The Earth Observation Data User Programme

J-P. Guignard & G. Pittella
ESA Directorate of Applications, ESRIN, Frascati, Italy

S. Hougs
ESA Directorate of Applications, ESA, Paris, France

The Data User Programme (DUP), an ESA optional programme, is designed to encourage and support Earth-observation-related industry in Participating States to bridge the gap between research and the establishment of operational services based on thematic information products. In addition, the DUP supports the preparations for operational exploitation of future satellites such as Envisat-1. Since its inception at the end of 1996, fourteen projects have been awarded.

Introduction

In general, value-adding suppliers of information products face a significant increase in requirements between performing research or demonstrating pilot projects and offering operational services within current competitive conditions. The latter may involve critical changes in the way in which activities are defined and financially secured. It also implies investment in final product development, the establishment of processing facilities and the necessary marketing activities. This is also evident within ESA's Member States where the industry is too small and dispersed to be able to undertake these activities without support.

In view of growing world-wide competition, ESA's Earth Observation Programme Board decided to remedy the situation by proposing an optional programme as a mechanism to provide the necessary initial support for value-adding companies, service providers and research laboratories within the Member States. The Data User Programme (DUP) was established at the end of 1996. Its aims are to:

- define, establish and validate market-oriented services for information products derived from Earth-observation data
- develop those services at a European level, with the potential for extension to the rest of the World market, including Developing Countries
- capitalise on existing ERS-1 and ERS-2 data and prepare for exploitation of the Envisat-1 satellite, which is due to be launched by the end of 1999.

This support should build on existing research such as the results of pilot projects and make maximum possible use of data from ESA missions. In preparation for exploitation of the Envisat-1 mission, data from third-party missions could also be used.

Although these missions are predominantly experimental, it is expected that preparation for operational and commercial use of their data will, as a spin-off, lead to the definition and consolidation of requirements for future satellite missions that are entirely operational.

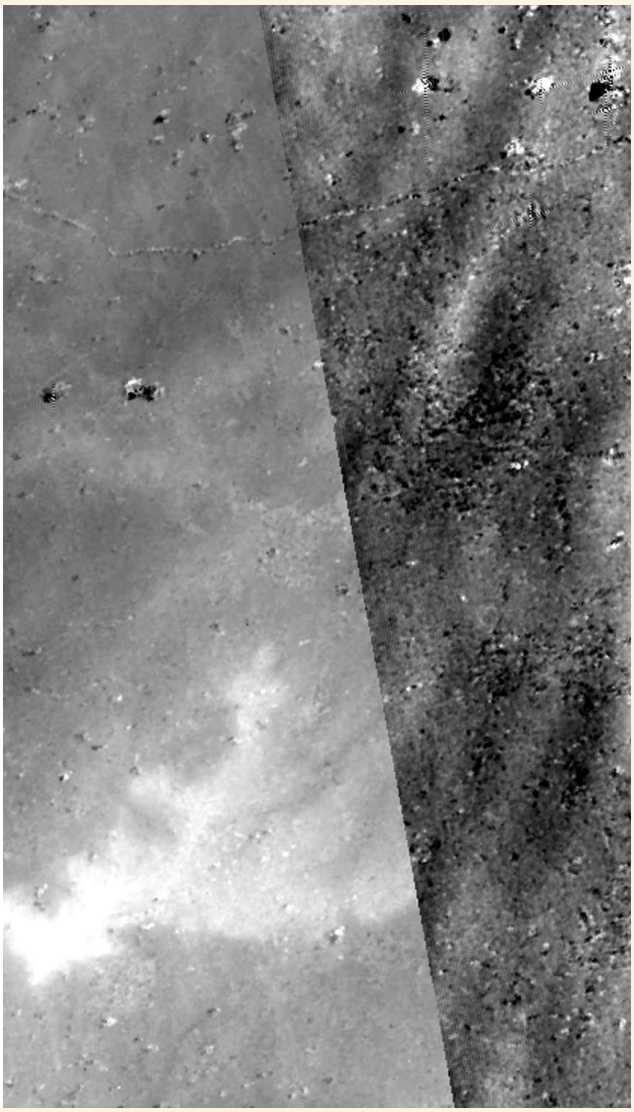
Value-adding companies should be encouraged to regard Earth-observation data as one of several information sources from which to build a marketable product. The inclusion of non-space data will result in a higher level of information and render products more readily applicable and, consequently, more useful.

