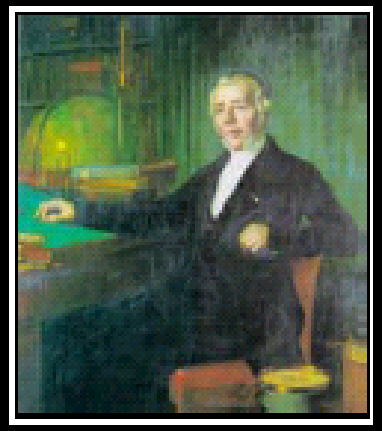
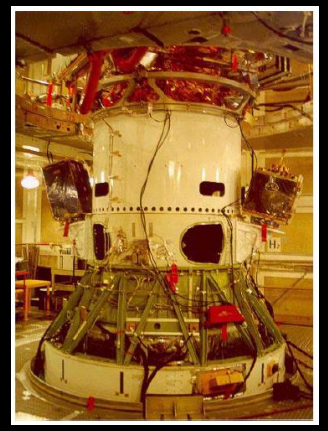
Swarm, the “ultimate” magnetic mapping mission.

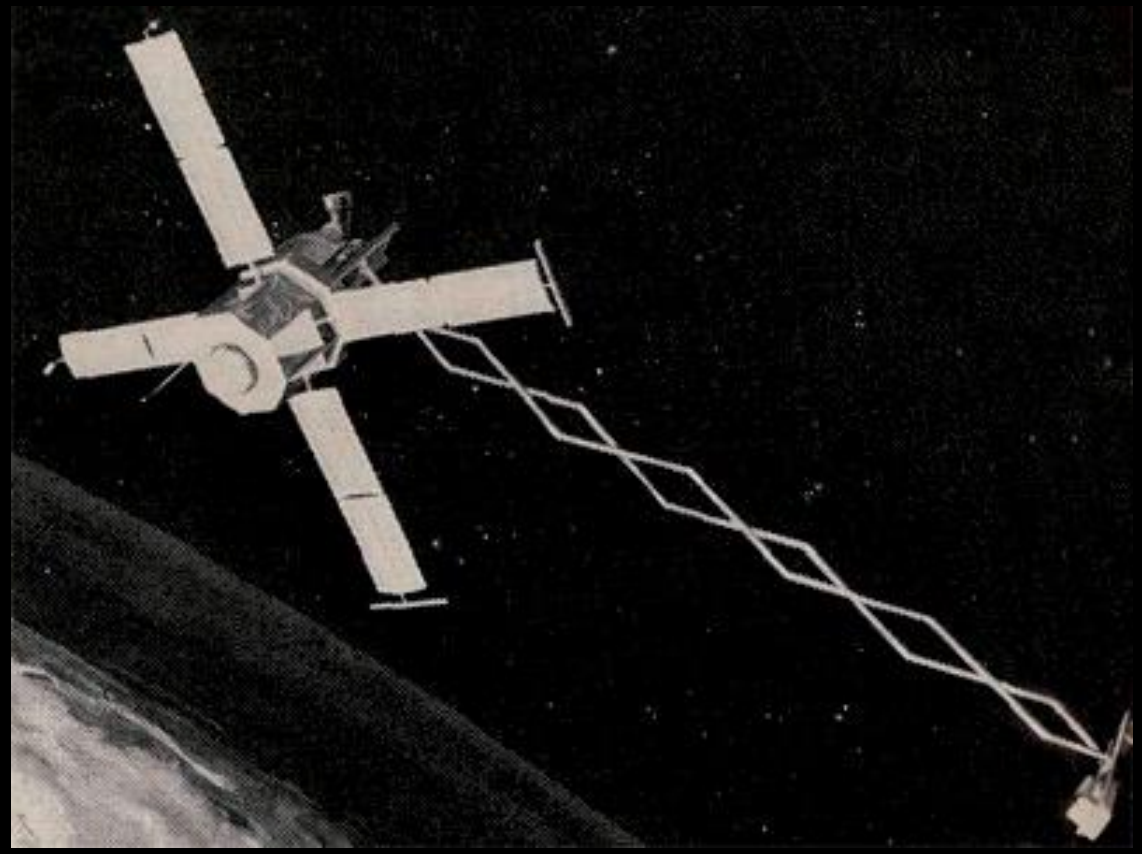
Swarm 10Y: Past, Present and Future

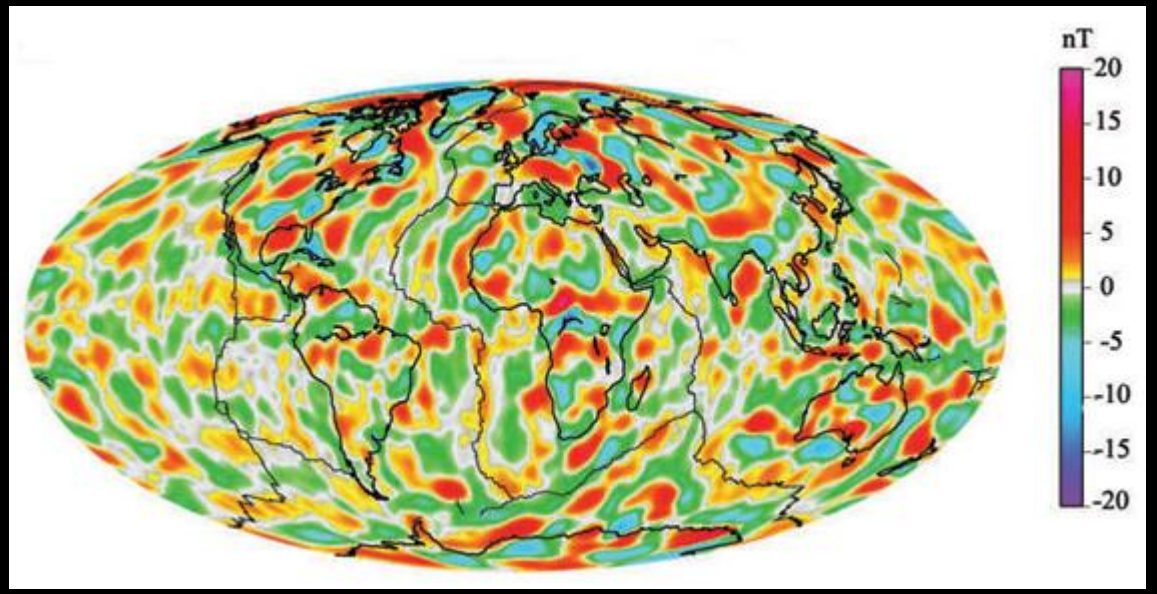




Professor, John Leif Jørgensen
