European Space Agency Announces Contest to Name the Cluster Quartet.

1. Contest rules

The European Space Agency (ESA) is launching a public competition to find the most suitable names for its four Cluster II space weather satellites. The quartet, which are currently known as flight models 5, 6, 7 and 8, are scheduled for launch from Baikonur Space Centre in Kazakhstan in June and July 2000.

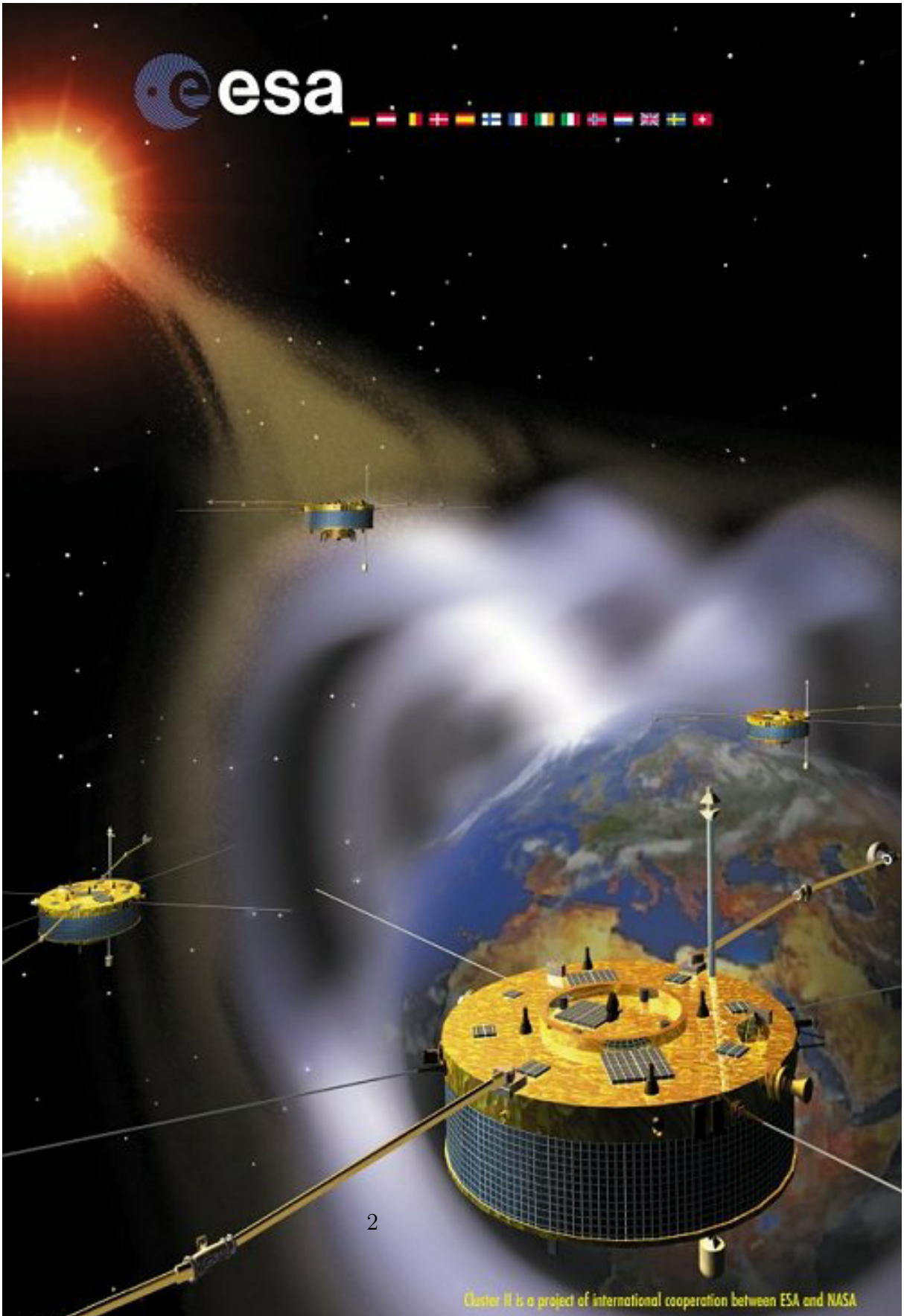
Professor Roger Bonnet, ESA Director of Science Programme, announced the competition for the first time to the European Delegations on the occasion of the Science Programme Committee (SPC) meeting held in Paris on 21-22 February 2000.

The competition is open to people of all the ESA member states. Each entry should include a set of FOUR names (places, people, or things from history, mythology, or fiction, but NOT living persons). Contestants should also describe in a few sentences why their chosen names would be appropriate for the four Cluster II satellites. The winners will be those which are considered most suitable and relevant for the Cluster II mission. The names must not have been used before on space missions by ESA, other space organizations or individual countries.

