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March 1989

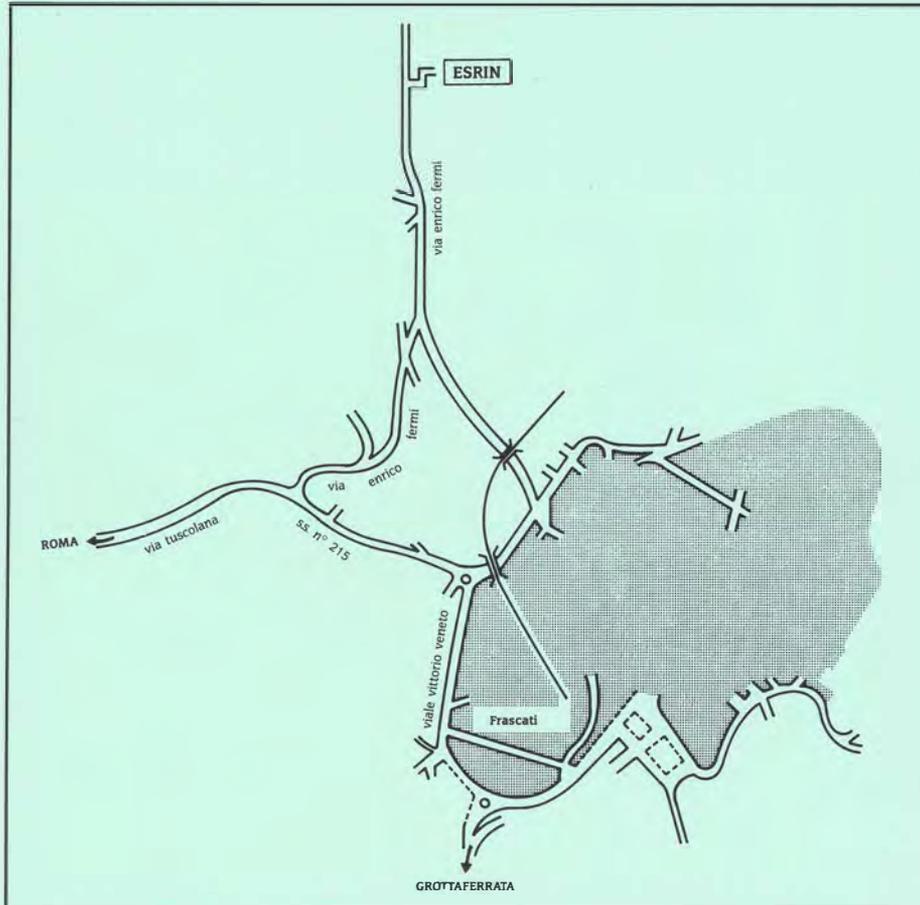
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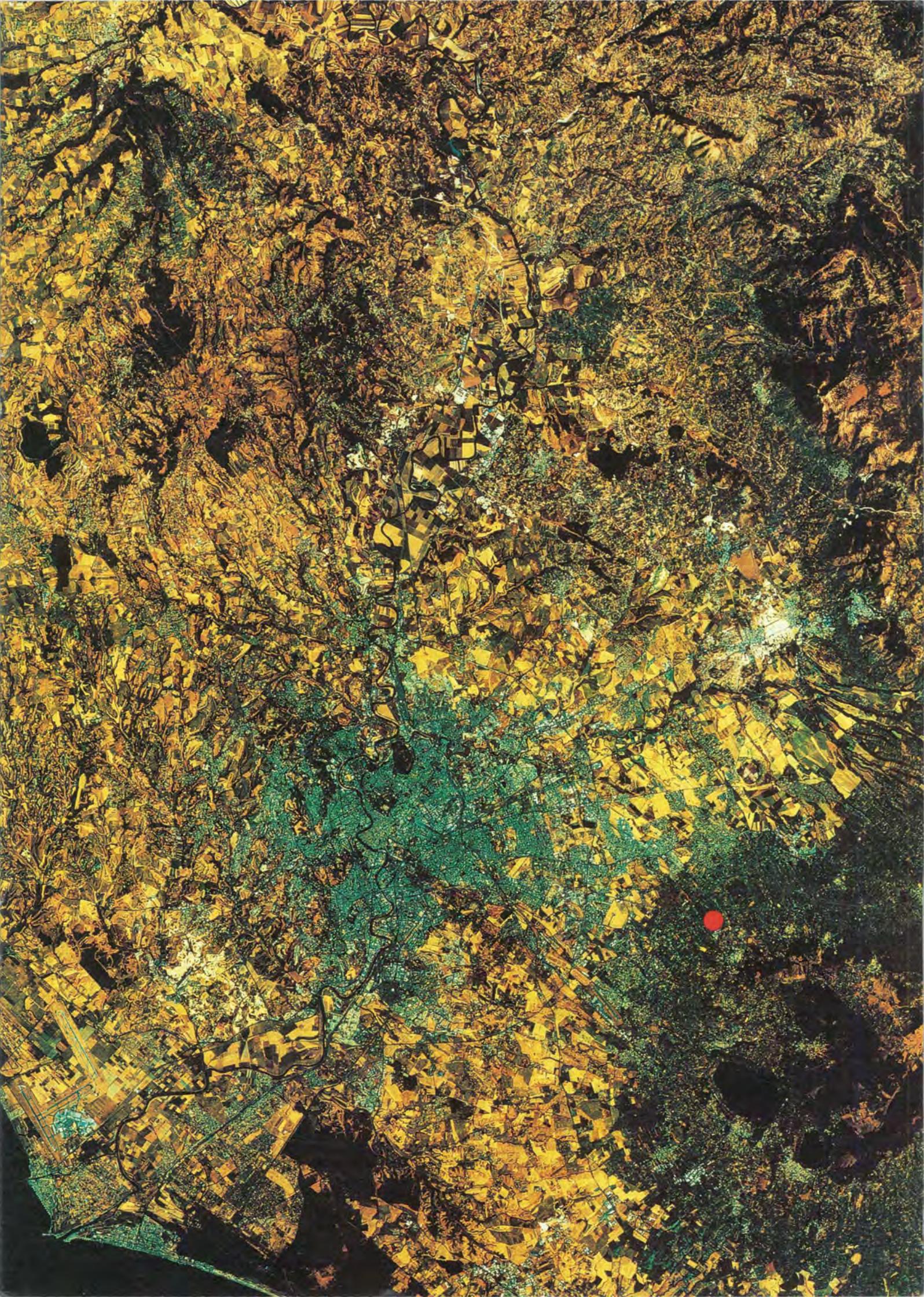
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MBB-ERNO, Helga Lade - Lorenz, NRSC Farnborough (UK)

