20 years of european cooperation in space

ESA ESTABLISHMENTS

ESA HEADQUARTERS
8/10 rue Mario Nikis
75738 PARIS CEDEX 15

Staff: about 280

ESA moved into its permanent Headquarters in Paris on 16 October 1976. The Agency's Director General, its Director of the Scientific Programme, of the Space Applications Programme, of the Space Transportation Systems Programme and of Administration are all stationed at Headquarters from where the overall management of the Agency's activities is carried out.

ESTEC
Keplerlaan 1
2201 AZ NOORDWIJK ZH
The Netherlands

Staff: about 780

Inaugurated on 3 April 1968 by HRH The Queen of the Netherlands, then Princess Beatrix, and Prince Claus, ESTEC is the Agency's main technical centre. It is responsible, with the programme directors in charge of the various projects, and, for the management of ESA programmes in the scientific, communications, earth observation and space transportation fields being developed by European industry. In addition, the Centre's specialised staff carry out studies for future satellite programmes and a space science programme as well as being responsible for the programmation and management of a European space technology research programme.

A wide range of testing installations and laboratory facilities on site ensures the verification of satellites from individual components to full system level. New facilities are presently under construction which, when terminated, will be amongst the largest of their kind in the world.

ESOC
Robert Bosch Strasse 5
61 DARMSTADT
Federal Republic of Germany

Staff: about 230

ESOC came into being as a result of a decision taken in 1967 to move satellite control activities from ESTEC and to integrate them with the data processing activities of ESDAC (the European Space Data Centre), located at Darmstadt since early 1964.

ESOC is in charge of all satellite operations and the corresponding ground facilities and communications networks. The ESOC-controlled network includes a central control centre in Darmstadt and telemetry, tracking and control facilities at ground stations around the world. At present, ESOC is controlling and operating some ten different spacecraft, both scientific satellites as well as pre-operational and operational satellites (meteorological and applications). It is also carrying out payload data processing activities for Meteosat and Exosat. In addition, ESOC is responsible for all computer installations and technical data processing activities within the Agency.

ESRIN
via Galileo Galilei
Casella postale 64
00044 FRASCATI
Italy

Staff: about 70

IRS
Following a 1964 agreement between NASA and ESRO for "cooperation and exchange in the field of scientific and technical information", a joint ESRO/ELDO Space Documentation Service (SDS) was set up in Paris in April 1965. Transferred to ESRIN in 1973, it was renamed Information Retrieval Service (IRS) in 1978, and since then has developed into the leading European online information service, with well over 60 databases covering a wide variety of fields.

EPO
1978 also saw the setting up of a secondary activity at ESRIN, the Earthnet Programme Office (EPO). The EPO acquires, archives and preprocesses remote sensing satellite data (from US spacecraft only at present) and distributes it, via a network of National Points of Contact, to an ever-increasing number of users. Earthnet is also involved in the definition of the ground segment for the ESA Remote Sensing Satellite Mission, ERS-1.

Apart from these main centres, ESA has technical teams located in national Establishments for the conduct of certain programmes: the Meteosat Programme Office is in the CNES Space Centre in Toulouse (France), the Spice Team (Spacelab Payload Integration and Coordination in Europe) is stationed on the DFVLR premises at Cologne-Porz (FRG) and an ESA team is present at the Ariane Launch Site at Kourou (French Guiana). The Agency has a Liaison Office in Washington DC (USA).

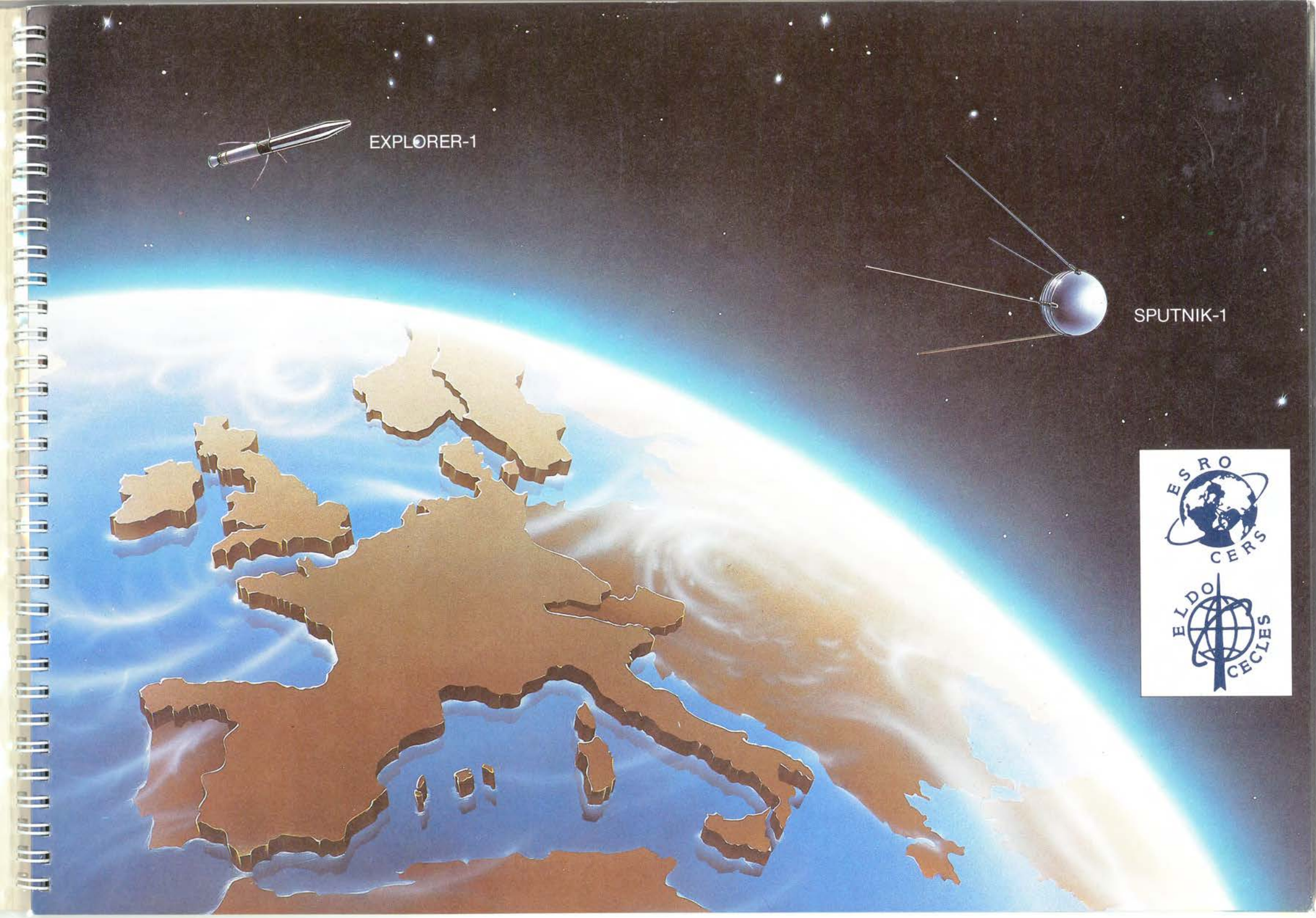
1957-1964

HOW IT ALL STARTED

The USSR put the very first artificial satellite, SPUTNIK-1 into orbit on 4 October 1957 and the USA launched its first spacecraft, EXPLORER 1 on 31 January 1958.

