies or International Research Organisations)
- Served by ESA
- Cost of reproduction; waivers to be approved by EO Programme Board

Category-2 Use

'All other uses which do not fall into Category-1 use, including operational and commercial use.'

- Served by appointed Distributing Entities (open market)
- User Price at discretion of Distributing Entities
- Distributing Entities may negotiate directly with NFS for Category-2 use

I. The new Data Policy is based upon the use made of the data, rather than on the user. This principle aims at providing equal data access conditions for similar applications and projects. Approved research projects will be granted the same rights and duties, whether they are handled by publicly funded research organisations/institutes or private companies. All services and all operational use of data, independent of whether the services are offered by public or private bodies, will be subject to the same conditions.

II. A clear definition of scientific use (Category-1) or any other use (Category-2), and the mechanism for identifying them, form part of the Data Policy. Any other use of the data, for example, in an international

cooperation or as part of national projects of ESA Member States, has to be approved and serviced according to these two mechanisms. The user interface for Category-2 use has been fully delegated to distributing entities, while ESA retains full responsibility for Category-1 use.

III. The responsibility for market and service development is largely delegated to industry. The agreements between ESA and the so-called 'Distributing Entities' are contracts including formal and mutually agreed commitments for investment, market-development activities, delivery times, success-oriented discount schemes to increase sales, etc. In order to ensure competitive market conditions and to give users a choice, two consortia with overlapping world-wide distribution rights were selected. It is also foreseen to cater to so-called 'niche markets' through the direct appointment of specialised distributors. This direct-appointment procedure will primarily concern entities from Participating States, including national fixed and mobile stations, and will take into account one or more of the following elements:

- actual or planned investments supported by Participating States in facilities and activities related to the distribution system
- the need to complete the geographical coverage offered by already appointed Distributing Entities

- the need to complete the range of services offered by already appointed Distributing Entities.

IV. The pricing scheme for the data was also updated. For Category-2 use, commercial Distributing Entities were given full freedom to offer data and services according to market prices and their own business plans. For Category-1 use, a price just slightly above the cost of the data-delivery medium was introduced. For projects approved by ESA's Programme Board for Earth Observation, data are provided free of charge.

V. Distributing entities may negotiate directly with national or foreign receiving stations with the aim of:

- offering stations technical capabilities and services via a professional distributing entity to a world-wide market, beyond the one directly accessible to the station
- enlarging and complementing the portfolio of products and services available to Distributing Entities through ESA
- developing links via the stations to local markets.

The full implementation of the new Data Policy for Category-1 and Category-2 users is a stepped process: for ERS, past agreements and contracts have still had to be honoured, while new arrangements, in particular for Envisat, are following the new principles.

Scientific use (Category-1)

Announcements of Opportunity

Approximately 750 Envisat AO projects were accepted and approved as early as 1998. Some of them, in particular the Calibration/Validation projects, have already started and are receiving limited amounts of ERS data free of charge. This year, the leaders of these projects will have the opportunity to update their data requirements submitted in the original proposal. These revised requirements will be carefully evaluated and an appropriate data allocation – of ASAR and MERIS high-rate products in particular – will be granted. The exact allocations will be determined based upon the absolute needs to meet the objectives of the approved project, and upon an evaluation of the practical feasibility of generating and delivering the requested data. The Project Leaders will then be able to submit their actual data requests directly to the Order Desk via the Payload Data Segment (PDS).

Category-1 projects

With the implementation of the new Data Policy, the submission of new project proposals has become possible on an ad-hoc basis, and

not only in response to the issue of an Announcement of Opportunity (Fig. 3). Some 25 such projects have already been reviewed and accepted over the last three months, and a further 16 are currently under review. These data are being provided at reproduction cost. The procedures for submission, evaluation and acceptance of Category-1 projects are described in a separate article (by Y-L. Desnos et al.) in this Bulletin, and on the dedicated web site: <http://www.projects.esa-ao.org>.

Terms and conditions for Category-1 use

The Project Leaders of all approved Category-1 projects, including the AO projects, will be asked to sign ESA's standard 'Terms and Conditions for the Utilisation of Data' before they can submit data requests. They are based on a similar contract used in the past for the ERS AO projects. The Project Leader will be asked to confirm that:

- the data are to be used exclusively within the framework of, and for the purposes described within, the accepted project proposal
- the data are not to be distributed to users outside the approved list of cooperating investigators
- regular progress reports and a final report will be provided
- the project results will be presented at ESA Workshops and Symposia
- the ESA copyrighting of the Envisat and ERS data will be respected.