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Opposite page: The Rome area, with Esrin pinpointed in red, as seen by the Thematic Mapper Instrument onboard Landsat5 from an altitude of 705 km.





esrin: tuned in to the outside world

'All roads lead to Rome' goes the saying. Nowadays, it could be said that many of the information links between ESA and the outside world of 'users' lead to ESRIN in Frascati, in the hills above Rome. ESRIN is the Centre in which data from numerous sources is acquired, processed and archived, ready for consultation, analysis and interpretation throughout ESA Member States and indeed well beyond their frontiers.

ESRIN, through the different networks which have been set up in the Member States of ESA, has a finger constantly on the pulse of its users thus making it possible to achieve a coordinated European approach in a number of disciplines.

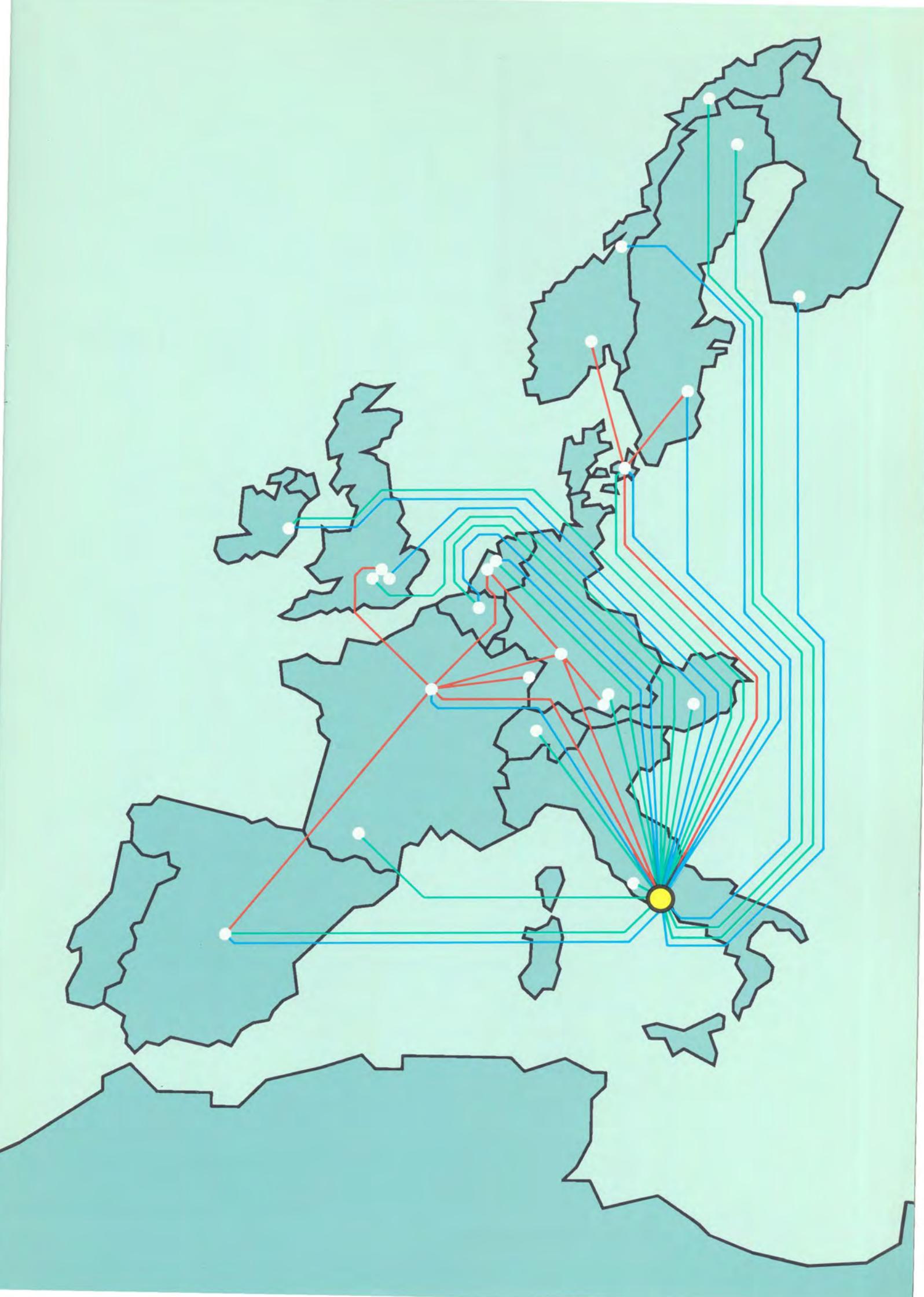
Much of the information handled by ESRIN is in the form of the written word. The one notable exception to this is the data dealt with by the Earthnet Programme Office which is part of the overall Earth Observation programme of the Agency. Earthnet receives data from Earth observation satellites through its network of ground stations stretching from the North of Sweden to the Canary Islands. The 'raw' data as they are known, are processed and archived, and made available to an ever-growing community interested in monitoring our planet's resources, state of health and evolution.