DTU Space
10/04/2024

1979-1980 Magsat, GSFC, NASA



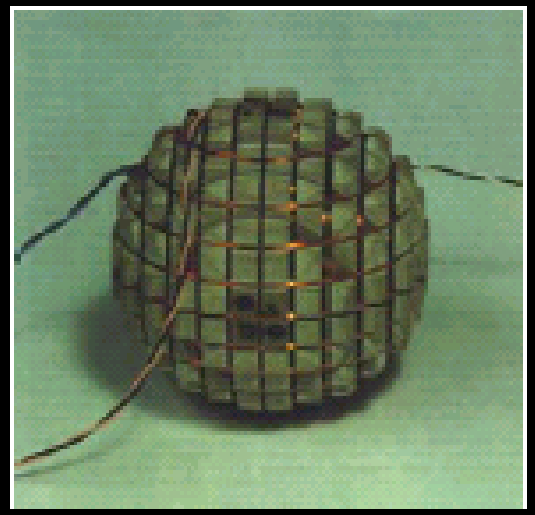


Magnetometer accuracy ~1nT
Attitude stability ~10nT
Attitude modelling -> 5nT

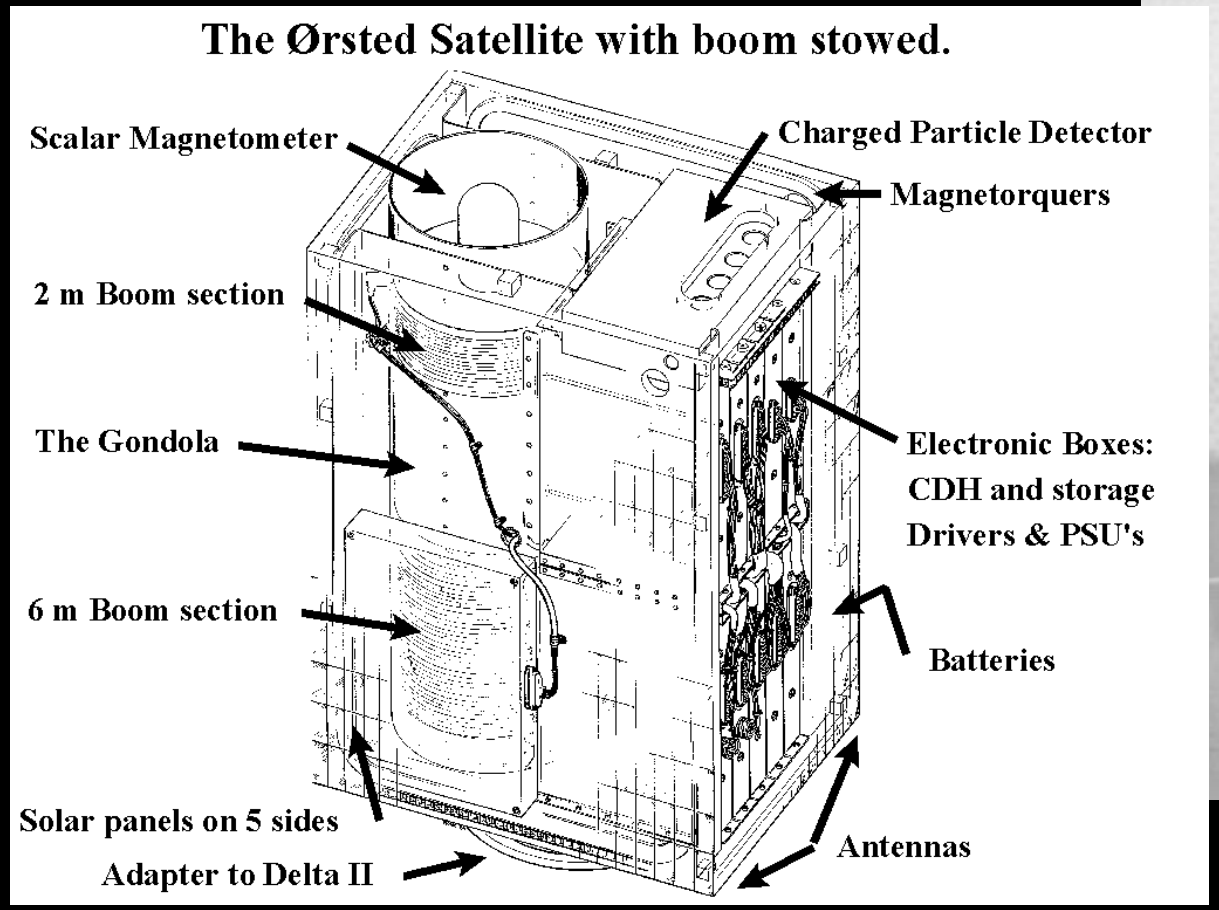
1999-now Ørsted, DTU Space, Research Councils

