

In-flight calibration of the experimental Absolute Scalar Magnetometer vector mode on board the Swarm satellites

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Abstract:

While the role of the ASM is to provide absolute measurements of the magnetic field's strength for the in-flight calibration of the Vector Fluxgate Magnetometer, it can also deliver simultaneously vector measurements with no impact on its scalar performance. Since these scalar and vector measurements are both perfectly synchronous and spatially coherent, their comparison can be directly used to assess the ASM performances at instrument level with no need to correct for the various magnetic perturbations generated by the satellites. This presentation will detail the ASM vector calibration process, with an emphasis on its susceptibility to the ASM operational conditions (primarily the sensor temperature and attitude, but also sun exposition parameters). The evolution of the instrument's performances during the first year of the Swarm mission will then be discussed, with a particular interest in the long term scalar residuals behaviour. These results will be analyzed to demonstrate both the noise performances of the ASM scalar and vector measurements and their excellent long term stability.