The first steps towards the establishment of an operational service are typically completely funded by the DUP, but it is envisaged that an increasing financial contribution from the value-adding companies themselves will be requested for subsequent stages. Confidentiality and intellectual property rights are safeguarded under the Agency's rules. Contracts specifically include the cost of data, which must be purchased through authorised distributors.

The DUP is structured as an optional programme in five-year phases. The present Participating States are Belgium, the Netherlands and Switzerland. Other States are currently considering joining the programme or already preparing to do so.

How are projects selected?

Each year the Agency issues a Call for Proposals from value-adding companies and service providers in Participating States. The selection procedure is in two rounds, both of which are competitive. In the first round, candi-



Project example 1

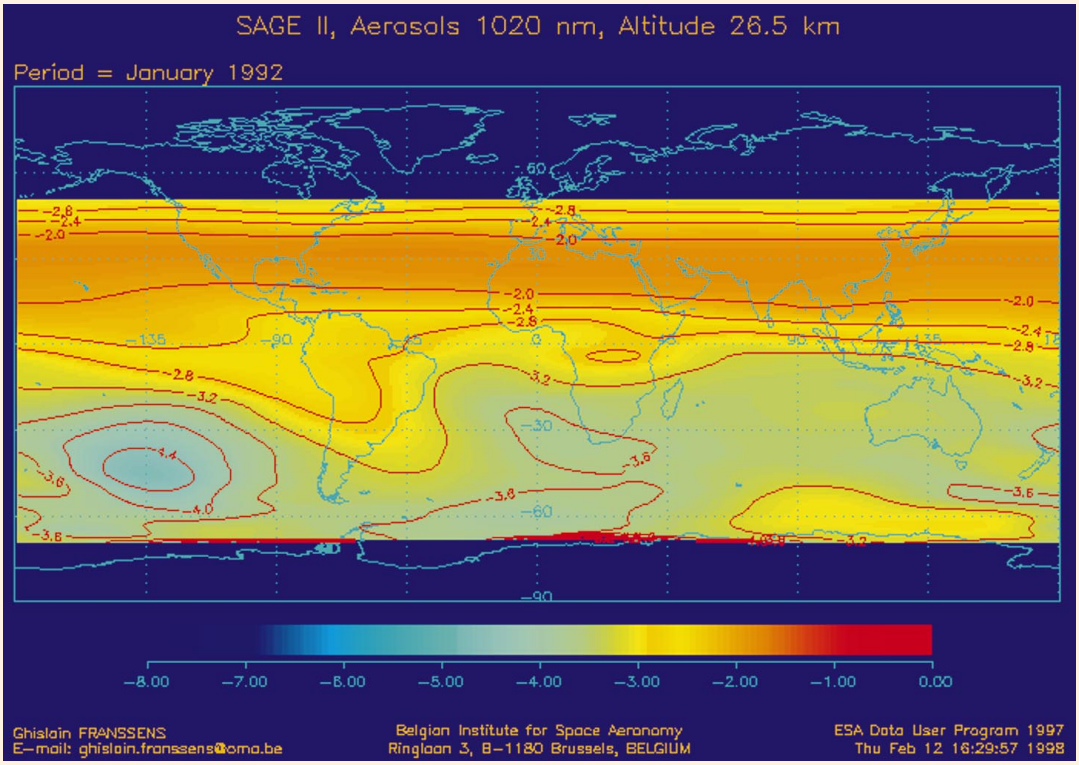
Quality assessment of SAR DTM

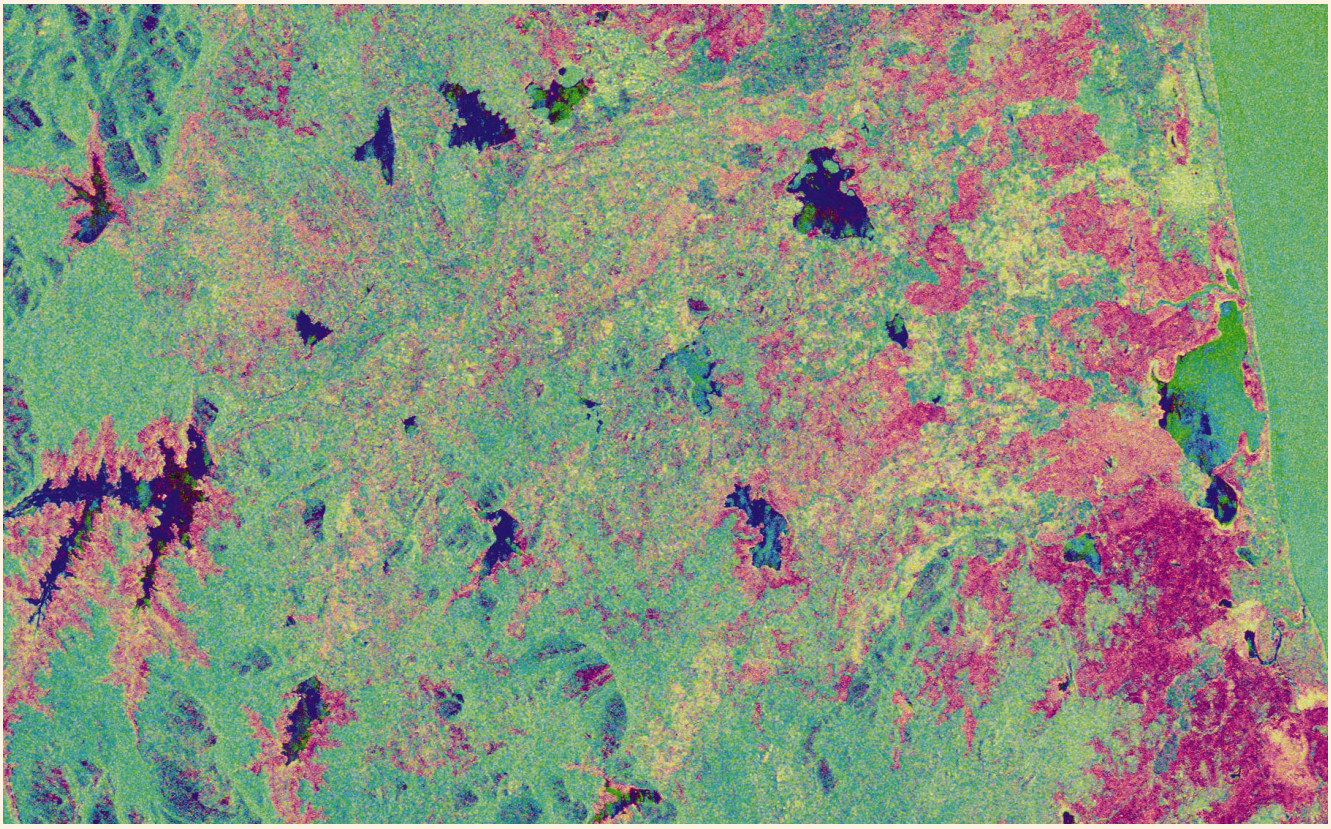
The ability of Synthetic Aperture Radar (SAR) Interferometry to derive Digital Terrain Models has already been demonstrated by several projects using data from ERS-1 and ERS-2. One of the main difficulties in bringing this application into operational service has been the correct quantitative determination of the quality (i.e. accuracy) achieved in the product in relation to the various error sources and, specifically, to the effect of atmospheric disturbance. This project has yielded a method for the objective qualification of the DTM Insar product and validated it over the full coverage of Belgium. Present work includes the application and demonstration of the method on additional geographical areas selected as significant targets.