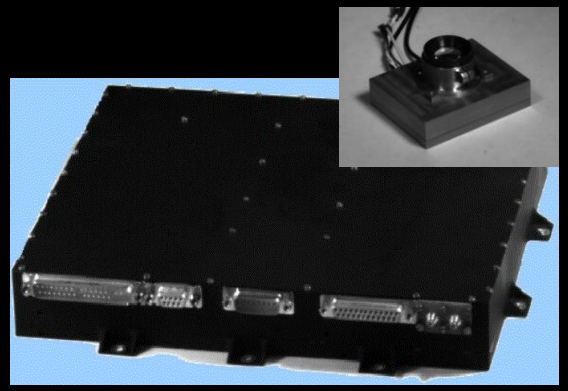
Magnetometer accuracy ~1nT
Attitude stability ~1nT x 5nT
Attitude coverage 50%

Ørsted, instrument innovations



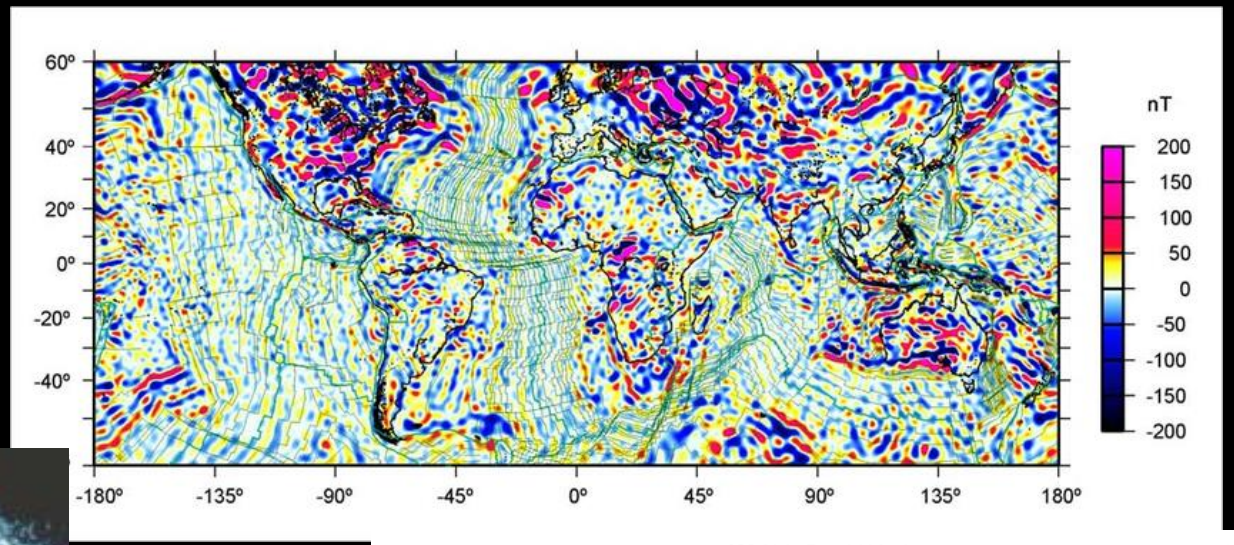
CSC Fluxgate magentometer

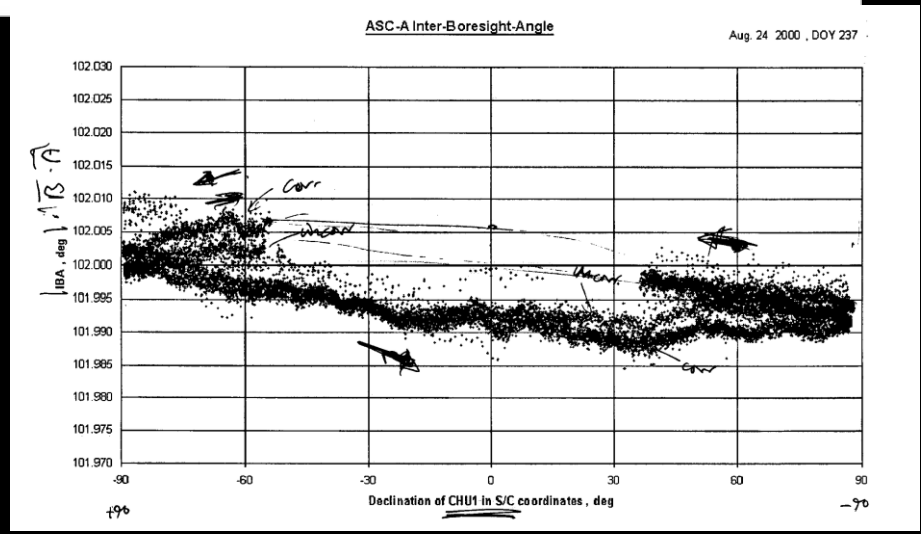




