SIRAL, a new-generation radar altimeter-interferometer for the CryoSat satellite

Built by Thales Alenia Space, the SIRAL instrument is designed to monitor polar ice

Cannes, April 1st, 2010 – Scientists worldwide are impatiently awaiting critical data to be supplied by the Thales Alenia Space-designed SIRAL interferometric radar altimeter, which will help them assess the size and thickness of polar ice and how it changes over time. By more precisely measuring its surface and changes in elevation, scientists will be able to better understand the ice cycle and our changing climate.

Slated for launch on April 8th from the space centre in Baïkonur, Kazakhstan, the CryoSat – ESA’s Ice mission is part of the ESA’s Living Planet programme. The satellite was built by EADS Astrium as prime contractor, and features the SIRAL (SAR Interferometric Radar Altimeter) instrument, designed to study polar terrain elevations to provide a highly accurate topography of this shifting environment. The satellite will be placed in polar orbit at an inclination of 92°. It will fly over the poles at an altitude of 720 km, and will circle the Earth once every 100 minutes.

According to Laurent Rey, SIRAL project manager at Thales Alenia Space: “Thanks to SIRAL, scientists will be able to combine data on the size of polar ice sheets with elevation measurements. This will enable them to study not only the current state of this natural environment, but also how fast it is changing globally. The data gathered will give us additional information to help us better understand the Earth’s climate.”

SIRAL is an interferometric radar altimeter derived from the Poseidon altimeter on the Jason satellite. An innovative instrument in a compact package weighing just 90 kg, SIRAL combines three measurement modes:

- Low-resolution, used for conventional altimetric measurements of the relatively stable continental ice sheets in the Antarctic.
- Synthetic Aperture Radar (SAR) mode, used for high-resolution measurement of floating sea ice, enabling the indirect measurement of the thickness of ice floes.
- Interferometric radar mode, to study more contrasted elevations, like the very active areas located at the junction between the ice floes and Antarctica, and Greenland.

SIRAL features very high resolution; using its two antennas, it can scan the ground in 250-meter swaths, enabling it to more precisely determine the transitions between sea and ice. The CryoSat satellite is fitted with a redundant SIRAL instrument, used as a backup if necessary to ensure the long-term success of this critical scientific mission.

“Our challenge was to develop and produce two high-precision SIRAL instruments for this CryoSat mission,” adds Laurent Rey. “This type of instrument demands an extensive effort to deliver the required performance. The adjustments needed are extremely delicate, and doing this successfully depends on real technological prowess.”

A 6-month in-orbit validation phase is scheduled to check all instrument configurations, and to analyse its in-orbit performance in relation to the highly variable terrain that it has to measure.
The importance of polar ice
The ice in our polar regions plays an essential role in our environment, in terms of climate stability, sea levels and the circulation of major ocean currents. Observing this ice is therefore a necessity if we are to study global warming, which is one of scientists’ leading concerns today.

Ice sheets, glaciers, ice caps and snow are all highly sensitive indicators of changes in our climate, some because they are subjected to new climatic conditions that affect their survival, and others because they are located in the Arctic, where the global warming phenomenon is at its most intense. For all these reasons, it is more important than ever to keep an eye on our planet’s changing ice.

Thales Alenia Space, more than 20 years of success in space altimetry
Thales Alenia Space has worked on radar altimetry for over 20 years, and our instruments are widely recognized as among the best in the field. From 1980’s with the first Topex/Poseidon mission to current CryoSat satellite, Thales Alenia Space has provided Earth Observation missions with state-of-the-art altimeters.

The company is also the prime contractor for Sentinel-3 satellites (Sentinel 3A & 3B), part of the GMES program, devoted to cover the topography of ocean surfaces near coastal zones and ice masses.

CryoSat will be the third of ESA’s Earth Explorer satellites in-orbit (in the past twelve months), following on from GOCE and SMOS, for which Thales Alenia Space was respectively the prime contractor and main industrial partner.

For further information see: www.siral-instrument.com

About Thales Alenia Space
The European leader in satellite systems and a major player in orbital infrastructures, Thales Alenia Space is a joint venture between Thales (67%) and Finmeccanica (33%). Thales Alenia Space and Telespazio embody the two groups’ “Space Alliance”. Thales Alenia Space sets the global standard in solutions for space telecoms, radar and optical Earth observation, defense and security, navigation and science. The company achieved revenues of Euro 2 billion in 2008 and has a total of 7,200 employees located in 11 industrial sites in France, Italy, Spain and Belgium.

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