Fully aware of the exciting new possibilities opened up by space research, and conscious of the fact that it would be preferable for Europe to pool its resources in order to set up an effective space research programme, a group of European scientists laid the foundation stones in 1960 for the setting up of a European preparatory commission for space research (COPERS). On the last day of an Intergovernmental Conference held in November 1960, 12 nations signed the "Meyrin Agreement" setting up COPERS. At about the same time, the United Kingdom took the initiative to suggest the development of a European launcher making use of nationally developed hardware.

These efforts bore fruit in 1964 when the Convention of the European Space Vehicle Launcher Development Organisation (ELDO) and of the European Space Research Organisation (ESRO), forerunners of ESA, came into force respectively in February and March.


EXPLORER-1
SPUTNIK-1
ESRO
CERS
ELDO
CECLES

1964-1968

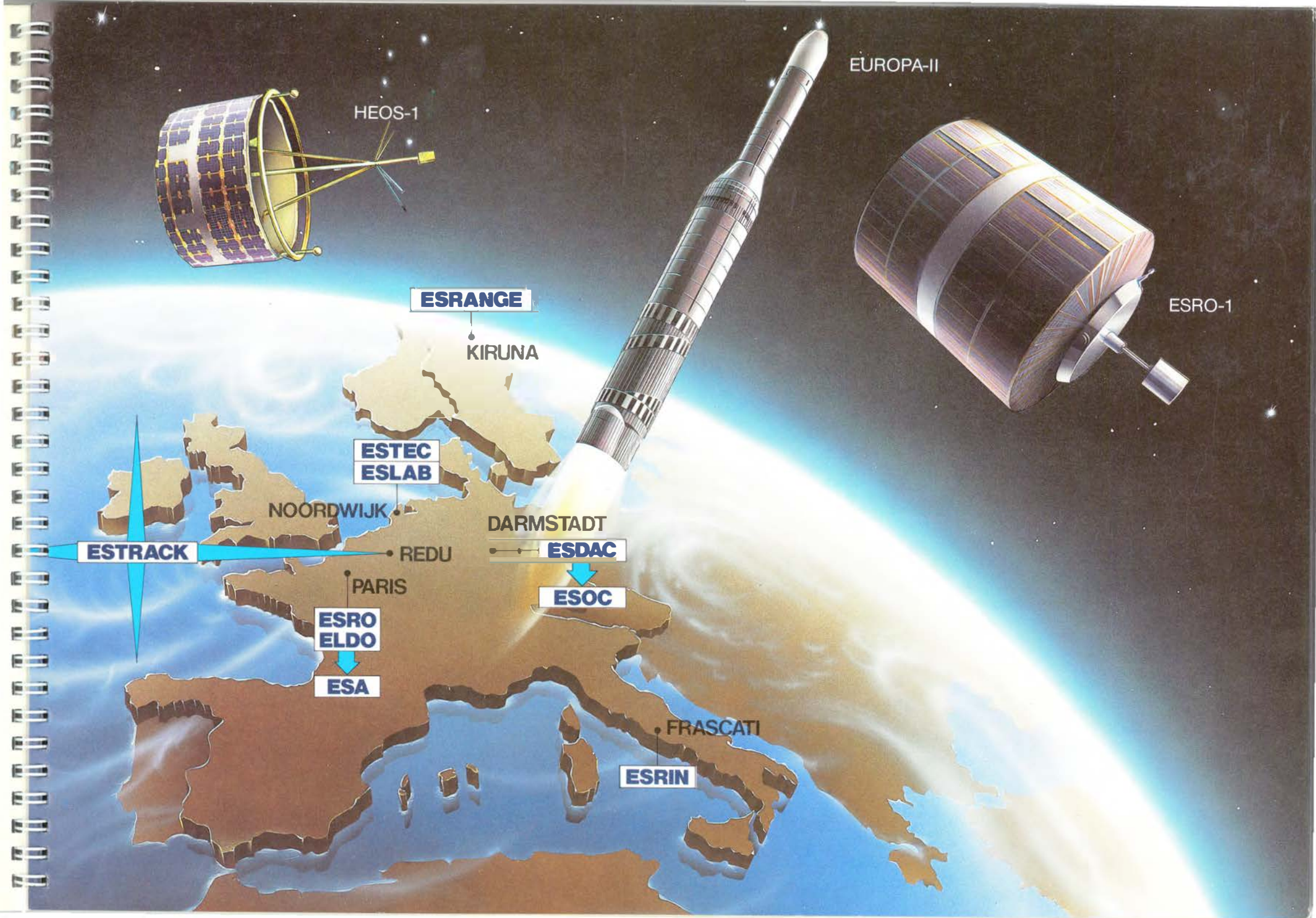
THE VERY EARLY YEARS

ESRO, with its Headquarters in Paris, set up its two main technical centres: the European Space Research and Technology Centre (ESTEC) in the Netherlands and the European Space Data Centre (ESDAC) later to become the European Space Operations Centre (ESOC) in Germany, as well as the European Space Laboratory (ESLAB), later to be integrated into ESTEC, and a smaller Centre devoted to the study of space plasma physics (ESRIN) in Italy, its ground station network (ESTRACK) and its sounding rocket range (ESRANGE) in Sweden.

Simultaneously, work started on the design and development of the first European scientific satellites, ESRO I (polar ionosphere and aurora studies), ESRO II (solar astronomy and cosmic rays) HEOS-1 (interplanetary physics and cosmic rays). All three spacecraft were launched by American rockets in 1968. Studies on five new satellites were also initiated.

The Sounding Rocket programme got underway with launches from Sardinia, France, Norway, Greece and Sweden.

ELDO began the design, development and construction of a launcher using a British rocket as its first stage, a French rocket as its second stage and a third stage developed by Germany. It was decided to use the Australian range at Woomera for development firings of this EUROPA launcher.


HEOS-1
EUROPA-II
ESRO-1
ESRANGE
KIRUNA
ESTEC
ESLAB
NOORDWIJK
ESTRACK
REDU
DARMSTADT
ESDAC
ESOC
PARIS
ESRO
ELDO
ESA
FRASCATI
ESRIN

1969-1974

THE YEARS OF CHANGE

During this five-year period, the importance of applications satellites (communications and meteorology in particular) as opposed to purely scientific satellites, came to the fore. The idea of cooperation in this field—not foreseen in the ESRO Convention—gained force rapidly.

Four scientific satellites were successfully launched during these years; ESRO-1B, HEOS-A2, TD-1A and ESRO-IV. The Space Documentation Service was installed at ESRIN, replacing the scientists who had left after the decision to put an end to plasma physics research at ESRIN. It was also during these years of change that it was decided to abandon the Sounding Rocket Programme, and ESRANGE was taken over by Sweden.

Launcher activities were less successful and, after the failure of F11 in 1971, the ELDO programme of launchers—EUROPA II and the study of a heavier launcher, EUROPA III—was discontinued.

The final years of this period of change saw Europe move towards the manned space field with the decision to develop Spacelab within the framework of the US Post-Apollo programme. It also decided to develop, on a cooperative basis, a European launcher, Ariane.

Finally, it was agreed to set up a single European Space Agency, ESA, entrusted with carrying out not only all tasks previously undertaken by ESRO and ELDO but also with new activities.