Project example 2

Development of global aerosol mapping from satellite level-2 products

The new ERS-2/GOME instrument and the package of atmospheric instruments under development for the Envisat-1 satellite will provide an unprecedented capability to study and monitor the Earth's atmosphere and its chemical constituents. With a view to operational use by meteorological and environmental users, the instrument derived geophysical information as aerosol parameters is to be put in the form of a global map. In order to achieve this, the measurements taken by the instrument over limited areas and at different times need to be suitably integrated into a 3-D product by means of physical models. The project aims at prototyping a service-oriented product of this kind by initially using data from non-ESA missions (e.g. SAGE) and later aerosol GOME products derived from ERS-2.

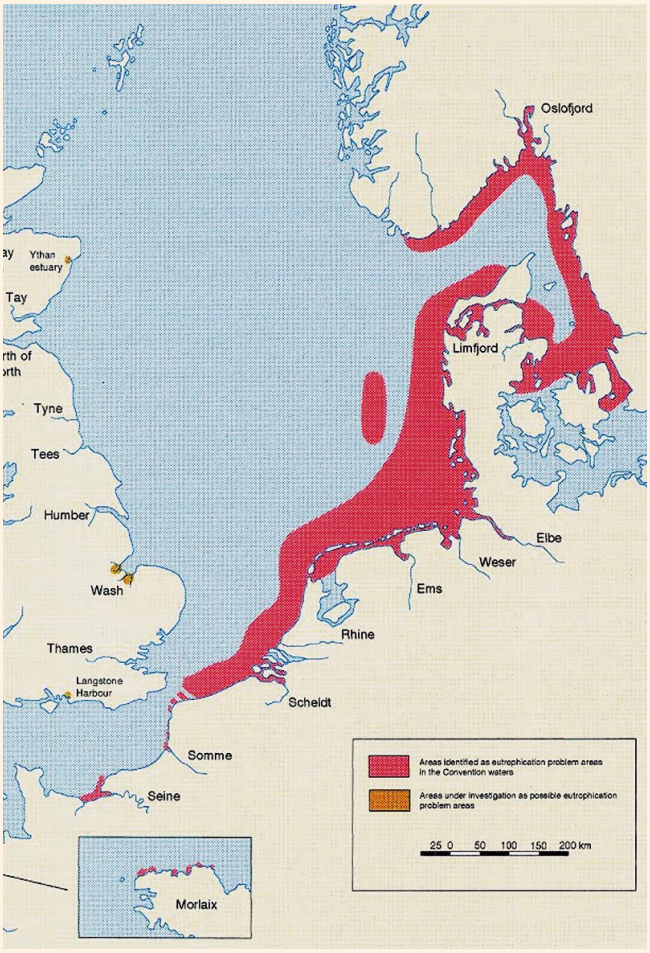




Project example 3

Product development for mapping and monitoring of land cover dynamics in tropical regions

Observation of tropical regions, where optical observation is heavily affected by almost permanent cloud cover, has proved to be one of the most promising applications of SAR. Two different product types for application in Sri Lanka are being developed in this project. One concerns the mapping of forests, the other the monitoring of rice-crop irrigation. Once the product development phase has been completed, the project envisages the transfer of the technology to a partner who will operate the system in Sri Lanka.



Project example 4

Pre-operational water and environment regional service

This project is designed to prepare the MERIS instrument, currently under development for Envisat-1, for operational use. The aim is to develop a tool to assess water quality from multispectral optical remote-sensing data. The products derived will relate to two regions: the Belgian and Dutch coastal zone and inland water bodies in the Netherlands and Switzerland. The project will initially focus on the definition of suitable user-oriented products and on the implementation of region-specific algorithms using available non-ESA ocean-colour missions such as IRS-MOS and SeaWiFS.