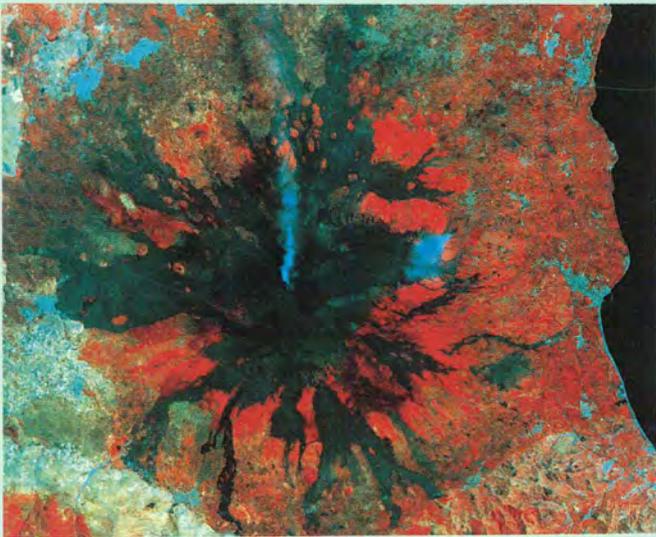
Besides Earthnet, two other sectors of activity can be found on the ESRIN site:

- the ESA Information Retrieval Service — ESA-IRS — is Europe's largest on-line information service offering its customers a wide variety of scientific and technological databases and,
- the Information Systems Division — ISD — a relative newcomer to the ESRIN family. It was set up in 1988 with a view to harmonising information handling systems within ESA's programmes, and with the Agency's contractors and its scientific communities.

The goal of each of the three sectors is to supply its 'customers' with the information they need in the quickest, most useful and cost-effective way. In order to achieve these aims, some very sophisticated tools have been developed by ESRIN's specialist teams. In fact, keeping at the forefront of data handling and dissemination technology is one of the Establishment's main tasks.

Above: the ESRIN premises with the town of Frascati in the background. Opposite page: the extent of ESRIN's links with the outside world. The green and orange lines represent the Earthnet networks, the blue lines the ESA-IRS network and the red lines show the network set up by the ESIS pilot project