HEOS-A2
ESRO-IV
TD-1A

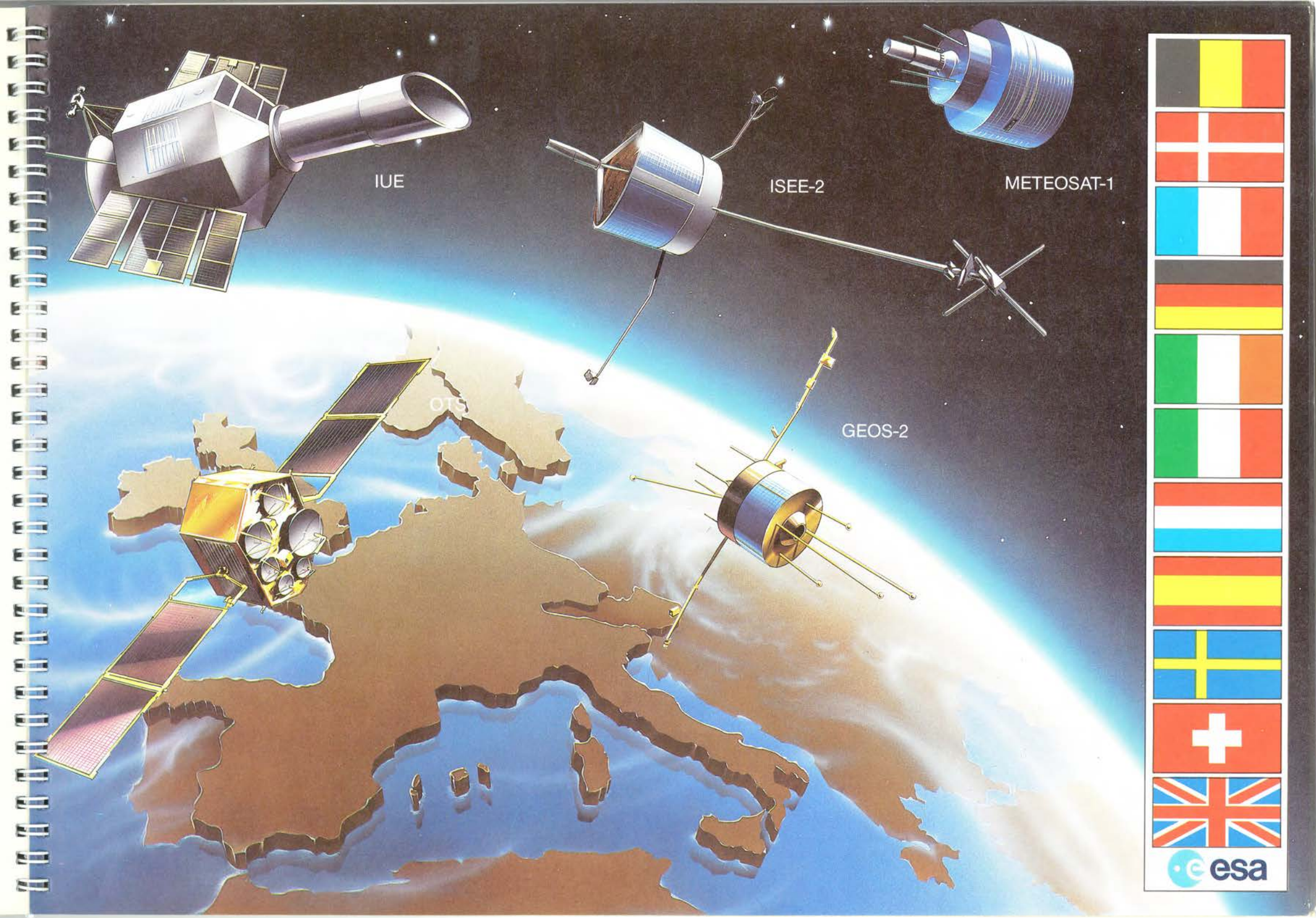
1975-1979

ESA IS BORN

The Convention setting up the European Space Agency was signed in 1975 by 11 European countries: Belgium, Denmark, France, Federal Republic of Germany, Republic of Ireland, Italy, Netherlands, Spain, Sweden, Switzerland and the United Kingdom. ESA was born. Subsequently, Austria and Norway became Associate Member States and close ties were forged with Canada.

The first ESA applications satellites: METEOSAT-1 (weather forecasting) and OTS (experimental telecommunications satellite) were launched in 1977 and 1978 respectively.

Four new scientific spacecraft were placed in orbit: COS-B (gamma ray astronomy) in 1975, ISEE-2—one of three spacecraft of a collaborative NASA/ESA mission designed to study the magnetosphere and Sun/Earth relations—in 1977, and in 1978 GEOS-2 for the study of the far magnetosphere and IUE (International Ultra-violet Explorer)—a joint ESA/NASA and United Kingdom project.


IUE
ISEE-2
METEOSAT-1
OTS
GEOS-2
esa

1980-1990

THE SCIENTIFIC PROGRAMME

In the opening years of the decade ESA had five scientific satellites in orbit, all operating remarkably well and providing the European scientific community with exciting new data. ESA's X-ray observatory satellite—EXOSAT (launched in May 1983) joined COS-B, ISEE-2, GEOS-2 and IUE.

Four new pioneering missions are under development at present and will be launched before the end of the decade:

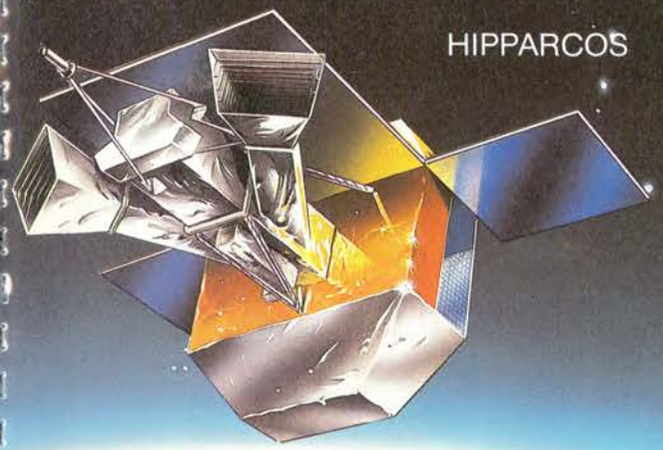
GIOTTO (launch in 1985) will take a close (500 km from the nucleus) look at Halley's Comet; the encounter is due to take place in March 1986.

The Space Telescope is a NASA project for which ESA is providing one of the on-board instruments—a Faint Object Camera—and the spacecraft's solar arrays. Probably one of the most ambitious projects undertaken to date in space astronomy, the Space Telescope is scheduled for launch 1986.

ISPM—a cooperative ESA/NASA project will study the properties of the interplanetary medium and solar wind outside the plane of the ecliptic (launch: 1986).

HIPPARCOS, which will provide a catalogue showing the position of some 100,000 stars, is scheduled for launch in 1988.

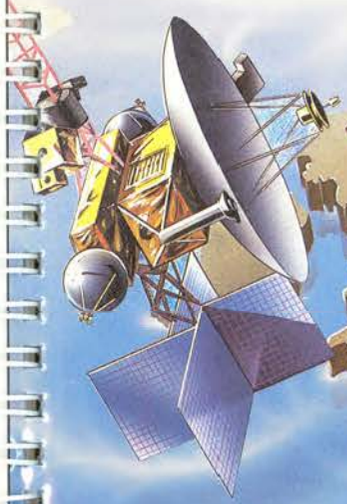
Planning for the 1990s is also going ahead. Besides the development of an infra-red observatory satellite (ISO), scheduled for launch in the early years of the next decade, studies of possible new projects are being carried out throughout Europe.



