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CNES TO WORK ALONGSIDE CEA/LETI ON EUROPEAN SWARM MISSION TO OBSERVE EARTH'S MAGNETIC FIELD FROM SPACE

The CNES Board of Directors has given the go-ahead for phases B, C, D and E to supply absolute magnetometers developed by the CEA/LETI research laboratory—with support from CNES—for the SWARM mission, part of ESA's Earth Observation Envelope Programme (EOEP-3). SWARM is a constellation of three satellites that will study the Earth's magnetic field and its temporal evolution. The three satellites, scheduled to launch in 2009, are expected to operate for four years.

Observing Earth's magnetic field from space is a priority for the French scientific community. The SWARM constellation will have an original in-orbit configuration to answer **key questions about the inner workings of the planet**, in particular to provide new insight into Earth's self-sustaining internal dynamo, which is still poorly understood. By providing continuity of observations after the Ørsted and CHAMP missions, SWARM will also allow scientists to track medium-term variations in magnetic field intensity.

The payload on the SWARM satellites is chiefly composed of **magnetometers** capable of measuring the strength and direction of the magnetic field. The LETI electronics, technology and instrumentation laboratory at the French atomic energy agency CEA is a European centre of excellence in magnetometers. It is working on the **absolute magnetometers that will measure magnetic field intensity** and serve to calibrate vectorial measurements for SWARM. The French instruments proposed for this project will experiment a new concept designed to acquire absolute and vectorial field measurements with the same instrument. This concept marks a **technological innovation in space magnetometry** that could be used on future Earth and planetary observation missions.

In the 1990s, CNES began a partnership with CEA/LETI in magnetometry that is being pursued today with SWARM. Its objective is to maximize science return from the mission and evaluate how the new instrument concept performs in space. CNES will qualify, produce, test and deliver the absolute magnetometers, working in close collaboration with the Institut de Physique du Globe de Paris (IPGP), responsible for science data validation. Magnetometer development work will take place at CEA/LETI.

The French scientific community, led by IPGP, will be exploiting data from the mission to model the magnetic field and its temporal variations, and taking part in geophysical data analysis. These data will help to better discriminate magnetic field sources of internal and external origin, and tell us more about the conductivity of Earth's mantle and the workings of its inner dynamo.

The cost to CNES of phases A/B/C/D/E of the project is about €9 million.

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