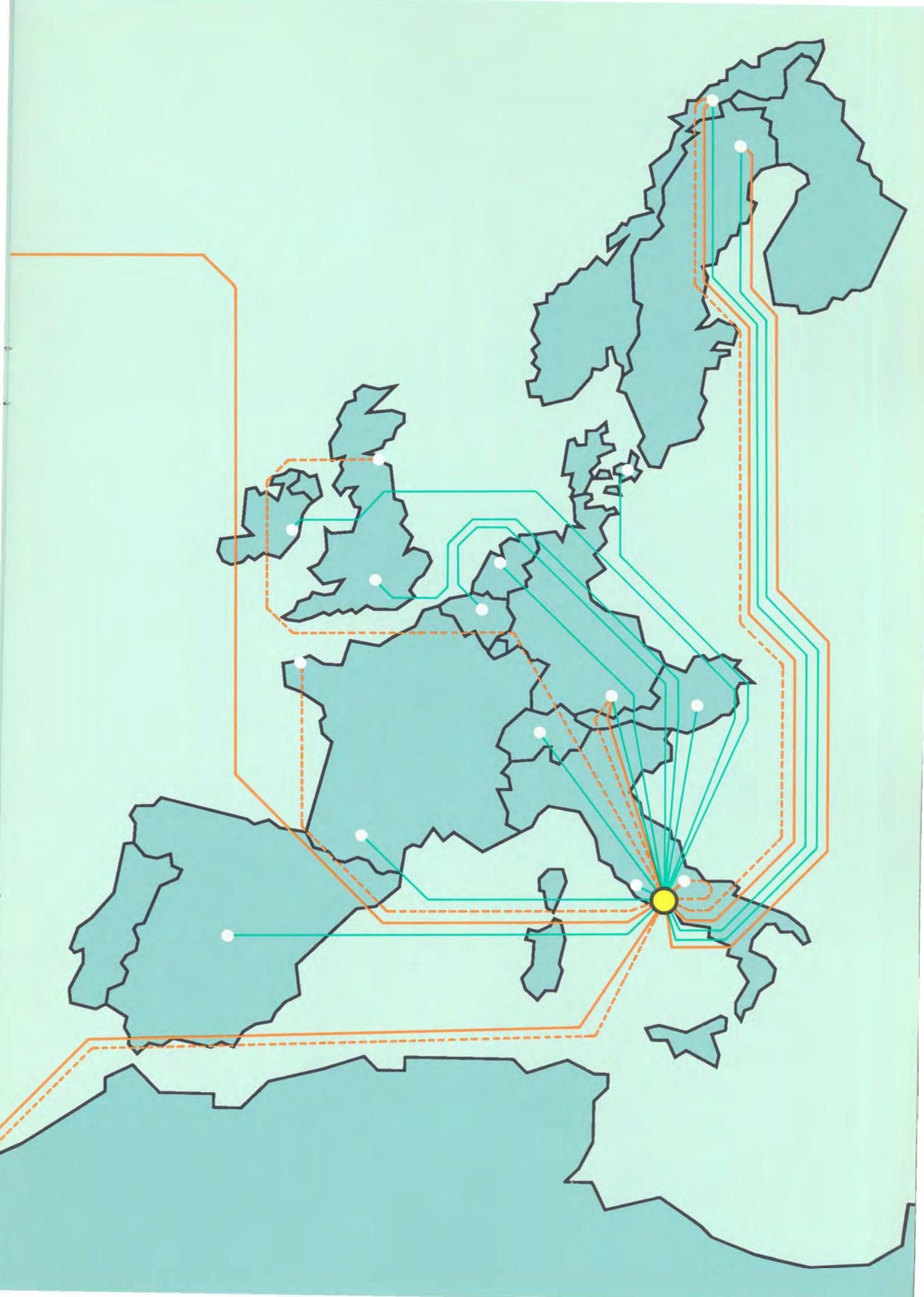


earthnet: images of our planet

Over the last ten to fifteen years, we have become more and more aware not only that Mankind's actions may be disturbing the delicate balance of our environment but also that the resources of our planet are not limitless. These questions are very topical today, with newspaper articles and television programmes devoted to such questions as the 'greenhouse' effect, the ozone hole, increasing deforestation, desertification, and so on. The best way to combat what is a potentially dangerous situation is for us to acquire more and better information about the factors influencing our natural resources in order to find the ways and means of protecting our future. This, however, can only be done by viewing the Earth as a single system and by taking into account the physical, chemical and biological interactions between the atmosphere, the oceans, the land and ice regions and, of course, the Earth's core itself. Only by observing our planet from space can we hope to achieve this aim.

The Earthnet Programme Office at ESRIN plays a vital role in this task by providing an ever-increasing user community with the data from Earth observation satellites, either in the form of images or simply as 'raw' or pre-processed data. For more than ten years now, Earthnet has been disseminating different types of data which it acquires, through its ground stations, from a series of United States Earth observation satellites, together with the French 'Spot' and Japanese 'MOS-1' spacecraft. Furthermore, in addition to the Seasat, Nimbus and HCMM archives which are already available, Earthnet is now setting up a European archive of data from the Tiros-N series of satellites which not only provide meteorological information but are also being used for such diverse applications as regional and global vegetation monitoring, snow and ice mapping, etc. Thousands of magnetic tapes and photographic images have been distributed throughout Europe,

Above: Earthnet images bear witness to dramatic events: the eruption of Etna on 25 July 1985 as seen by the Landsat-5 Thematic Mapper. Opposite, Earthnet's connections with the outside world. The green lines show the links to the National Points of Contact; the orange lines show the connections with the ground station network: Kiruna in Sweden, (Landsat, MOS-1, ERS-1), Fucino, Italy (Landsat, MOS-1, ERS-1), Maspalomas in the Canary Islands (Landsat, Spot, MOS-1, Tiros-N, ERS-1), Tromsø in Norway (MOS-1, Tiros-N), and Gatineau in Canada (ERS-1). The dotted lines show the links to the receiving stations for the Tiros-N satellite network (Dundee in Scotland, Lannion, France, Oberpfaffenhofen in the Federal Republic of Germany, Rome, Maspalomas and Tromsø)



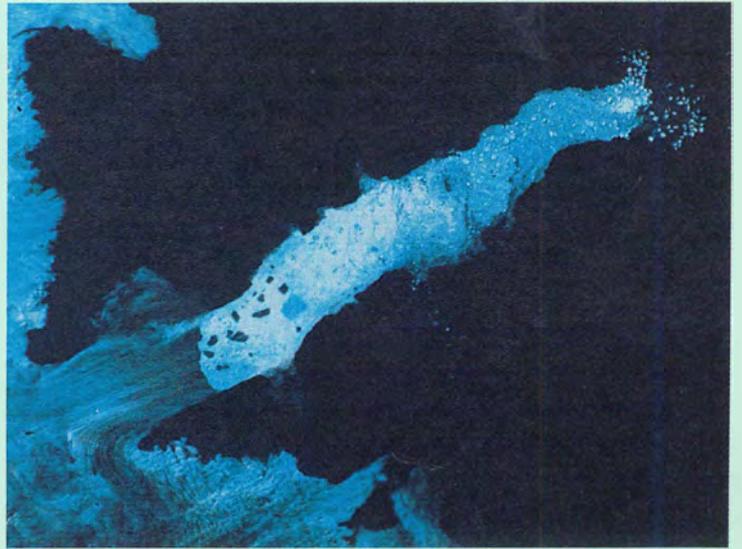
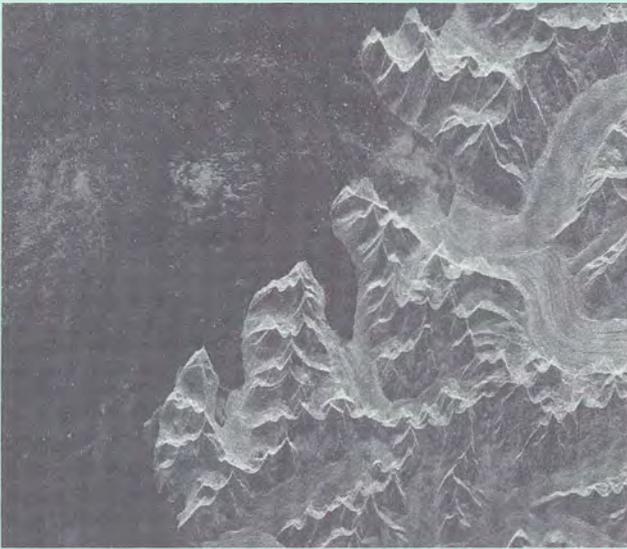
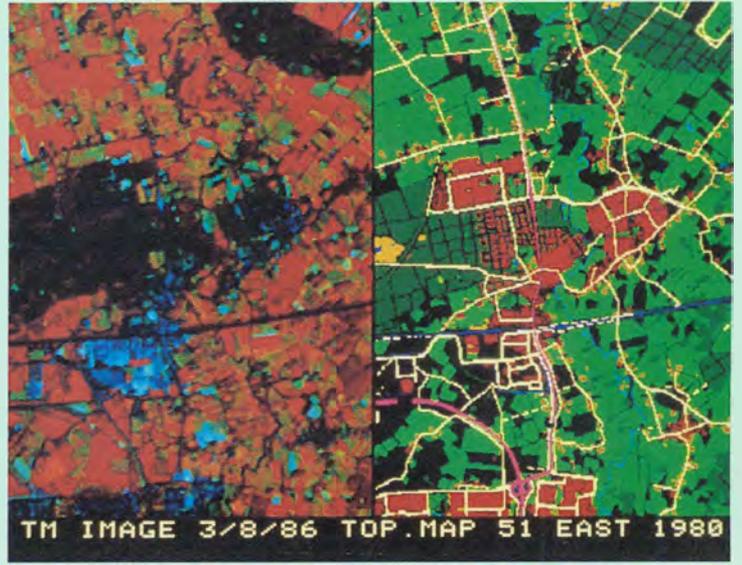
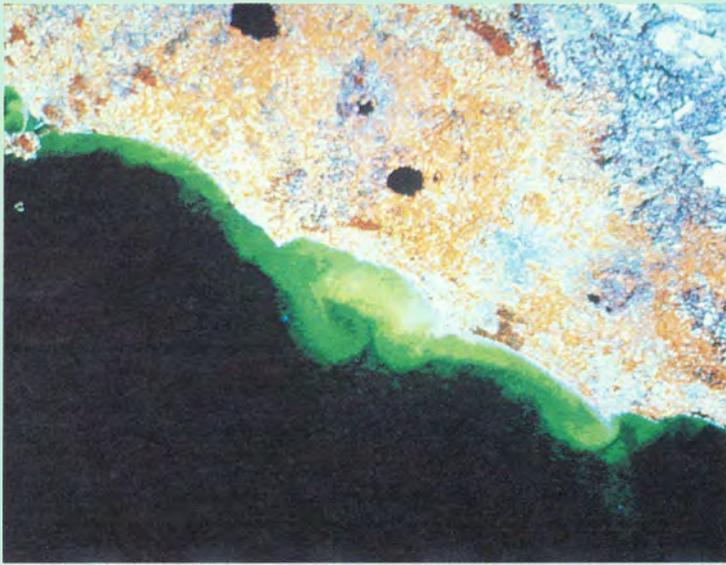
earthnet

