

EARTH OBSERVATION SYMPOSIUM (B1)  
Interactive Presentations (IP)

Author: Mr. Jeremiah Pate  
United States, miahtpate@gmail.com

## PICOSATELLITE-BASED SUBSURFACE EARTH OBSERVATION

**Abstract**

The applications of small satellites in Earth Observation are manifold; they enable the mass retrieval of geospatial data at a much decreased 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 on will enable observation of what lies beneath the Earth's surface. The Gossamer satellites will use a panel of instruments to gather data from beneath the earth's surface to learn more about the materials the lie below Earth's topsoil. The information gleaned can be used to locate a wide diversity of terrestrial resources, ranging from valuable minerals to hydrological information. Furthermore, the satellites will be able to study chemical concentrations in the biosphere, gather invaluable environmental insights. The Gossamer satellite will consist of 15 picosatellites that will spread out to form a swarm cluster of spacecraft. The cluster acts as a phased-array, allowing for increased subsurface radar abilities. The each picosatellite contains an extremely precise magnetometer and gravity sensor, both based on atomic vapor interferometry systems. The unique combination of these three technologies in a swarm orientations allows for extremely fine subsurface observation. Gossamer will open a new data-set for Earth Observation.