

IAF EARTH OBSERVATION SYMPOSIUM (B1)
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SUBSURFACE EARTH OBSERVATION USING A PICOSATELLITE CONSTELLATION

Abstract

The applications of small satellites in Earth Observation are manifold; they enable the mass retrieval of geospatial data at a much-reduced cost. However, one realm of data is massively under analyzed; the swarm of satellites that circle overhead only capture the surface of earth. The spacecraft we are presenting will enable observation of what lies beneath the Earth's surface. The Gossamer satellites will use a panel of instruments including magnetometry, synthetic aperture radar, and gravimetry to gather data from beneath the earth's surface to learn more about the materials the lie below Earth's topsoil. Each picosatellite contains an extremely precise magnetometer and gravity sensor, both based on atomic vapor interferometry systems. This raw data will be coupled to powerful machine learning algorithms to create a 3-dimensional tomographic map extending up to 2 kilometers underground. The information gleaned can be used to locate a wide diversity of terrestrial resources, ranging from valuable minerals to hydrological information. The relatively low-cost of each individual Gossamer satellite allows for the constellation to be continuously updated with more advanced satellites complementing the data collection of previous Gossamer satellites. Ultimately, Gossamer will open a new data-set for Earth Observation.