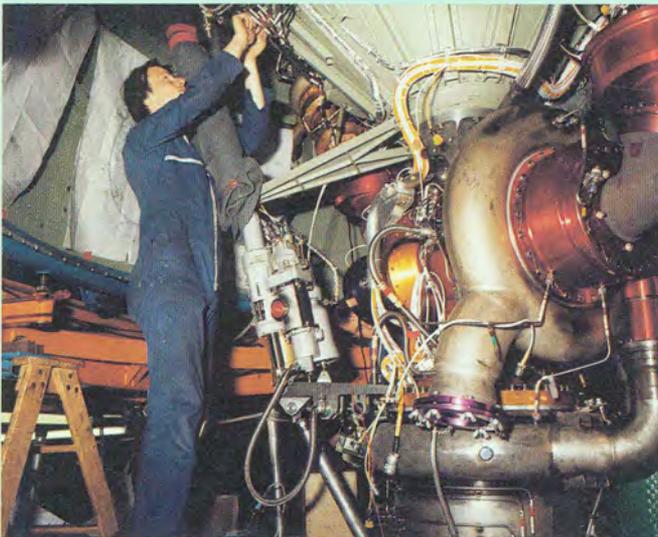
giving the users data from a variety of different sensors and platforms. Earthnet works through a series of National Points of Contact in the ESA Member States each of which disseminates the images in its own country and provides assistance for data interpretation.

Earthnet has long been preparing for the key role it will play once ESA's first Earth observation satellite (ERS-1) is in orbit from 1990 onwards. It will provide the ERS-1 Central Facilities and will coordinate the Processing and Archiving Facilities. Thanks to these new facilities, users will be able to consult the central data catalogue and the future mission plan, order fast delivery products and even put in requests for observations. The Central Facilities — which will be operational well into the next century — could form the basis for the User Centre for Columbus Polar Platform Earth Observation Payloads at ESRIN.

Earthnet relies heavily on its network of ground stations which collect the data transmitted by the different satellites as they pass within their coverage zones. There are at present three stations for the reception and processing of data, and two centres devoted to processing the data from the all-weather radar (synthetic aperture radar, or SAR) which will be one of the key instruments on-board ERS-1. Although three stations may not appear to be a very large network, the coverage of each station is, in fact, vast. Fucino, to the east of Rome, covers the whole of Europe, the Middle East, North Africa and part of the Soviet Union. Kiruna, in northern Sweden ensures that images of the polar zone, including Iceland and Greenland, as well as the whole of Scandinavia, are available, whilst the southernmost station, at Maspalomas on the Canary Islands, covers most of Western Africa down as far as the Gulf of Guinea. With such a coverage, Europe can not only monitor its own resources, it can also help developing countries, particularly in Africa, to understand, and find solutions for, their specific problems.

Some of the many applications for Earthnet images: pollution monitoring, Landsat-5 Thematic Mapper monitors the polluted coast at the mouth of the River Tiber (Italy); application mapping, Landsat-5 Thematic Mapper image (to the left of the photo) is used to update a large-scale map (photo courtesy of NLR, Emmeloord, The Netherlands); monitoring ice movements: to the left, a Seasat SAR image of the East Coast of Greenland (1978), and to the right the Jakobshavn Glacier on the West Coast of Greenland (1982) - sea ice can clearly be seen on both images, and its movements monitored at each successive satellite pass. The last two photographs show how a satellite image (left) can, by using a computer, be transformed into a three-dimensional image (right). The photograph on the left is a Landsat-5 Thematic Mapper view of the Lake of Lucerne in Switzerland (process. IKT, ETH Zurich), that on the right shows the Pilatus Mountain and the Lake of Lucerne computed from Landsat-5 Thematic Mapper data, this type of image is of particular interest for environmental monitoring and planning





esa-irs: esa's information retrieval service

Nowadays, a mass of information is being generated on more and more specialised subjects. The problem for so many people, be they scientists, engineers, managers, research workers, or indeed men and women working in any of the scientific and technical fields is, first and foremost, to know whether the information they need on a specific subject does in fact exist, where to look for it and, finally, once the source has been identified, how to select from the millions of references which may be available exactly what they need. And this is where ESA-IRS steps in; it brings rapid electronic retrieval of information to industry, research establishments, academic institutions, and businessmen throughout Europe and, indeed, the world.