Autonomous Star Tracker

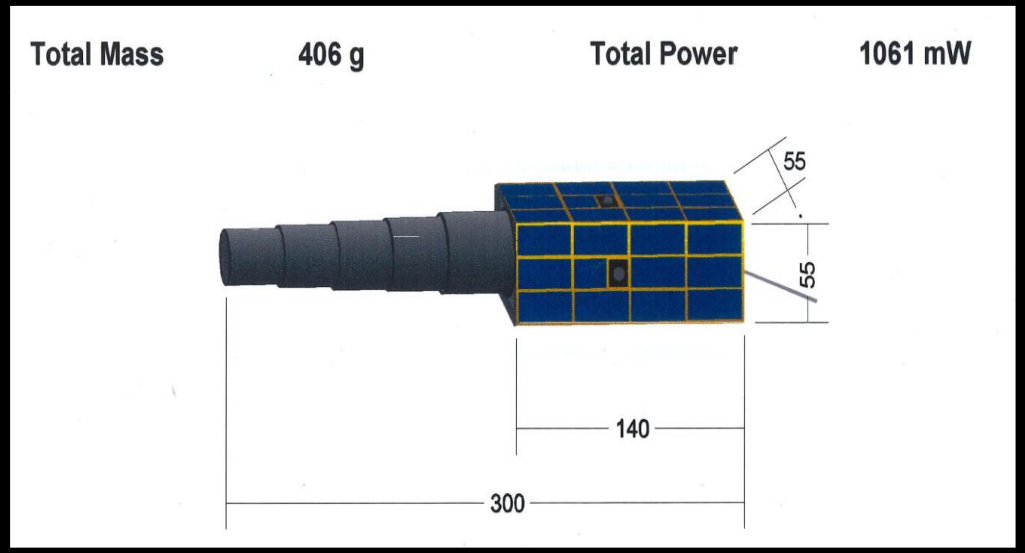
2000-2010 CHAMP, GFZ, DLR

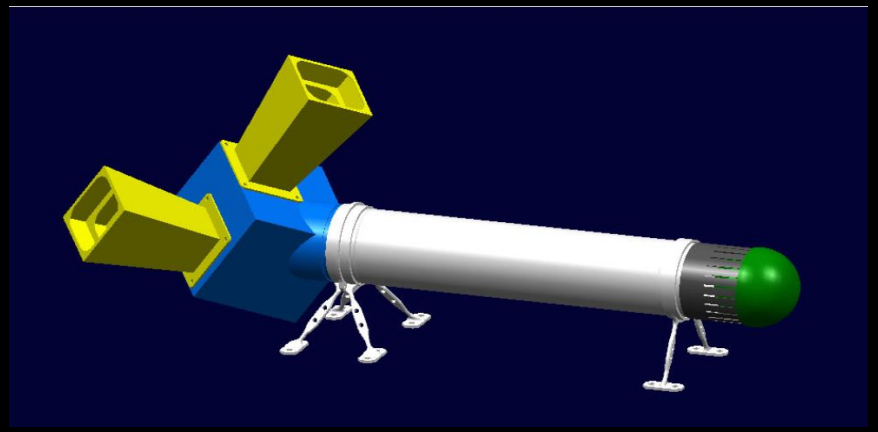


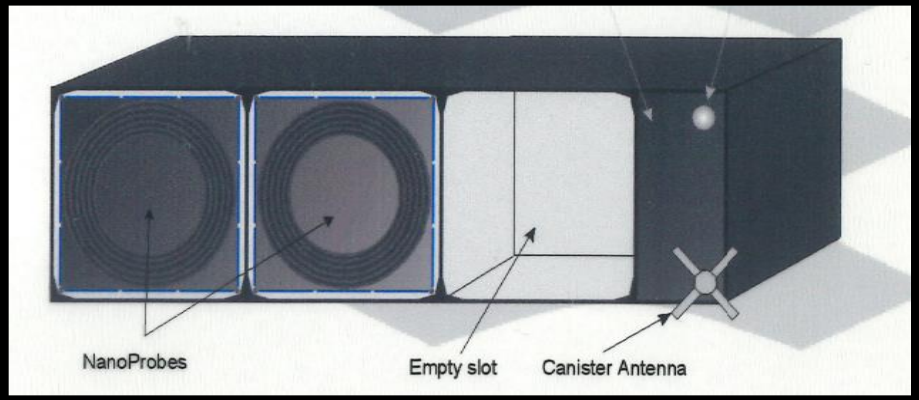


Magnetometer accuracy ~1nT
Attitude stability ~1nT
Attitude coverage 98%

