GAPMAP: The First Commercial Multi-Angle Polarimeter Constellation for Aerosol Characterization and Monitoring

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The increasing demand for high-quality spatial products is driving growth in the NewSpace sector. The integration of advanced remote sensing technologies with cost-effective small satellites enables the development of innovative spatial products. The work by GRASP has led to the creation of the GAPMAP constellation, a highly capable multi-angle polarimeter designed for Earth observations, aligned with the increased interest of this kind of observations [1]. GAPMAP captures each pixel of the Earth at four wavelengths, five angles, and in multiple polarization states, providing high-quality calibrated data for detailed characterization of aerosol, cloud, and surface properties. The first of this constellation, GAPMAP-0, is currently aboard the Adler-2 6U cubesat mission, launched in April 2023 and funded by Findus Venture. This initial demonstrator highlights the private industry's ability to produce scientific data beyond conventional imagery, with preliminary data results from events like the Canadian wildfires soon to be presented. Following the successful demonstration of GAPMAP-0, the next in line, GAPMAP-1, is slated for launch in Q3 2025. The commercial venture already offers a range of data products, from Level 1 to 4, derived from this demonstrator and other publicly accessible missions. These products include Level 2 aerosol and surface characterization using the Generalized Retrieval of Aerosol and Surface Properties (GRASP) algorithm [2], fostering synergy among various data sources (sensors). Additionally, Level 4 products utilize chemical transport models on global, regional, and local scales to identify emission sources and analyze atmospheric dynamics. The targeted customer base includes not only major public agencies but also diverse business-to-business markets, such as the pollutant industry, mining sector, agricultural communities, and other private entities seeking surface and atmospheric insights through a constellation of small satellites.

References

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