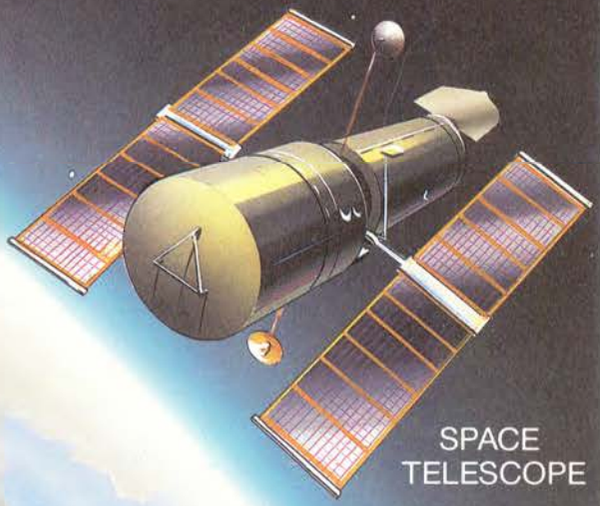
HIPPARCOS

EXOSAT

GIOTTO



ISPM



SPACE TELESCOPE

VILLA FRANCA

1980-1990

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HIPPARCOS
EXOSAT
GIOTTO
ISPM
SPACE
TELESCOPE
VILLA FRANCA

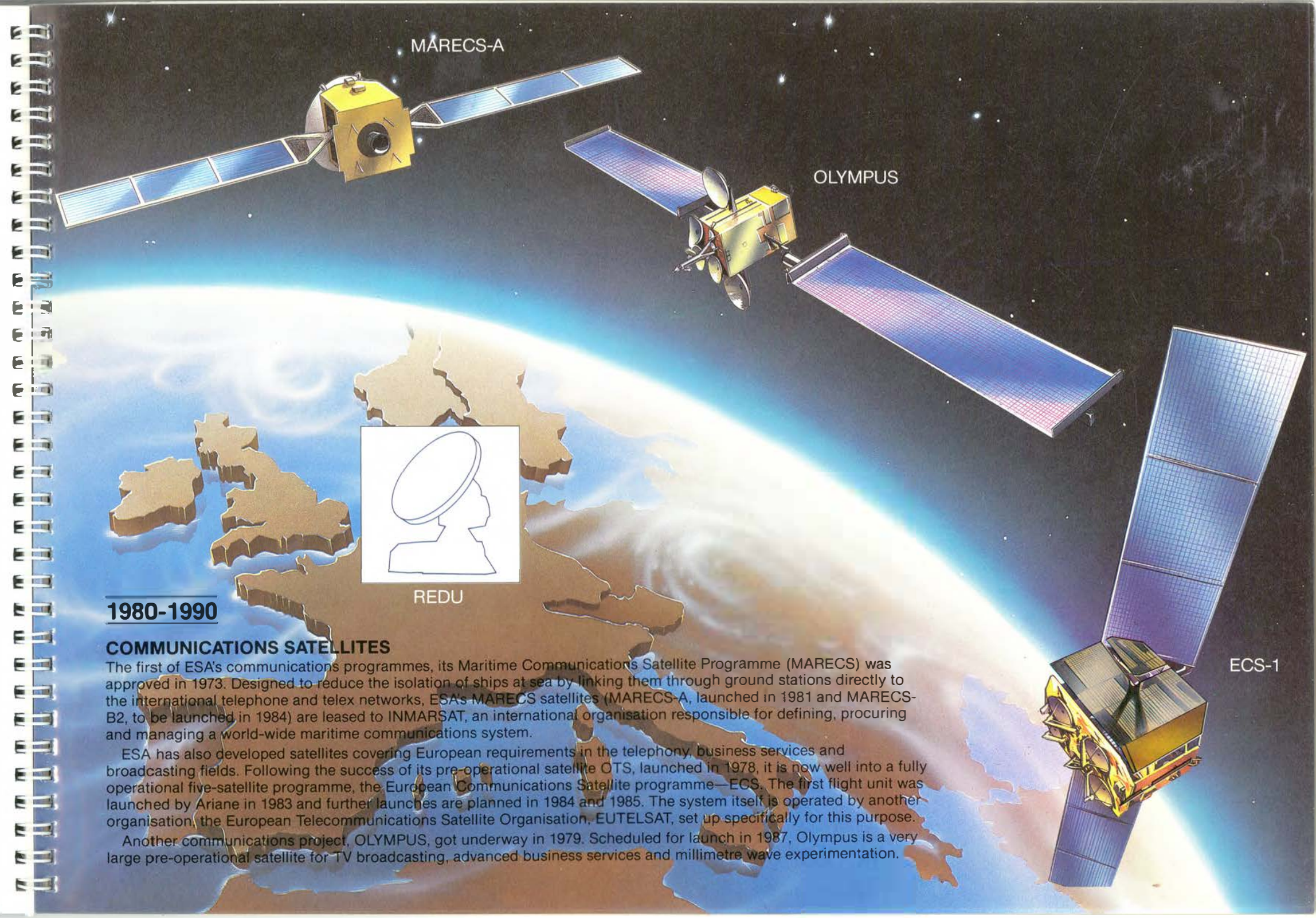
1980-1990

COMMUNICATIONS SATELLITES

The first of ESA's communications programmes, its Maritime Communications Satellite Programme (MARECS) was approved in 1973. Designed to reduce the isolation of ships at sea by linking them through ground stations directly to the international telephone and telex networks, ESA's MARECS satellites (MARECS-A, launched in 1981 and MARECS-B2, to be launched in 1984) are leased to INMARSAT, an international organisation responsible for defining, procuring and managing a world-wide maritime communications system.

ESA has also developed satellites covering European requirements in the telephony, business services and broadcasting fields. Following the success of its pre-operational satellite OTS, launched in 1978, it is now well into a fully operational five-satellite programme, the European Communications Satellite programme—ECS. The first flight unit was launched by Ariane in 1983 and further launches are planned in 1984 and 1985. The system itself is operated by another organisation, the European Telecommunications Satellite Organisation, EUTELSAT, set up specifically for this purpose.

Another communications project, OLYMPUS, got underway in 1979. Scheduled for launch in 1987, Olympus is a very large pre-operational satellite for TV broadcasting, advanced business services and millimetre wave experimentation.



