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PHOTO NASA

The International Space Station orbits the Earth at a height of 400 km. The Atmosphere Space Interactions Monitor (ASIM) climate observatory will study the Earth's atmosphere while orbiting and add to our knowledge of the Earth's climate.

Giant lightning to be studied

A new climate observatory is to be mounted on the exterior of the International Space Station. The observatory will study phenomena that may influence the Earth's climate, e.g. the lighting that shoots up vertically from the clouds to heights of 80 km.

DTU Space is to be in charge of a new climate observatory in space. It will then be possible to study phenomena such as the giant lightning or sprites. The lightning was first discovered in 1989 when the first photo of sprites, as they are called, was taken by chance. The lightning shoots upwards from the clouds instead of downwards like conventional lightning and can reach heights of 80 km. When NASA subsequently studied the photos of the atmosphere taken from space over the years, they discovered more sprites.

The lightning is difficult to observe, but is one of the more spectacular phenomena that the new climate observatory ASIM (Atmosphere Space Interactions Monitor) will be studying.

This major Danish contribution to the European Space Association (ESA) will put DTU Space in charge of the new climate observatory in space. The plan is to mount ASIM to the exterior of the International Space Station in 2013.

Understanding the climate better

ASIM will have a unique view of the atmosphere from the space station, and will also observe aqueous vapor, clouds, aerosols and extreme thunderstorms – all factors that play a role in the Earth's climate.

„A better understanding of the many processes affecting the climate will improve forecasts of climate change involving major costs to society," says Torsten Neubert, Senior Consultant and Scientific Manager of the ASIM project at DTU Space.

DTU Space researchers have been preparing ASIM for years, and with Denmark's decision to increase its contribution to ESA, which was taken at the space association's conference of ministers in the Hague, the project will now finally become a reality.

Sprites may affect the ozone layer

One aspect to be studied using ASIM is the chemical change in the atmosphere caused by the sprites, including changes to the ozone concentration in the stratosphere. It is still unclear whether the sprites have any appreciable effect, but naturally this is something the researchers want to investigate.

„Individual sprites probably don't have much effect, but some global hot spots exist where sprites are more common, and the question is whether the lightning affects the atmosphere locally at these locations," says Torsten Neubert.

The ASIM team will also be working with DMI to observe phenomena such as how aqueous vapor is transported in the top troposphere and bottom stratosphere, which are driven by vertical convection during heavy storms. Aqueous vapor plays an important role for the climate e.g. as it is an effective greenhouse gas. Measurements from ASIM on the International Space Station will be compared with measurements from the Earth's surface, from balloons and aircraft. A widespread international alliance has been established for this purpose.

More money for Danish space research

ASIM is being realized thanks to new funds for space research resulting from negotiations on globalization funds for 2009. A total of DKK 135m has been granted to increase the Danish contribution to ESA – with a special focus on climate and Earth observation programs. Most of this money will return to Denmark, mainly in the form of contracts with Danish companies, and will therefore create high-tech growth and innovation. For example, Terma, a Danish company, is likely to be responsible for the primary work on ASIM.

The extra funds – in addition to ASIM – have enabled Denmark to join a new climate research program, the Climate Change Initiative, which will systematize the last 30 years' Earth observation data, thereby making the data accessible to researchers wishing to use it. Denmark has also been able to increase its participation in the large joint EU and ESA GMES initiative (Global Monitoring for Environment and Security).

– LONE DJERNIS