With the expertise and know-how it has built up over the last 25 years, ESA-IRS now plays a leading role in Europe for the acquisition, retrieval and dissemination of scientific and technical information in the form of computer-accessible databases. It has developed its own highly sophisticated retrieval systems — so sophisticated in fact that they already contain some of the improvements recommended for future-generation systems — and it is continuously introducing ways and means to improve the services it offers its users. In fact, the more sophisticated its systems become, the easier it is for the user to find the relevant information.

ESA-IRS has, since 1964, had an agreement with NASA on the exchange of aerospace information. In addition, it is now producing a European aerospace database which reflects the scope of the current and future European aerospace programmes. Taken together, these two databases provide users with a very wide coverage of the field.

ESA's Information Retrieval Service is extensively used in ESA and by a very diverse scientific and technical community throughout Europe and well beyond its frontiers. The fact that it now has over 6000 companies registered

Above: the European aerospace industry is a major user of ESA-IRS. The main feed lines of the Ariane second stage engine being mounted in the integration hall at MBB-ERNO in Bremen. Opposite page: the ESA-IRS network of national centres, located in Brussels, Lyngby in Denmark, Dublin, Amsterdam, Trondheim in Norway, Madrid, Stockholm, London, Espoo in Finland, and the ESA-IRS office at ESA Headquarters in Paris



on its books with some 9000 password holders, and that it can offer databases containing over 50 million items of information, is sure proof of its success.

The ESA-IRS National Centres set up in nine European countries have played a major role in building up and maintaining this successful record. As sole representatives of ESA-IRS in their respective countries, they are able to provide feedback on specific user requirements for new fields of information, technological innovations and improvements which may be of particular interest to their scientific and industrial user communities. The information they provide enables the Service to plan ahead, be it to search for new sources of information, to include new databases, or to envisage further technological developments. This permanent cross-fertilisation between the end users and the Service is to everybody's advantage. Europe has, through ESA-IRS, a powerful tool for the dissemination and retrieval of information which is so vital in today's world.

Opposite page: a few examples of the wide variety of ESA-IRS users and of the type of information they will need: the European Space Tribology Laboratory, a university lecture hall (photo: Helga Lade - Lorenz), one of the main ERS-1 instruments, the Along-Track Scanning Radiometer, undergoing vibration testing at ESTEC



77N12420# NASA STAR Technical Report Issue 03
 Ceramic airframe bearings / Final Report, Feb. 1975 - Feb. 1976
 (AA)VANNYK, J. W.
 Boeing Aerospace Co., Seattle, Wash. (BR113710)
 AD-A025142; D180-19447-1 N00019-75-C-0170 760200 P. 106 refs 0
 In: EN (English) Avail.: NTIS HC A06/MF A01 p.341

A friction and wear screening investigation of ceramic coatings, lubricants, and lubricant reservoir designs was conducted for an 1100 F bearing application. A slotted reservoir design was evaluated in both elevated- and room-temperature screening tests. Load-spectrum and life bearing tests were conducted on a cylindrical lubricant reservoir design. These tests demonstrated a maximum load capacity of 22,000 psi and a life of 19,862 cycles at 15,000 psi. An improved lubricant reservoir ceramic bearing design was developed using a hot-pressed silicon nitride ball sliding against an alumina coating on titanium. Tests conducted with the slotted reservoir design bearings at elevated temperatures resulted in early failure of the bearing. Axial cracks in the silicon nitride ball were the apparent cause of bearing failure. Room-temperature tests of the slotted reservoir design were conducted under conditions simulating a hydrofoil flap hinge application. The tests demonstrated a significant improvement in performance. The load capacity of 28,000 psi and a wear life of 60,000 cycles at 15,000 psi were obtained with this design.

Author (GRA)

Category code: 37 (mechanical engineering)
 Controlled terms: *AIRFRAMES / *BALL BEARINGS / *CERAMIC COATINGS / SOLID LUBRICANTS / ALUMINUM OXIDES / SILICON NITRIDES / SLIDING FRICTION / WEAR TESTS /

 INFORMATION RETRIEVAL SERVICE

85-06136 Pollution 85006136
 Judicial recourse against foreign air polluters: A case study of acid rain in Europe
 Pallemarts, M.
 Address not stated
 HARVARD ENVIRON. LAW REV. VOL. 9, NO. 1 PPP. 143-209 Publ. Date 1985
 Lang. ENGLISH

This article explores the opportunities for private litigation by acid rain victims in European countries against foreign sources of long-range transboundary air pollution. Such private actions would aim not only to secure compensation or injunctive relief, but also to establish the illegality of transboundary air pollution, to draw public attention to the magnitude of acid rain damage, and to increase pressure on the involved governments to reach effective solutions. Thousands of lakes in Scandinavia have become so acidified that they can no longer sustain any fish. The productivity of hundreds of thousands of acres of forest in West Germany and other areas of central Europe has severely decreased as trees die following acid rain damage to their foliage, the leaching of nutrients from the soil, and other stress factors linked directly or indirectly to air pollution. In addition, acid rain causes accelerated corrosion of materials, including the rapid decay of many historical monuments in urban areas.