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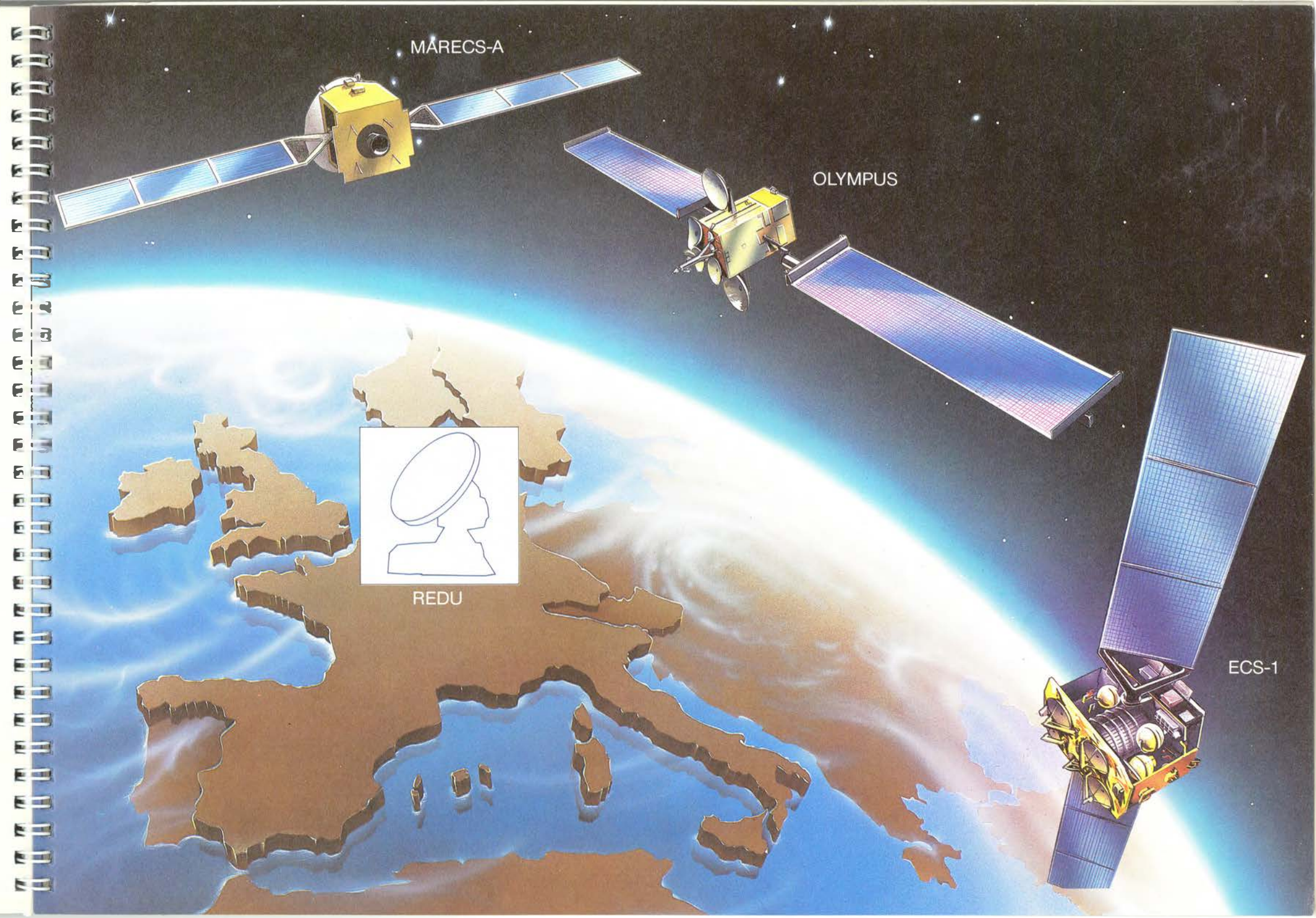

