Contribution ID: **22** Type: **Oral**

The EnMAP hyperspectral satellite mission: initial science results two years after launch

Wednesday 16 October 2024 14:10 (10 minutes)

Since 2019, several countries and agencies have successfully launched a number of spaceborne imaging spectroscopy systems in orbit or on the International Space Station (ISS) such as DESIS, PRISMA, HISUI, GF-5, EnMAP and EMIT. Among these recent missions, the German Environmental Mapping and Analysis Program (EnMAP) stands for its long-term development, sophisticated design with on-board calibration, high data quality requirements, and strong science accompanying program. EnMAP was launched in April 2022 and, following a successful commissioning phase, started its operational activities in November 2022. EnMAP has been a long-term collaboration between the energy fields as a DLR/GFZ mission with DLR leading the overall management and coordination, and the ground segment, and GFZ leading the science segment, OHB building the space segment. The EnMAP mission encompasses global coverage from 80° N to 80° S through on-demand data acquisitions. Data are characterized by open free access, 30 m spatial resolution, high spectral resolution with a spectral sampling distance of 6.5 nm and 10 nm in the VNIR and SWIR regions respectively, and high signal-to-noise ratio. In this presentation, we show the science potential of EnMAP for space-based imaging spectroscopy to operate in various environments, including high and low light levels, dense forests, Antarctic glaciers, arid agricultural areas. This enables various applications in field such as agriculture and forest, soil compositional mapping, raw materials, methane mapping, water quality assessment, and snow and ice properties. Overall, EnMAP's performance exceeds the mission requirements, and significant potential for contribution to scientific exploitation in various geo- and bio-fields is demonstrated. EnMAP is also expected to serve as a key tool for the development and testing of data processing algorithms for upcoming global operational missions such as upcoming Copernicus mission CHIME and NASA mission SBG.

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Session Classification: Instruments and systems