Classification Codes: 0000
 Controlled Terms: Europe / acid precipitation / environmental impact / soils / ecology / fish / land pollution



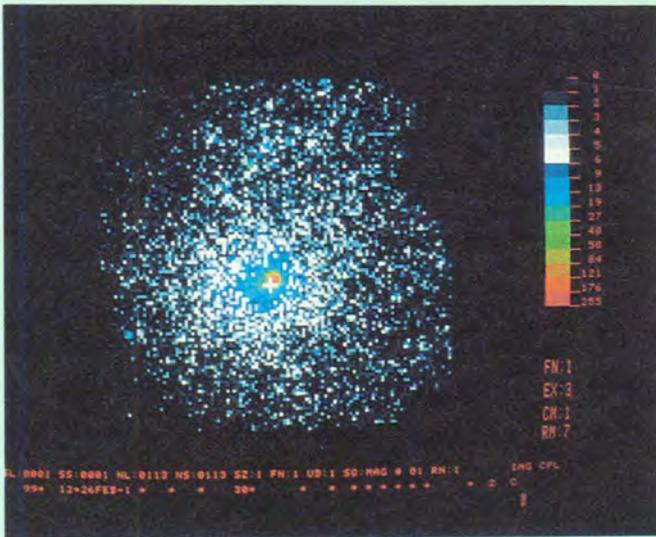
84A22775 NASA IAA Journal Article Issue 08
 Dynamic effects during vibrothermographic NDE of composites
 (AA)RUSSELL, S. S.; (AB)HENNEKE, E. G., II
 (AA)GM. Research Laboratories, Warren, MI; (AB)(Virginia Polytechnic Institute and State University, Blacksburg, VA) and Quality Control (International Conference on Testing, Evaluation, 13, 14, 1983) NDT International (ISSN 0308-9126), vol. 17, Feb. 1984, p. 19-25. Research supported by the Martin Marietta Aerospace and Alcoa Foundation. R40200 P. 7 refs 7 In: EN (English) p.1096

Vibrothermography is an NDE technique whereby a structure is excited with mechanical vibrations and the temperature profile on the surface is mapped by real-time video thermography. Damage in the structure is frequently more efficient at converting the input mechanical energy to heat than are undamaged regions of the structure. Hence, damage appears on the thermal map as warmer regions. While using this technique to investigate manufacturing defects in tensile coupons made from sheet moulding compound and panels of graphite epoxy damaged by impact loadings, a dependence of the temperature patterns upon the frequency of the mechanical excitation was observed. This paper attempts to model mechanical behavior and to verify the model by experiment.

Author

Category code: 38 (quality assurance/reliability)
 Controlled terms: *COMPOSITE MATERIALS / *NONDESTRUCTIVE TESTS / TEMPERATURE MEASUREMENT / *THERMOGRAPHY / *VIBRATION TESTS / DELAMINATING / FIBER REINFORCED COMPOSITES / IMPACT DAMAGE / TEMPERATURE DEPENDENCE /

 INFORMATION RETRIEVAL SERVICE



isd: handling the information flow

Information handling is the 'lifeblood' of most of today's scientific, technological, and managerial activities. ESA, with its coordinated space research and technology programme, is at the centre of a flow of information, criss-crossing Europe and indeed going well beyond its frontiers. As a result of the microtechnology revolution, information handling is now more and more based on electronic systems rather than relying solely on paper. Although such systems can provide more efficient means of handling some information, they do create problems of their own. The Information Systems Division (ISD) was set up at ESRIN in 1988 for the purpose of finding solutions to these problems.

ISD differs from the other divisions in ESRIN in that it is not a source of externally generated information for one particular user community. Its role is to find common solutions to particular problems in the information handling area. ISD is now concentrating on three different sectors: it is developing the European Space Information System (ESIS) which will allow scientists in the astronomical and solar-terrestrial disciplines easy access to data archived in a variety of different forms and geographical locations. It is also coordinating the definition and integration of information systems for ESA programmes, and, thirdly, it is developing an ESA documentation management system for the distribution and archiving of ESA documentation both in-house and elsewhere.

The Esis programme offers scientists an easier solution to a long-standing problem; it enables them to examine space data from a variety of missions

Above: image of the supernova 1987A taken from the IUE Data Base which can now be widely consulted through the Esis network. Opposite page: the Esis pilot project. The squares represent the archiving facilities: the IUE database at Villafranca in Spain, the World Data Centre and Geophysical Data Facility at Rutherford Appleton Laboratory, Didcot in the United Kingdom, the Exosat database at Estec in the Netherlands, the Space Telescope database at the Space Telescope European Coordinating Facility in Garching, Federal Republic of Germany, and the Simbad database managed by the Centre des Données astronomiques in Strasbourg, France. Other national access points, indicated by circles on the map, are located at ESA Headquarters in Paris, the European Space Operations Centre, ESOC, in Darmstadt, Federal Republic of Germany and in Copenhagen, Oslo and Stockholm.