MARECS-A
OLYMPUS
REDU
ECS-1

1980-1990

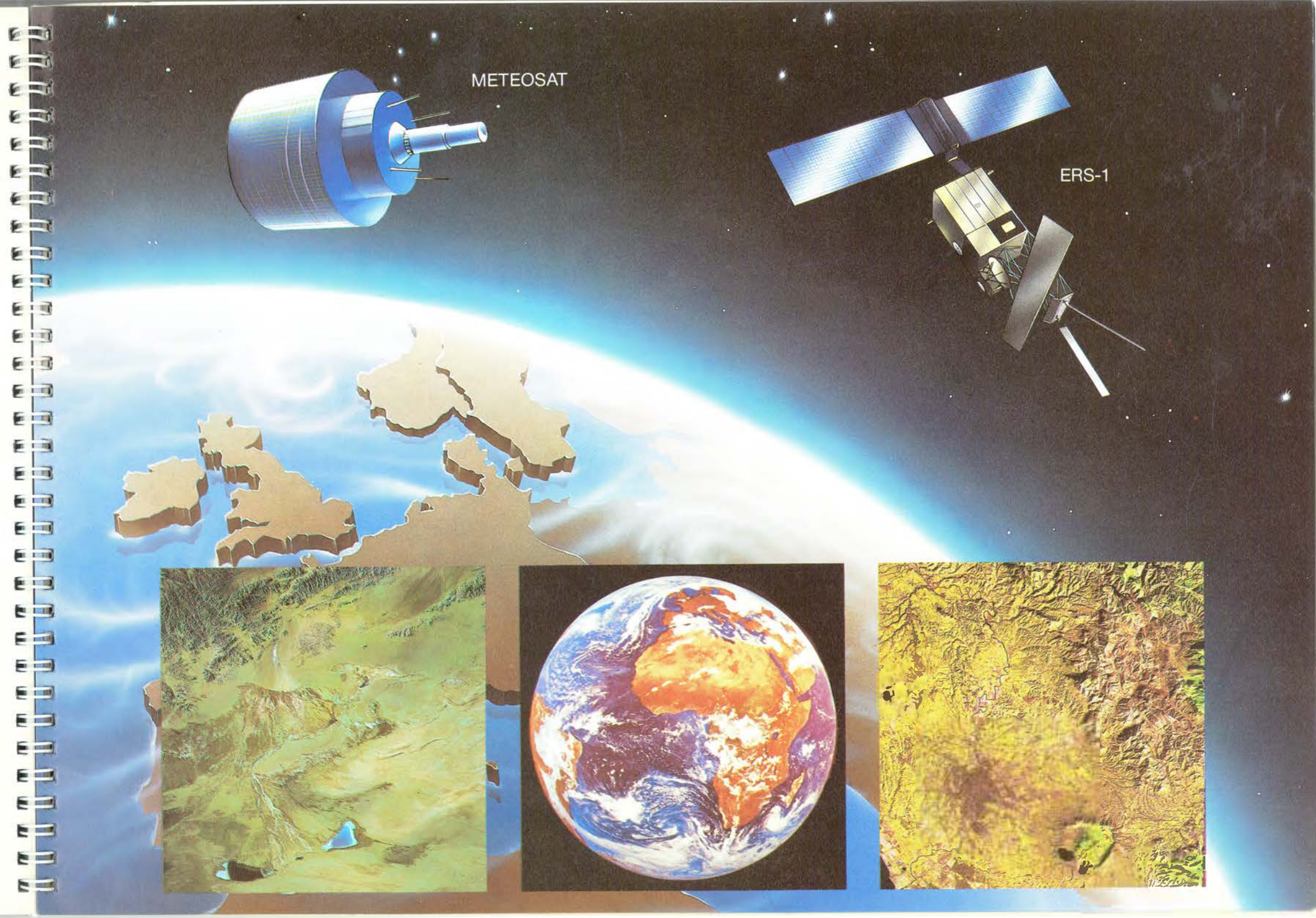
EARTH OBSERVATIONS

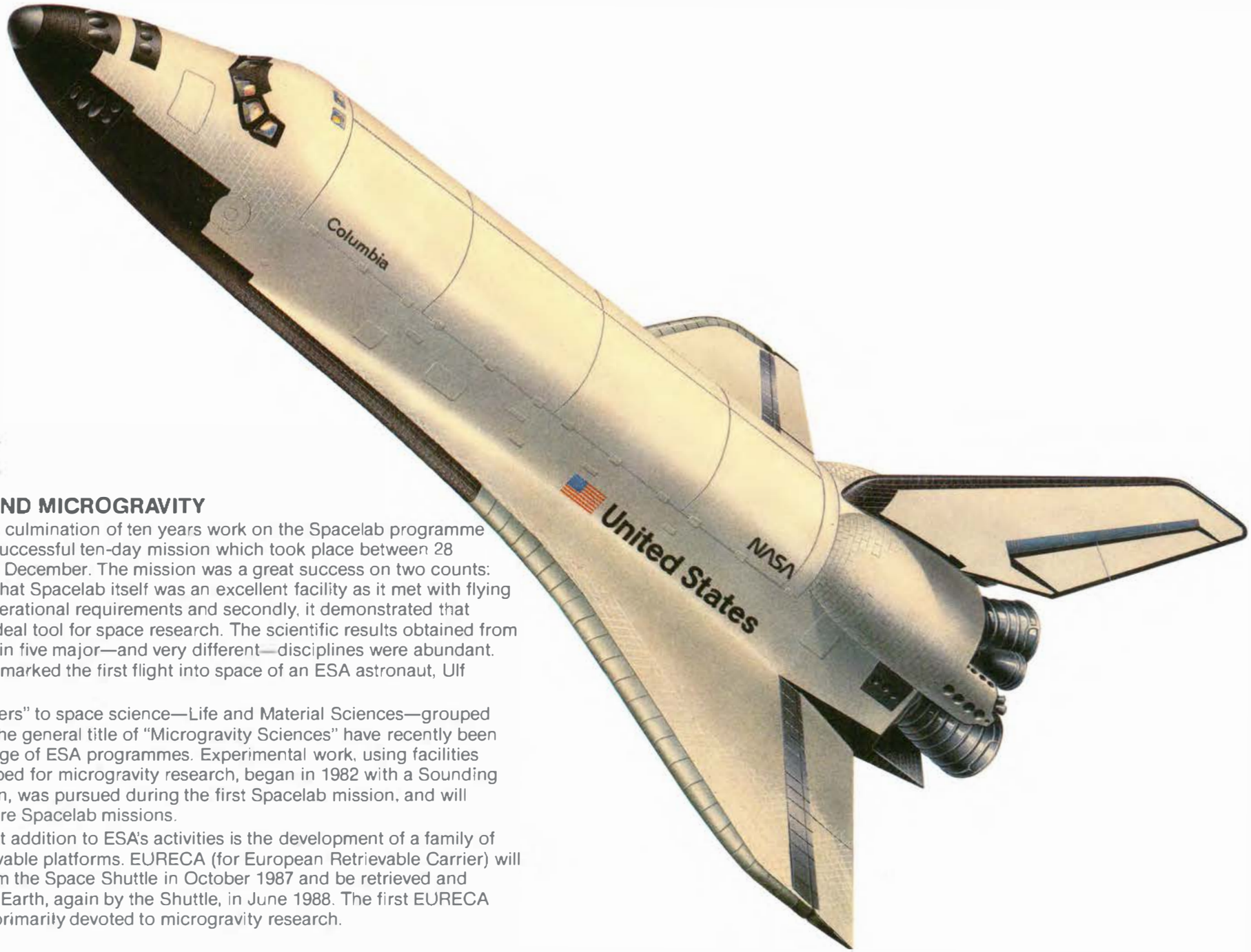
Spacecraft are ideal platforms from which to observe the Earth and its immediate environment. ESA entered the Earth observation field in 1977 with the launch of its first applications satellite, Meteosat-1. The second unit was launched by Ariane in 1981 and continues to provide the images seen daily on television screens throughout most of Europe. In May 1983, a European Meteorological Satellite Organisation, EUMETSAT, was created to establish, maintain and operate a European system of operational meteorological satellites. Initially, the system will be a continuation of the Meteosat Programme, with launches planned for 1987, 1988 and 1990. ESA has been entrusted with carrying out the Meteorological Operational Programme on behalf of EUMETSAT.

ESA's first Remote Sensing Satellite Programme got underway in 1981 with a view to launching towards the end of the decade a pre-operational observation satellite, ERS-1, oriented mainly towards ice and ocean monitoring.

Europe also has its own network, EARTHNET, for the distribution of remote sensing data acquired, for the time being, from US satellite missions. The Earthnet offices are at ESRIN in Italy.

From left to right: Spacelab 1 Metric Camera image of Western China, Meteosat view of the Earth in the visible channel, Thematic Mapper image of the Rome area (Landsat) distributed by Earthnet.


METEOSAT
ERS-1



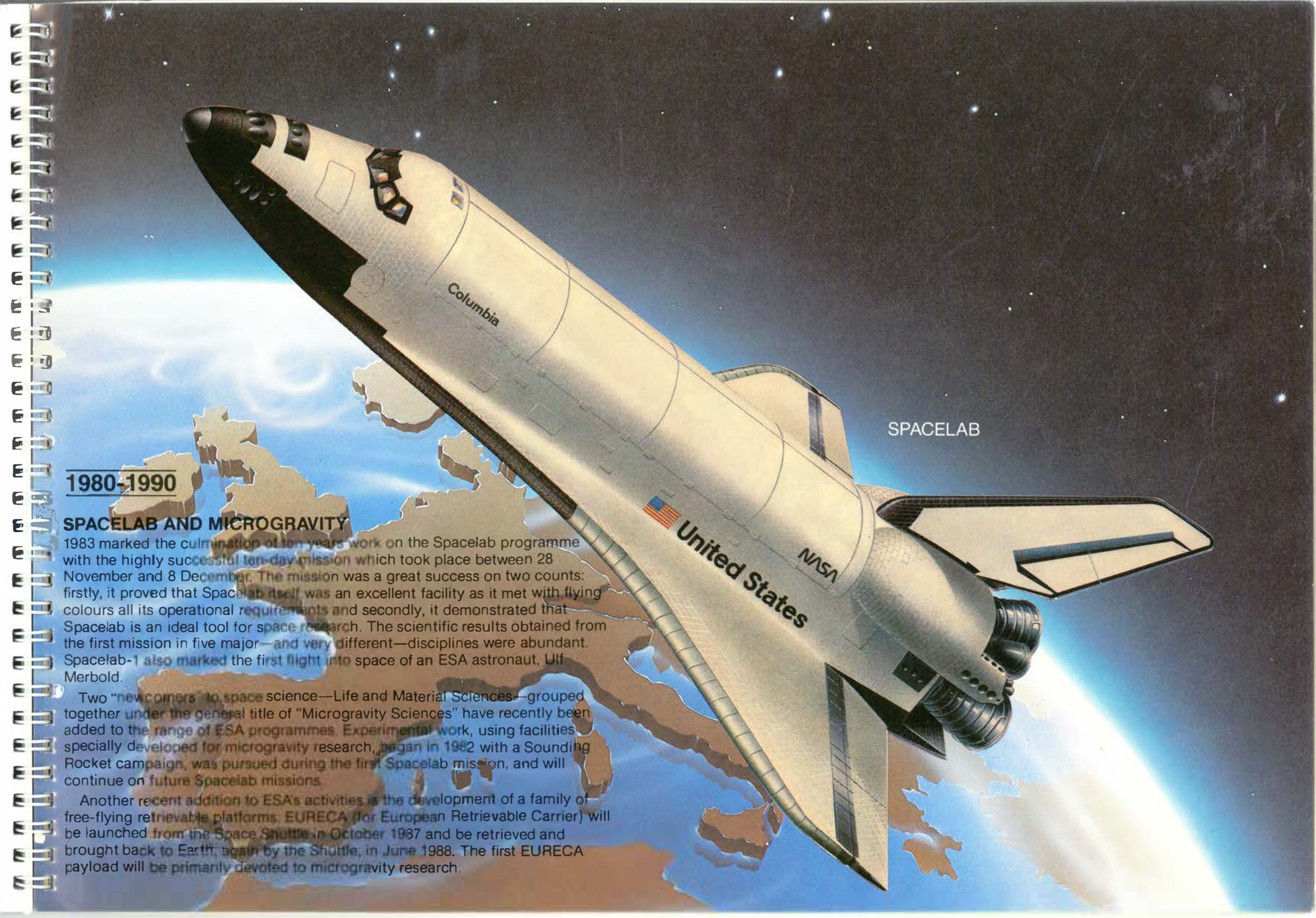
1980-1990

SPACELAB AND MICROGRAVITY

1983 marked the culmination of ten years work on the Spacelab programme with the highly successful ten-day mission which took place between 28 November and 8 December. The mission was a great success on two counts: firstly, it proved that Spacelab itself was an excellent facility as it met with flying colours all its operational requirements and secondly, it demonstrated that Spacelab is an ideal tool for space research. The scientific results obtained from the first mission in five major—and very different—disciplines were abundant. Spacelab-1 also marked the first flight into space of an ESA astronaut, Ulf Merbold.