Table 1

No.	Project Objective	Contractor
1	Development of 3-dimensional information products relating to global mapping of aerosols	BIRA, (B)
2	Development of methods for quality assessment of SAR data for suitability for DTM production with predefined accuracy requirements; combined with associated quality indicators for the final product	CSL, (B)
3	Operationalisation and knowledge transfer to industry for service provision of SAR based products related to forestry and rice field information in tropical areas	RSL, (CH)
4	Development of 4-dimensional information products related to global mapping of aerosols, including improvements of data assimilation models	BIRA, (B)
5	Topographic mapping and merging of information into GIS for use by the Geological Survey and Mines Department, Uganda	RMCA(B) + UNESCO's GARS teams + UGSMD(Ugd)
6	Development of an information product derived from SAR extracted data for crop early monitoring systems	UCL-MILA (B)
7	Development of a forestry monitoring product for operational use in Malaysia	DHV (NL) + WAU (NL) + KEC (NL)
8	Development of GOME ozone fast delivery products at information level for the implementation of a Near Real Time user service	KNMI (NL)
9	Development of a bathymetry product for use by sand mining industry off the Belgian coasts	ARGOSS (NL) + UoG (B) + WWK (B)
10	Preparation of a pre-operational water and environment regional service for MERIS using SeaWiFS and MOS	IVM(NL) + RSL (CH) + MUMM(B) + MD(NL)
11	Development of a drought early warning product derived from scatterometer data with application and validation in Mali	NEO(NL) + TUW(A) + IER(Mali)+ ILWM(B)
12	Establishment of a flood monitoring service in Bangladesh	SYNOPTICS (NL)+ NLR(NL) + EGIS (Bangladesh)
13	Development of a propagation model product (derived from SAR DEM and vegetation from Spot) for operational mobile telephone network planning	E. BASLER & PARTNERS (CH) + RSL (CH)
14	Development of a subsidence mapping product for application in urban areas. It will be derived from differential InSAR data and validated in Northern Italy	Gamma (CH)

dates are required to submit summary proposals only. Those selected for the second round are asked to submit detailed proposals. The main selection criteria are as follows:

– in order to form the basis for an operational service, products must be at information level
– products must respond to needs expressed by public services or to market opportunities identified by the value-adding companies
– products must be amenable to a sustainable service at European level, in synergy with other sources of information.

Additional requirements regarding staffing, overall costs, data needs, implementation schedule, etc. are also taken into account. Delegates from the Participating States are involved in the final selection process.

The DUP supports interaction with the various players and other interested parties by means of the DUP Internet home page* and information meetings. Workshops are arranged to stimulate the flow of information between the parties involved in the programme (research institutes, value-adding companies, service companies, etc.)

Current activities

Fourteen activities have been started so far (see Table 1). Most of these focus on specific interaction between the know-how of value-adding companies and the market opportunities they have identified. They address areas for operational services where experience already exists (e.g. users of ERS Synthetic Aperture Radar (SAR) for interferometry, flood monitoring and bathymetry). They also represent focused efforts to establish pre-operational services in readiness for full exploitation of future missions (for example atmospheric chemistry, water-quality monitoring), in particular Envisat-1.

It is noteworthy that half of the projects are joint undertakings between value-adding companies and/or research institutes, and transcend national boundaries.

Also important is the fact that half of the activities concern Developing Countries. This reflects the Participating States' strong concern to establish operational services that are commercially viable and at the same time capable of providing solutions to problems in the Developing Countries (e.g. hazard and agricultural monitoring, infrastructure support).

The targeted customer segments are private enterprises, civil services and institutional bodies.

Conclusion

The Data User Programme is presently the only ESA programme which addresses the problems value-adding companies and service providers face when trying to gain a lasting foothold in the competitive market for Earth-observation products at information level. If they are to succeed in doing so, they must be able to take the vital step from research to commercial exploitation of data from Earth-observation satellites. This requires investment and involves risks. The DUP is a concrete way of supporting these efforts. esa

* http://styx.esrin.esa.it:8099/