~2010 NanoProbe, DTU Space
A swarm of observatories
Main + 30 Nano’





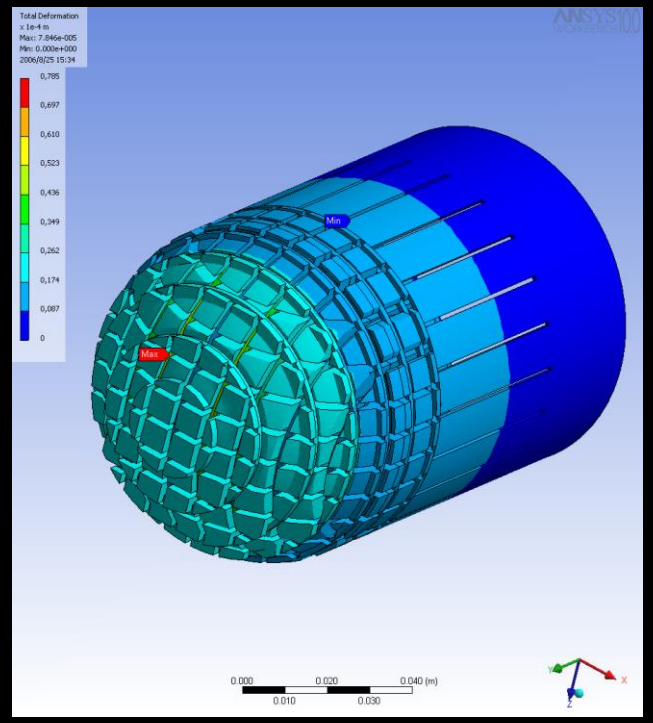


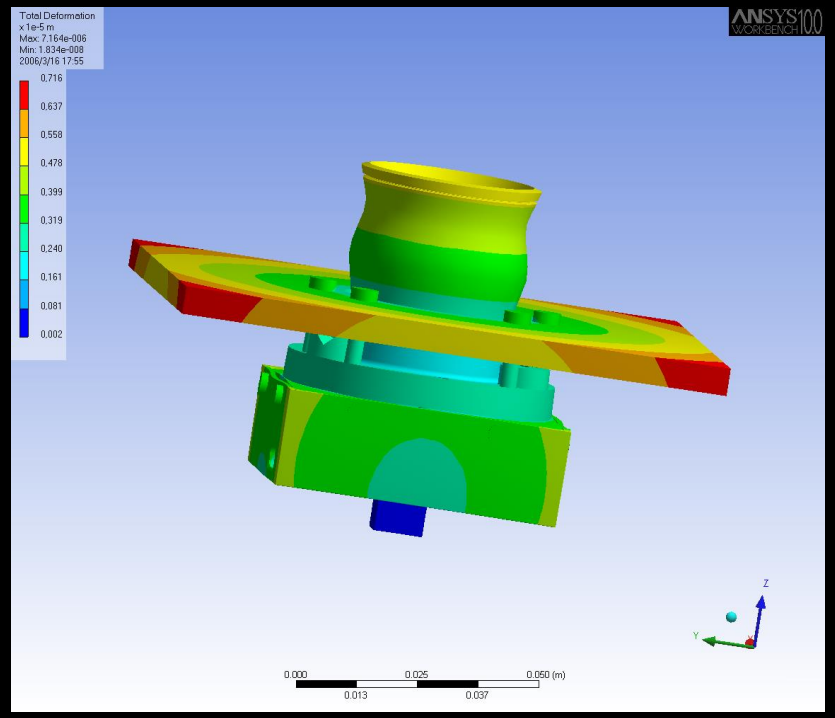
Magnetometer accuracy ~5nT & 1nT
Attitude stability ~100nT & 1nT
Attitude coverage 100%
Full temporal gradiometry locally