Two "newcomers" to space science—Life and Material Sciences—grouped together under the general title of "Microgravity Sciences" have recently been added to the range of ESA programmes. Experimental work, using facilities specially developed for microgravity research, began in 1982 with a Sounding Rocket campaign, was pursued during the first Spacelab mission, and will continue on future Spacelab missions.

Another recent addition to ESA's activities is the development of a family of free-flying retrievable platforms. EURECA (for European Retrievable Carrier) will be launched from the Space Shuttle in October 1987 and be retrieved and brought back to Earth, again by the Shuttle, in June 1988. The first EURECA payload will be primarily devoted to microgravity research.



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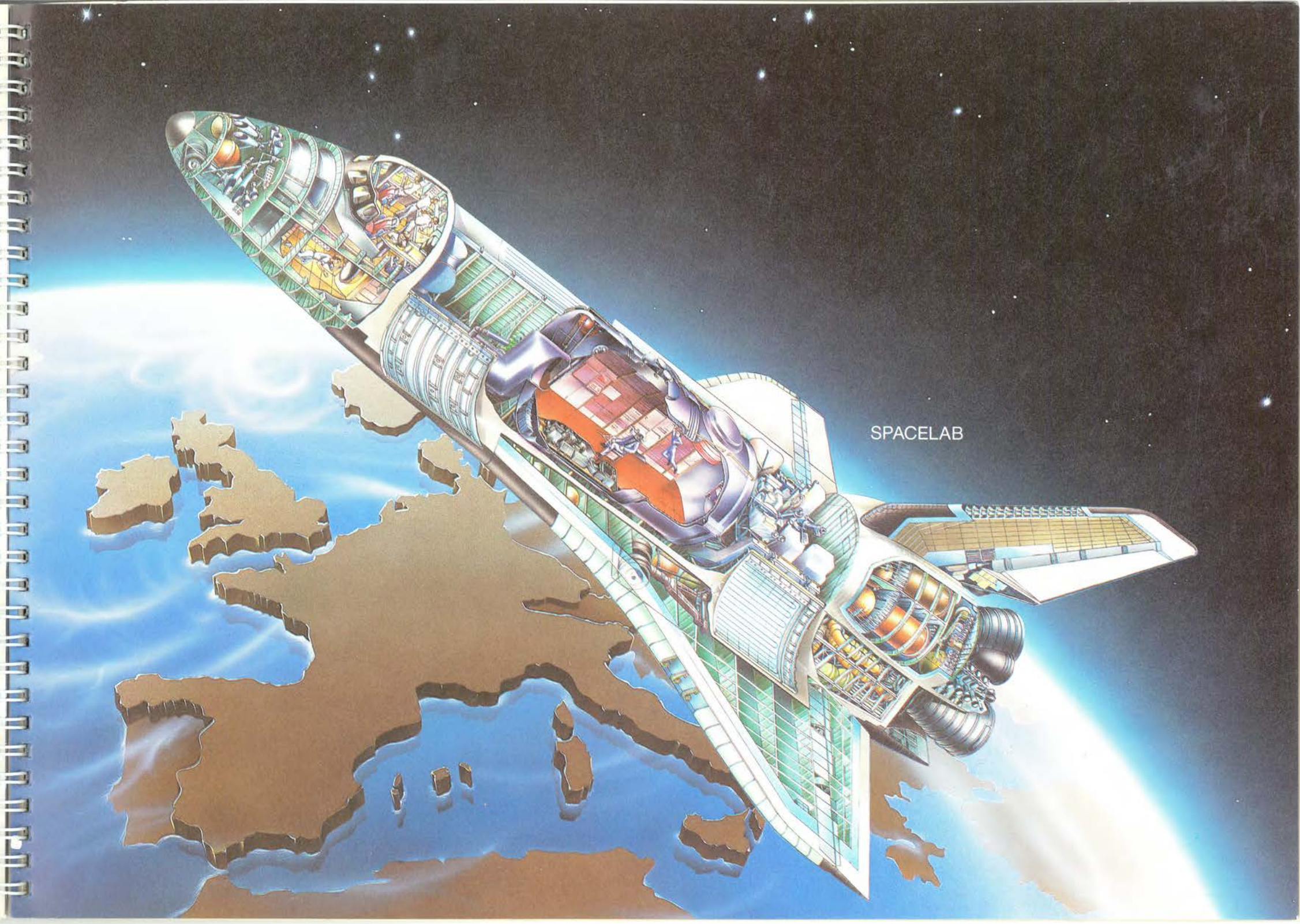

SPACELAB

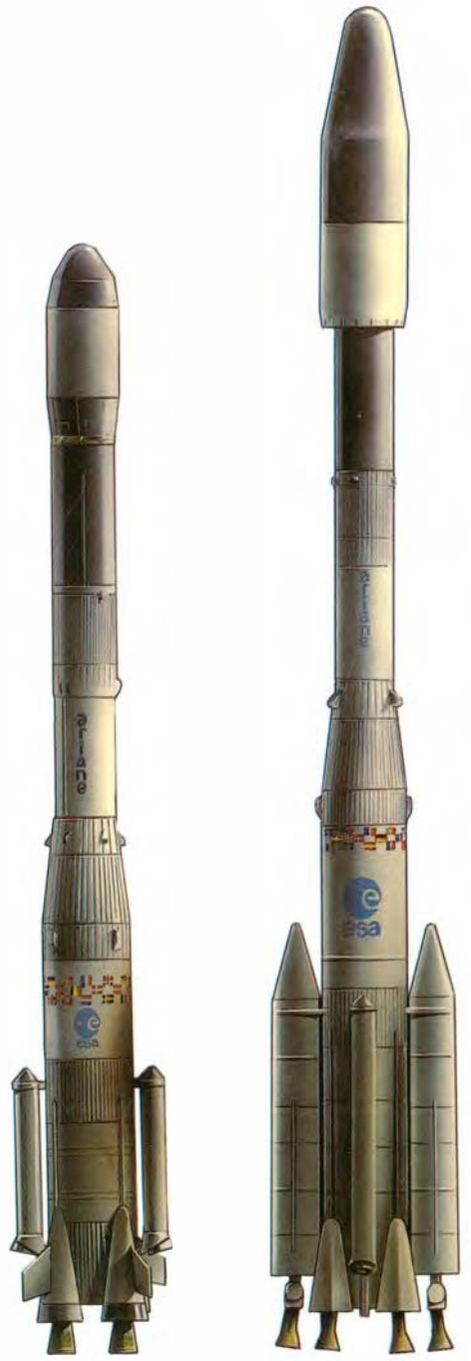
1980-1990

THE ARIANE LAUNCHER

The European launcher—ARIANE—programme started in 1973 when the Ministers responsible for space research confirmed that it was essential for Europe to develop its own launch capability. Only six years later, in December 1979, Ariane successfully completed its first test flight. As with any complex, high technology programme of this kind, Ariane had its teething troubles; the problems incurred have now been overcome and Ariane has successfully launched seven payloads, three ESA spacecraft, Meteosat-2, MARECS-A and ECS-1, and Amsat P_3B, Apple (an Indian telecommunications satellite), and two Meteosat-2, MARECS-A and ECS-1, and three non-EuroIntelsat V spacecraft.