Cost of data for Category-1 use

The data for Category-1 use are normally provided at the cost of reproduction. In exceptional cases, such as Announcements of Opportunity (AOs), for example, and following the approval of the ESA Programme Board for Earth Observation, the data may be provided free of charge.

The price range for Category-1 use of Envisat data will be similar to that for ERS data (e.g. 100 – 300 Euro per ASAR scene). Prices for LBR products will be mainly dictated by the

supporting medium and can be free of charge for data downloads from servers. A final price list for Envisat Category-1 data use will be published after the satellite's launch later this year, in line with the product-validation campaign.

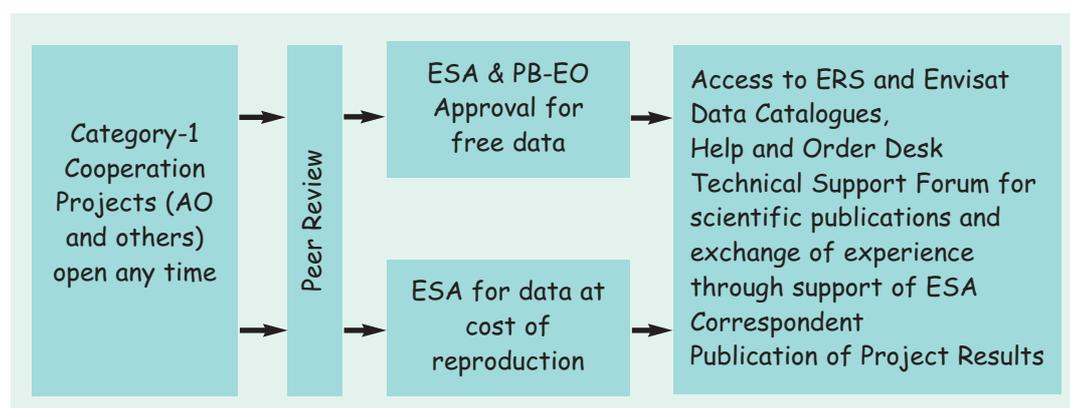
Cooperation with funding agencies and international research entities

ESA, through its Category-1 use scheme, offers data at favourable conditions or even free, and provides support to users in the form of tools, a help desk, a forum for exchanging and publishing results through symposia, web sites, journals and through its 'Correspondent' scheme. This scheme not only offers full transparency to ESA Member States and other users, but is also a tool for on-line monitoring of the projects' progress and results by national and other funding agencies. Such cooperations are being agreed upon with the Netherlands, the United Kingdom and the European Commission, and are open to other agencies. Throughout the approval process, the funding agencies' experts may participate in the review process. Some of these experts may themselves act as Correspondents for specific projects. A similar cooperation within a Category-1 framework is foreseen with large international research entities.

Category-2 use

Appointment of Distributing Entities

Contracts with the two Distributing Entity consortia were signed in September 2000 after a long process of consultation and negotiation. Consultations started in September 1999, when ESA organised a Workshop with 47 companies to discuss ideas for setting up contracts for the commercial distribution of ERS and Envisat data. This Workshop was attended not only by the traditional data distributors, but also by representatives from the European aerospace industry and many value-adding and service companies. The feedback gathered led first to the release of an open, competitive Invitation to Tender, and then





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Envisat

The improved Envisat characteristics over ERS are of great value to EMMA, which will focus on product and service development for diverse applications. Agriculture and vegetation will benefit from the multi-polarisation capabilities of the ASAR in discriminating crop types and soil moisture; geology and exploration will exploit the same capabilities not only on a regional scale, but also on a continental scale with the wider swath modes, at a fraction of the cost. For offshore applications, Wide Swath imagery with WV polarisation will be able to cover larger areas; differential interferometry with a 35-day repeat cycle will be able to measure small terrain displacements due to plate movements, and other similar events, such as subsidences or landslides.