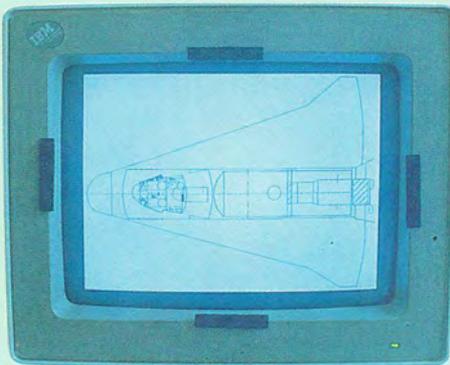
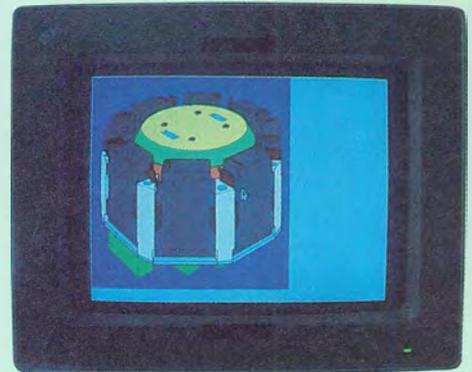
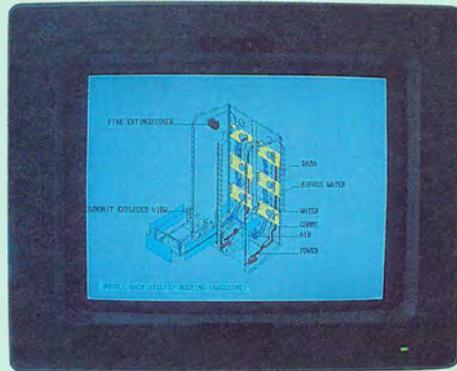
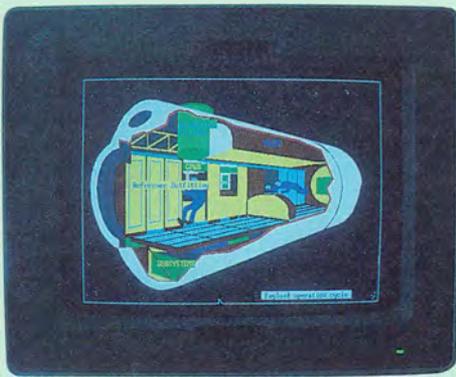
and from a variety of sources by means of a single communications link. The programme is now in a pilot phase which will last until the end of 1994. It will provide access to scientific databases in five different locations, including the IUE database in Villafranca, Spain, and databases in The Netherlands, the United Kingdom, France and Germany. Esis marks the beginning of a new era in the exploitation of space-science data which will certainly facilitate international collaboration.

The second area of activity includes the development of a Columbus Utilisation Information System (CUIS), specifically designed to enable the users of Columbus (Europe's contribution to Space Station Freedom) to obtain the information they need in order to prepare their experiments. Work is also proceeding on the development of a Hermes Information System which will be used to manage — from the technical, planning and financial points of view — ESA's Hermes spaceplane programme which is another key element of the European In-Orbit Infrastructure.

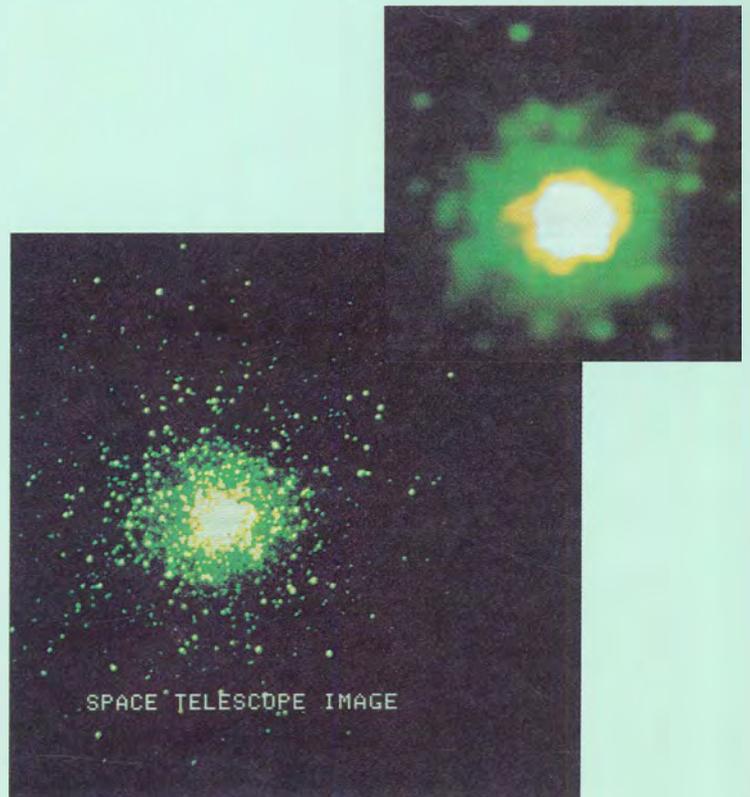
The document management systems activity is different again. It aims at providing ESA project teams, the European aerospace industry and ESA Member State delegations with modern means for disseminating and archiving documents. A system such as Emits (Electronic Mail Invitation to Tender System), which enables interested parties to check all on-going ESA tender actions via their terminals or personal computers, is a good example of this type of activity, as is Dodis (Document Distribution Systems), another electronic mail tool for the rapid distribution and archival of documents to ESA Delegations.

These activities clearly illustrate the variety of possibilities which can be achieved through a common denominator: the development of software to handle different types of information generated from all manner of sources in order to simplify and facilitate the task of the end user.

Opposite page: some of the information handling projects dealt with by ISD. At the top of the page, the Cuis system enables users to view the inside of the Columbus Attached Module, a double rack inside the module, and an experimental centrifuge. The next screen shows the Hermes reference configuration which can be called up on a personal computer via the Hermes Information System. This is followed by a screen showing a list of open tenders obtained through Emits. The photographs at the bottom of the page show the type of information available through Esis: an Exosat image of the Seyfert Galaxy, and the type of image of a very distant globular starcluster — which will be available when Space Telescope is operational — compared with a much less detailed image from a ground-based telescope



EXOSAT:
THE SEYFERT GALAXY NGC 1275





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March 1989

For further *technical* information on the areas outlined
in this booklet, please contact:

Earthnet: The Head of the Earthnet Programme Office
ESA-IRS: The Online Services Division
ISD: The Information Technology Office

For general information on ESRIN: The Public Relations Office

ESRIN,
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Telephone: (39) 6 941801, Telex: 610637 ESRIN I,
Facsimile: (39) 694180361

Opposite page: A NOAA AVHRR mosaic of Europe and North Africa (image processed by NRSC, Farnborough, UK)