One winning entry per country will be selected to go to the Finals of the competition. The prize for each national winner will be an invitation to attend the first Cluster II launch event in mid-June 2000 with their family (4 persons) in a 3-day trip (including excursions to tourist sites) to one of these ESA establishments:

ESRIN (near Rome, Italy): winners from France, Ireland, United Kingdom, Belgium.

VILSPA (near Madrid, Spain): winners from The Netherlands, Norway, Sweden, Finland.


esa
Cluster II is a project of international cooperation between ESA and NASA

ESTEC (near Amsterdam, The Netherlands): winners from Germany, Denmark, Switzerland, Austria.

ESOC (in the Rhine Valley, Germany): winners from Italy, Spain, Portugal.

During the first Cluster II launch event (June 2000) the chosen four names for the spacecraft will be announced. The grand prize will be:

- a trip for the winner and family (4 people) to Paris (including a social event) in early Autumn 2000.
- a plaque for the winner.
- a plaque and a special edition Cluster II scale model donated to the home town of the winner.

The 14 runners-up - the best entries from each ESA member state - will also receive awards. In addition, all entrants will receive a Cluster II poster.

Contest details can be found on the Internet at:
http://sci.esa.int/cluster/competition

Information on the competition can also be requested by normal mail by contacting the address below.

Entries can be submitted by:

Email: *cluster@spd.estec.esa.nl*

Normal mail to: "Name the Cluster Quartet"
Science Programme Communication Service, SCI-MC
ESA - ESTEC
Postbus 299, 2200 AG Noordwijk ZH
Países Bajos

Mailed entries must be postmarked no later than 10 May, 2000. The winners will be notified by letter in late May, 2000.

2. Cluster II: Mission to Explore the Sun-Earth Connection.

This summer, the European Space Agency (ESA) will be launching Cluster II, a unique scientific mission designed to explore space weather and discover how the Sun affects our world.

For the first time, a fleet of four identical scientific spacecraft will fly in group formation along elliptical (egg-shaped) orbits around the planet.

This satellite squadron will allow scientists to make the first detailed, three-dimensional, maps of the space environment within 120.000km of the Earths surface.

The Sun-Earth Connection.

Most of us are aware that the Sun is an important influence on our lives. It brings us light and warmth, and occasionally causes painful sunburn, or even skin cancer, if we expose ourselves to its ultraviolet rays for a long time.

When the Sun disappears at night or during a total eclipse, the Earth becomes cold and dark. But the Sun also influences our lives in other, less obvious, ways. It does this by disturbing the "weather"in space. Every second, millions of tonnes of material are blasted out from the Sun into space in the form of charged particles, mainly electrons and protons. This stream of particles creates a solar wind which travels at supersonic speeds towards the Earth.

Occasionally, violent solar storms eject high energy particles which streak across the 150 million kilometre gulf between the Sun and Earth in just a few hours. These storms are most frequent every 11 years. The next peak is expected in 2000, just as Cluster II is inserted into orbit to investigate their effects.

"Like the weather on Earth, the Sun is changing", says Prof R. Bonnet, ESA's Director of Science. Like the weather, it is sometimes difficult to predict its variations. They influence not only the Earth but the whole set of planets in the Solar System and the spacecraft which are orbiting in the interplanetary medium and circling the Earth.

Fortunately for us, the Earth's magnetic field creates a giant, protective bubble in space the magnetosphere. Like a mountain in a gale, the magnetosphere forces most of the particles in the solar wind to flow around it. The gusts in the solar wind mould the Earths magnetic bubble into a tadpole-shape, creating a tail which stretches millions of kilometres downwind.

However, Earth's magnetic defences can be breached by high-energy so-

lar particles. Two weak points above the planet's magnetic poles, known as cusps, allow the solar wind to leak into the magnetosphere and spiral down magnetic field lines into the thin upper atmosphere. Other particles which are trapped in the magnetic bubble can collect and then sweep down into the atmosphere. In either case, the particles collide with molecules of air, creating beautiful curtains of light known as auroras or polar lights.

"It is like a never-ending football game"says ESA's Cluster II project scientist, Philippe Escoubet. "The Sun is kicking particles towards us, like footballs. The Earth is the goal and its magnetic field is the goalkeeper. It's always trying to push the *balls* away, but some get past. When particles score goals they disrupt the Earth. Sometimes the Sun is very quiet, but when it's very active we get a lot of *balls* coming through."

Occasionally, the Earth's magnetic shield is so overwhelmed by particles blasted out during solar storms that the magnetic field fluctuates wildly, creating enormous electrical currents. These can induce major power cuts, like one in 1989 which struck six million Canadians during the middle of winter.

Minor gusts in the solar wind can also interrupt short wave radio communications, damage communication satellites which transmit TV signals and telephone calls, and even increase corrosion in oil pipelines.

Cluster II investigates

Like four ships skimming through a sea of particles, the flotilla of Cluster II spacecraft will spend two years investigating this interaction between our nearest star, the Sun, and our fragile world.