Business expectations and marketing plan

By focusing on developing the market potential that has not been fully exploited so far outside Europe, major growth is expected during 2001 and 2002. With Envisat being able to offer more operational solutions for user needs, growth should follow a constant and steady pattern also for key applications such as disaster management. Furthermore, the use of the Artemis data-relay satellite will increase access to global data and allow quicker delivery to users also, through faster electronic delivery services.



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Envisat

Spot Image and its partners in the SARCOM Consortium have been selected by ESA to distribute data world-wide from the ERS and Envisat. SARCOM has brought together some major players in the satellite-imagery market, all of whom distribute SPOT, ERS/Envisat and Radarsat data as complementary offers and a complete range of products and services.

Business expectations and marketing plan

SARCOM will offer an unrivalled service covering radar data reception, distribution and sophisticated products and services tailored to pollution monitoring, natural-hazard management, marine applications and mapping . SARCOM's marketing strategy is based on providing multi-sourced, complementary optical and radar data at low-, high- and very-high resolutions to boost development of the global market for satellite imagery and derived products and services.

to the setting-up of the two consortia, both comprising a number of companies offering a full range of services, from data acquisition to value-adding and information services. Negotiations with both consortia covered:

- business and marketing plans
- industrial commitments for investment and data purchase
- incentives and benefits for meeting and exceeding the business and sales targets set
- mutual commitments in terms of services, performance and quality
- possibilities for partnership projects with shared investment.

The current business plans are primarily based on sales of ERS SAR data, with ASAR and MERIS high-rate data forming the basis for business expectations in the Envisat time frame. LBR data, and in particular the data from the atmospheric instruments, are not included, since data from similar instruments on other missions are available under research conditions or at marginal cost. These data are therefore to be distributed by ESA under conditions similar to Category-1 for all uses, and will be made available for downloading from password-protected servers.

Despite the fact that both Distributing Entities offer world-wide services, for technical or political reasons certain markets may be accessible only to so-called 'niche distributors'. The Canada Center of Remote Sensing is one such case, currently being the only station operator offering ERS SAR Fast Delivery (FD) products over the area of interest to the Canadian Ice Service. Such 'niche distributor' contracts still allow a direct cooperation with either of the appointed world-wide Distributing Entities.

The expectations

The sum of commitments by the two Distributing Entities in terms of data sales for the first year already exceeds the sales of previous years. Following a stagnation in the commercial sales in 1999 and the first half of 2000, probably caused by the uncertain situation concerning prices during the on-going negotiations, the last quarter of 2000 (after signature of the contracts) showed a strong increase in sales, indicating that the commercial use of ERS data is still growing and exceeding expectations.

Based on a solid market analysis, the main application areas being targeted by the commercial Distribution Entities include: forestry, digital terrain modelling, ship routing, coastal management and fisheries, risk management (such as oil-spill monitoring, flood

assessment, subsidence monitoring, etc.). Many of these SAR-, ASAR-, ATSR- and MERIS-based commercial applications are expected to develop at a greater rate in non-European countries. Fast world-wide availability and distribution of the data is therefore another key factor in the development of the commercial market.

Both Distributing Entities have begun negotiations with receiving stations for access to Envisat data and the introduction of these stations' services into the mission's portfolio. Both parties predict a yearly increase in commercial data sales of some 20% if Envisat operations start successfully as predicted (not later than 6 months after the launch), and if the reliability and data quality are similar to or exceed those of ERS. Key technologies for this evolution are, for example, the interferometric exploitation of the ASAR data.

Both Distributing Entities are actively promoting and marketing the Envisat data, including the development of tools and special value-adding services. These activities will be set up in partnership with ESA, and will then either be available to all users, or fully funded by one consortium only and then offered to just the customers of that consortium.

Commercial prices can be negotiated directly with the Distributing Entities and are expected to be competitive with those of other satellite missions.

Both Distributing Entities have a strong interest in maintaining links to the science community as a basis for the development of operational applications and commercial services. Thus, scientific users may, beyond the Category-1 scheme, request favourable data-access conditions by cooperating with a Distributing Entity.

Conclusion

During its initial implementation, the Envisat and ERS Data Policy is proving to be flexible enough to cope with all of the requirements from the research and commercial communities. Furthermore, it is also providing a framework for cooperation with national, European and international institutions. The further definition of Envisat product costs during the satellite's Commissioning Phase will complete the implementation of this exploitation policy.

