

## **Multiprobe High-Precision Geomagnetic Field Mission.**

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The proposal intends to take advantage of the scientific and technical knowledge acquired in Denmark during the Oersted mission and to use this as a platform for new and exciting studies of the geomagnetic field and its variations.

One of the limiting factors in determining the main field of the Earth is the dynamical behavior of the external current configuration and its dependence on local time and season. Single satellite experiments will never be sufficient to provide a good description of this part, regardless of the accuracy of the measurements.

We therefore propose two pairs of mother-daughter-satellite combinations, each consisting of one satellite with high precision vector and scalar magnetometer plus star imager, and a second satellite with vector magnetometer only, following the first satellite in a separation of few hundred kilometers or less.

The two mother-daughter tandems will fly in almost sun-synchronous polar orbits at an altitude of, say, 400 - 600 km at different local times, preferable noon/midnight and dawn/dusk.

The proposed constellation of these four satellites is optimal for a study of magnetic sources both internal and external to the Earth. Determination of large-scale external contributions, and especially of their variability with local time and season, is necessary for a precise estimation of core and crustal fields. The proposed two identical high-precision satellites at different local times will make this possible for the first time (and in combination with observatory data allow for a further decomposition into ionospheric and magnetospheric parts.)

Small-scale field-aligned current systems, especially at polar latitudes, will be investigated by comparing the measurements on the mother and the daughter satellites. Missing knowledge of these field-aligned currents is one limiting factor of the accuracy of present day models of Earth's magnetic field.

If selected, this experiment should be offered as a joint project with foreign groups for cost sharing reasons and because it would have a great international interest. The simple (vector magnetometer only) satellites should also be considered as a possible Danish contribution to the recently proposed NASA "Magnetospheric Constellation" project consisting of 10 to 500 small satellites deployed at various locations in the magnetosphere in order to acquire "pixels" of a synthetic magnetospheric image. In this case the payload should be augmented with simple measurements of particles and electric fields.

All satellites should be equipped with GPS receivers to provide tomography of the electron density in the ionosphere. These measurements should, of course also be used for atmospheric profiling.