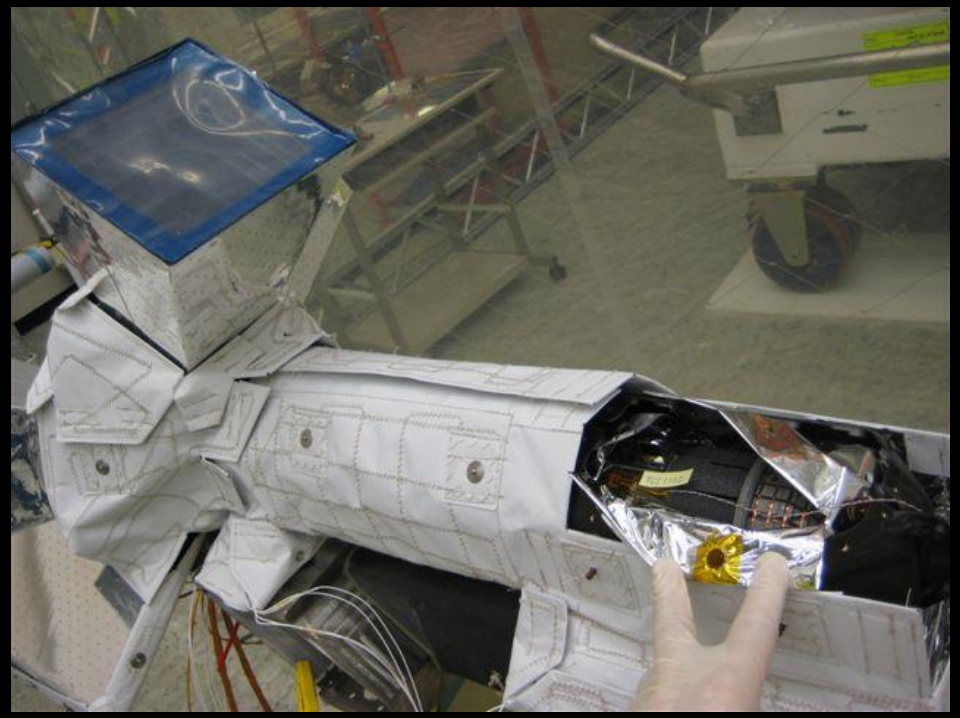
2013-now Swarm, Airbus & DTU Space, ESA

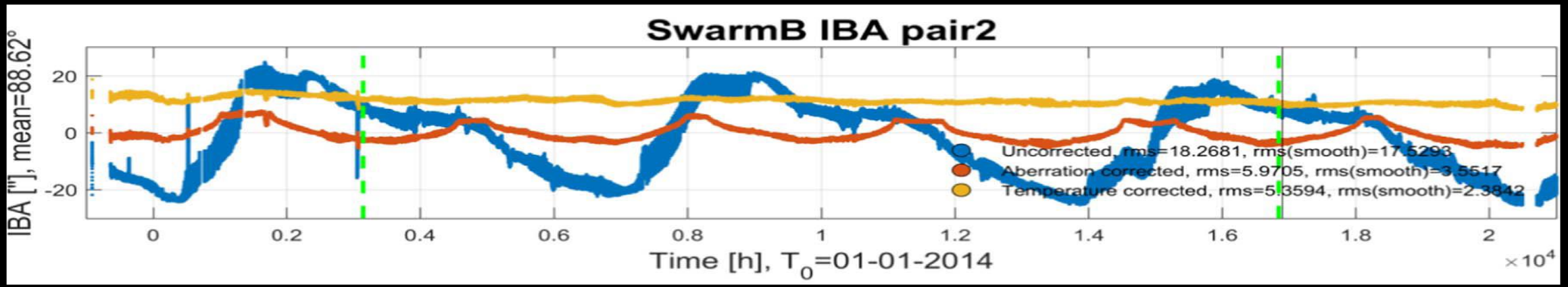
Magnetometer accuracy 1nT
Attitude stability 3D 1nT
Attitude coverage 100%
Full patched gradiometry globally