With even larger and heavier spacecraft requiring injection into the geostationary orbit at 36,000 km above the Earth, ESA decided to develop more powerful versions of the launchers—ARIANE 2, ARIANE 3 (which will have its first operational launch in 1984) and ARIANE 4. In its most powerful version, Ariane 4 will be able to launch spacecraft weighing over 4 tonnes into the geostationary transfer orbit when it becomes operational in 1985.

Commercial launch operations have been taken over by Arianespace, a private company set up for this purpose. The success of the European launcher is clearly demonstrated by the Arianespace order book which already has firm orders for the launch of 25 spacecraft, using 19 launchers, between May 1984 and December 1987.



ARIANE-1

ARIANE-4

ARIANE-2

1980-1990

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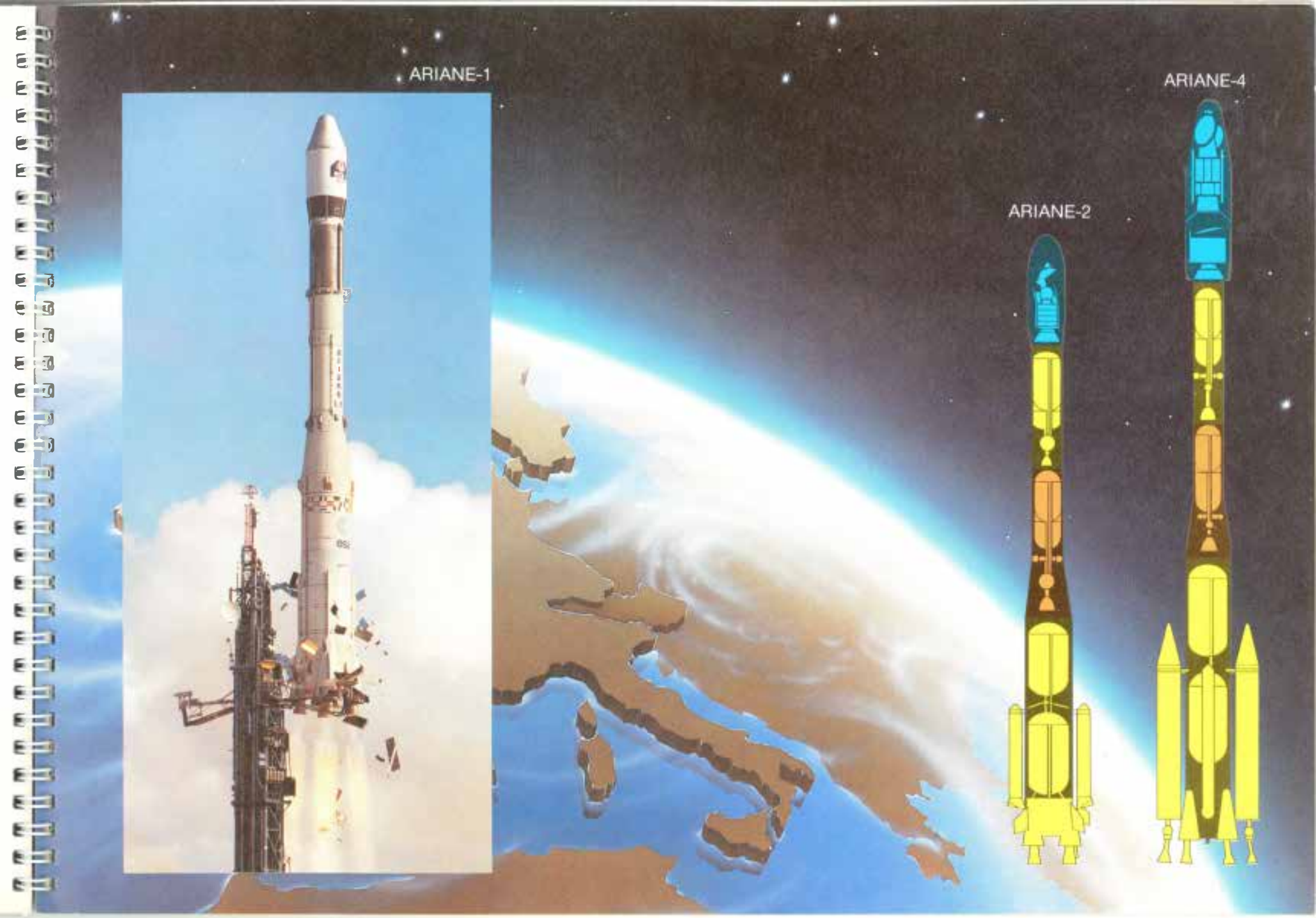

ARIANE-1
ARIANE-2
ARIANE-4

TOWARDS THE YEAR 2000

THE NEXT DECADE

The coming years are full of promise for European space research with exciting new scientific and applications projects under development and preparations being made to meet the requirements of the 21st century.

Studies are going ahead on advanced launch vehicles and on possible European participation in the US space station programme on which a decision should be taken at the end of 1985 or early 1986.

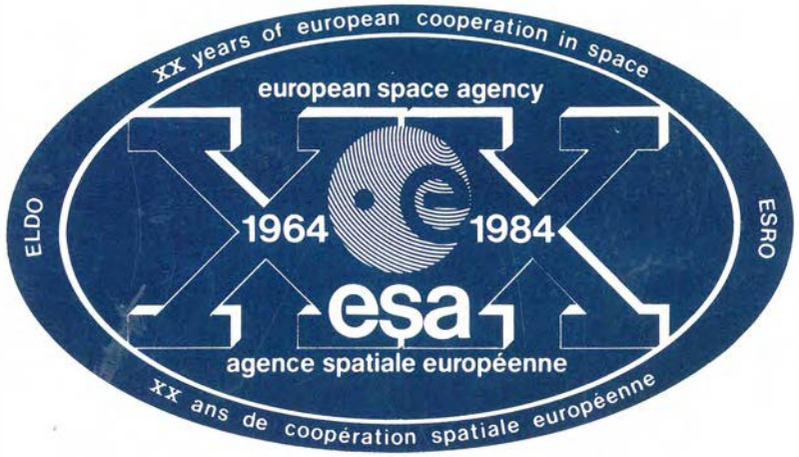
ESA looks forward to its next twenty years with confidence and enthusiasm. The boundaries of science are being pushed further and further back and, at the same time, space applications are changing, and will continue to change our daily lives. ESA is proof of the willingness and ability of Europeans to work together and to plan together for the future.


ISO

Further, more detailed information on the programmes described in this booklet is available from the Press Officers at any of the ESA Centres.

All artwork by Transart Limited based on ESA reference material.
Photographs: Page 7, Spacelab-1 Metric Camera—DFVLR for ESA, Meteosat and Landsat images—ESA and ESA Earthnet. Page 9, Ariane L6—ESA.

Designed and produced by Transart Limited, England. April 1984.



Public Relations – Press and Publications Section

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