They will swim through the various layers and boundaries within the magnetosphere, skim over the Earth's magnetic poles to investigate the cusps, and sail downwind to study the magnetic tail. As well as ploughing through the different regions of the magnetosphere, they will cross the shock wave which marks the edge of Earths magnetic bubble and enter interplanetary space where the solar wind blows at full force.

Eleven identical instruments on board each spacecraft will study all aspects of the Earths electrical and magnetic environment. Some of these are located on rods which protrude into the surrounding space, sweeping through the sea of charged particles as the spacecraft rotates. The magnetometers, which will measure local magnetic fields, are located on the end of two 5-meter-long booms. Four 50-meter wire antennas send back information on electrical fields and waves. Other instruments on the drum-shaped spacecraft investigate the population of charged particles and the electromagnetic phenomena associated with them.

Simultaneous measurements from the Cluster II quartet will provide invaluable snapshots of events taking place inside and outside the magnetosphere. Ground controllers will even be able to trim the spacecraft's courses, altering the distances between them in order to ensure that scientists receive the most detailed information ever obtained about the invisible interaction between the Sun and Earth.

"Cluster II will give us the best information yet on how the Sun affects the near-Earth environment", says Philippe Escoubet.

The spacecraft will give us four viewpoints - like having one camera behind the goal at a football match and three others at different angles. It will be the first time this has been done for the Earth's magnetic field. This is very exciting because such unprecedented detail will give us a much better opportunity to understand the space environment which surrounds our planet.

Thanks to the Cluster II and SOHO solar observing satellites, ESA is leading Europe to be a major world contributor in the International Solar-Terrestrial Programme (ISTP). This global research project, which includes scientists and spacecraft from ESA, the USA, Russia and Japan, is aimed at understanding all aspects of the Sun-Earth relationship. The intention is to link the processes taking place inside the Sun, its output of energy and the flow of the solar wind, and finally its effects upon our planet.

Cluster II the spacecraft and the mission in brief

Cluster II is one of ESA's top priority cornerstone science missions. It is a replacement for the original Cluster mission, which was tragically destroyed by an explosion during the maiden launch of the Ariane 5 rocket in June 1996.

Cluster II is scheduled for launch from Baikonur Cosmodrome in Kazakhstan in the summer of 2000. The four satellites will be put into orbit in pairs, using two Soyuz rockets provided by the Russian-French Starsem company, on 15 June and 13 July. They will then follow highly elliptical, polar orbits which will vary between 19.000 and 119.000km above the Earth. At times, they will be inside the protection of the magnetosphere, while at others they will be fully exposed to the supersonic solar wind.

The four identical spacecraft will investigate the changing space weather around our planet in unprecedented detail. In order to achieve this, each spacecraft carries an identical set of 11 instruments, provided by scientific institutions in different countries. These will measure charged particles, magnetic and electrical fields in near-Earth space, providing the first three-dimensional snapshots of this ever-changing environment.

Each cylindrical Cluster II spacecraft, which measures 2.9 meters in diameter and 1.3 meters in height, weighs 1.2 tonnes when it is fully fuelled. Large amounts of fuel are required in order to place the satellites in the correct polar orbits and to enable them to manoeuvre in space. some 2.5 tonnes of scientific equipment.

71kg of each spacecraft's mass is allocated to the scientific payload. Most of the science instruments are attached to the main drum-shaped body of the satellite, but the Cluster II spacecraft also carries two 5 meter-long experiment booms, four 50 meter-long wire booms, and two antenna booms.

Scientific institutions and industrial enterprises in almost all of the 14 ESA member states and the United States have participated in the Cluster II project. Working to strict deadlines, ESA and its European industrial partners, under the leadership of German prime contractor Dornier Satellite Systems, have successfully constructed and tested the Cluster II quartet in less than three years.

At the same time, the European ground segment for the mission has been prepared to receive and process the vast amount of data equivalent to 290 million printed pages that will be returned to Earth over the mission's two year lifetime. Signals to and from the spacecraft will be sent via a 15 meter antenna located at Villafranca in Spain and processed at the European Space Operations Control Centre (ESOC) at Darmstadt, Germany.

The Joint Science Operations Centre at Rutherford Appleton Laboratory in the UK will co-ordinate the scientific investigations. Its main task will be to combine all of the demands from the 11 science instrument teams into an overall plan. The stream of information returned by the 44 instruments will be distributed to eight national data centres, six in Europe, one in the USA and one in China.

Paying tribute to everyone who has put so much effort into achieving the remarkable revival of the Cluster mission, ESA's Project Manager John Ellwood said, "In the past two and a half years, a tremendous amount of work has been completed by both scientists and industry. It has been a fantastic achievement to build four satellites in such a short time."

"Everything is on schedule for the two launches of Cluster II in mid-2000,"he added. "We are confident that this tremendously exciting mission will provide spectacular new insights into the interaction between the Sun and our Earth."

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