Stability, stability, stability

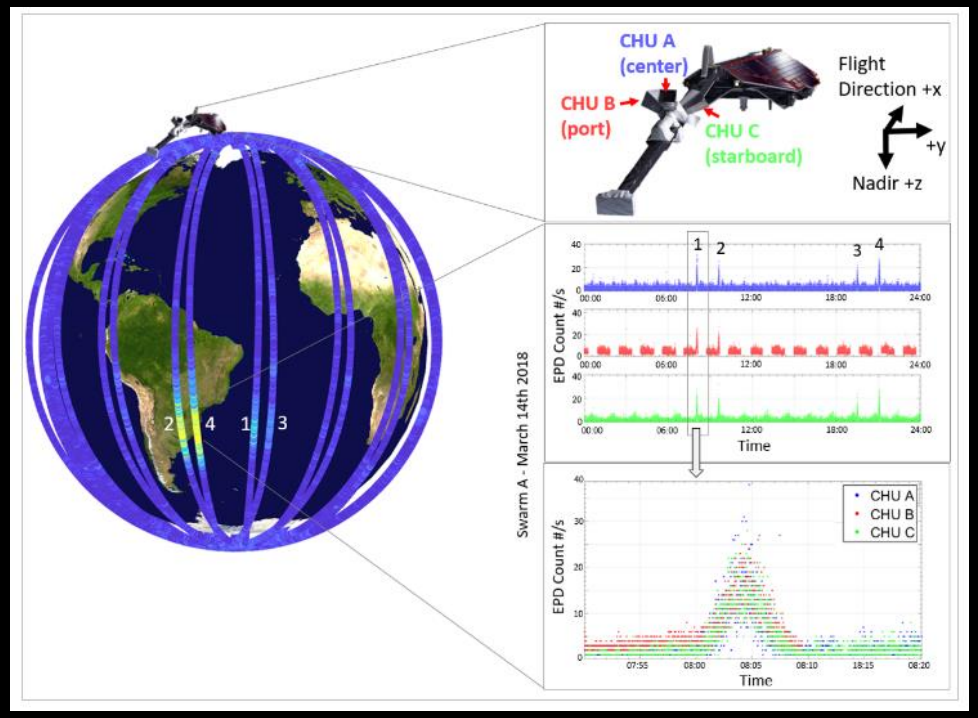


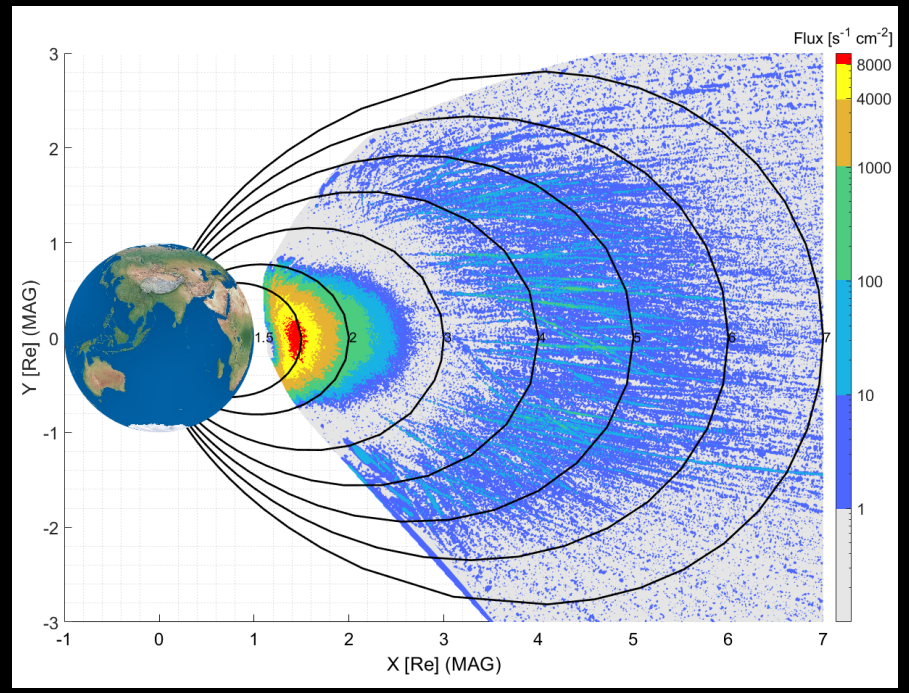


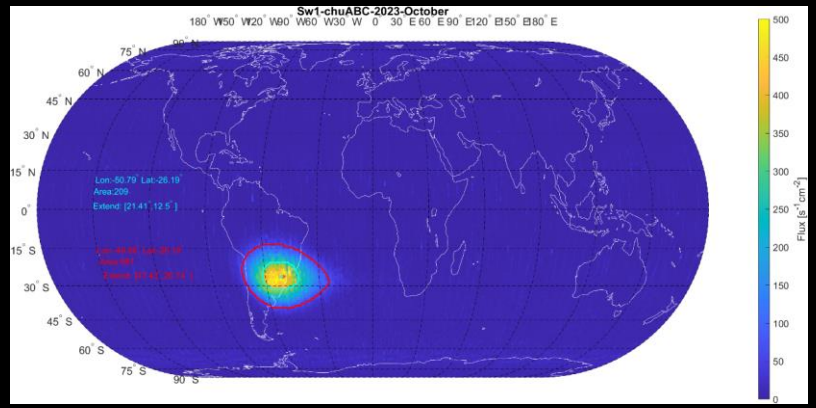


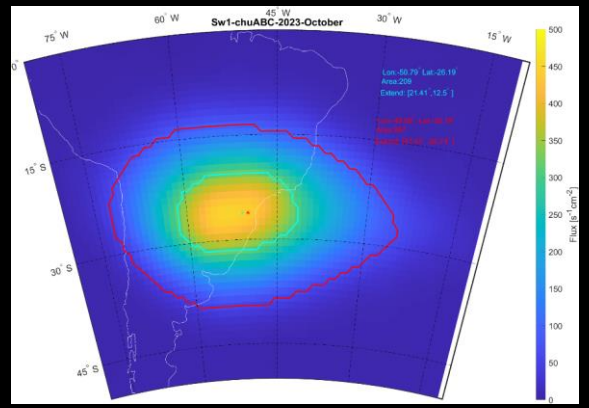


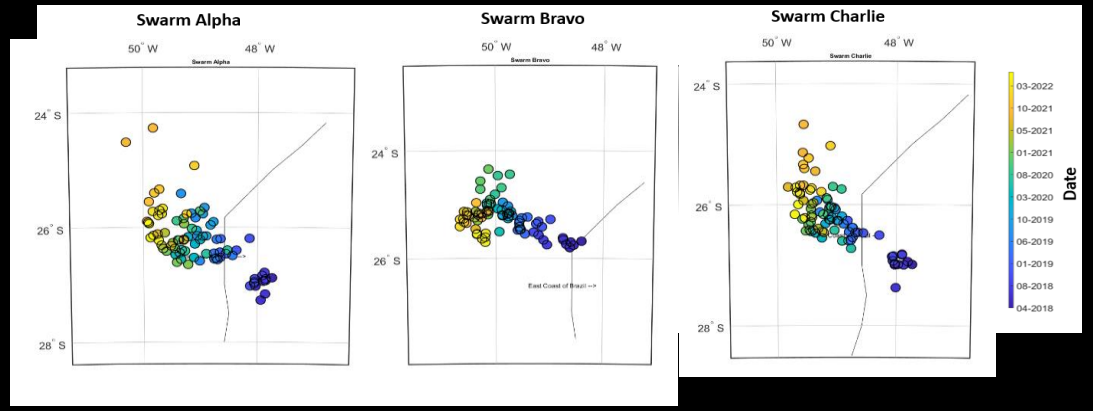
Swarm is more, much more
High Energy Particle Detector











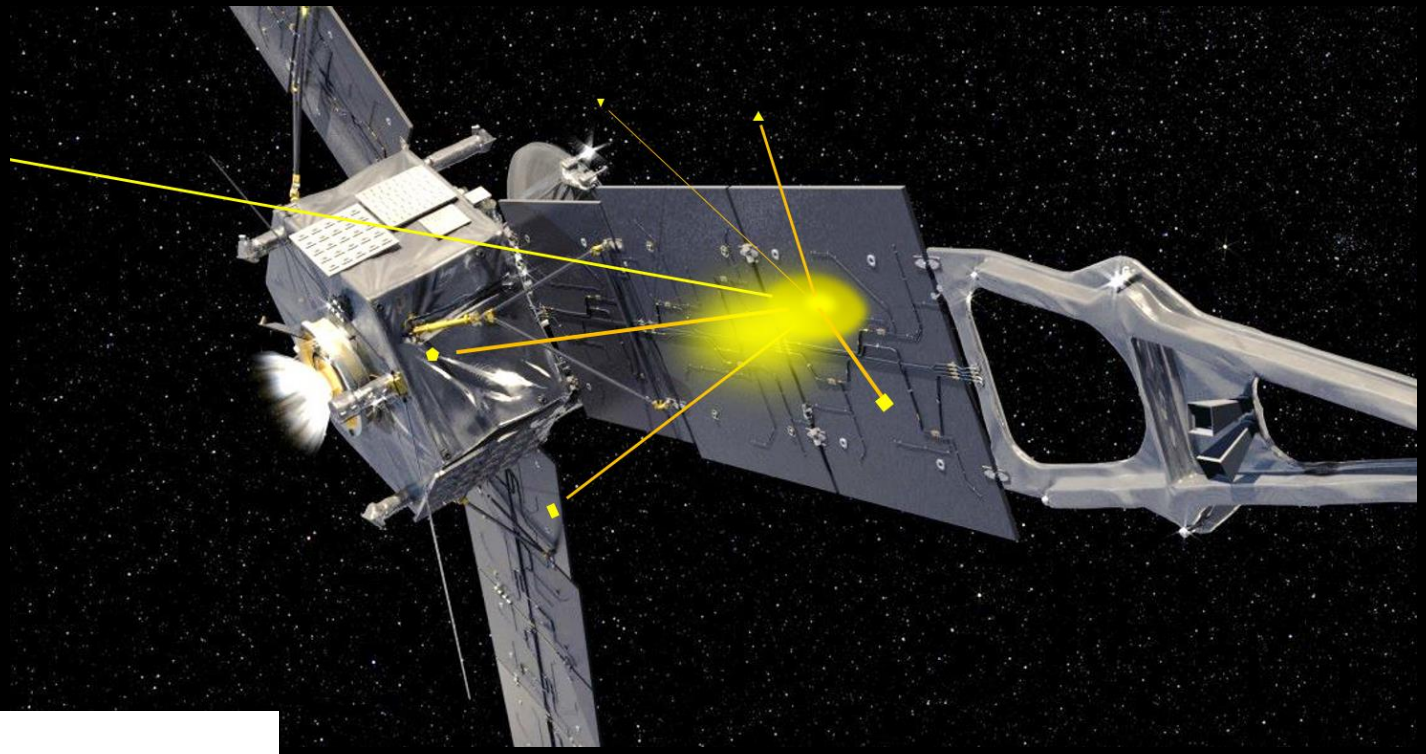
Swarm Alpha/Charlie

0.28-0.35 deg/year west and 0.21-0.22 deg/year North

Swarm bravo

0.325 deg/year west and 0.057 deg/year North

Swarm future is more - more Dust Particle Detector



Tails/debris:

Ion
Dust
Pebbles