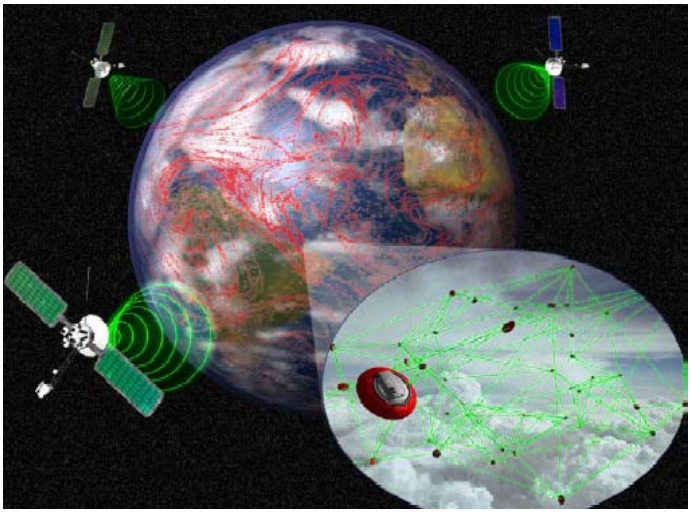
JOHN MANOBIANCO
ENSCO, Inc.

Global Environmental MEMS Sensors: A Revolutionary Observing System for the 21st Century



Conceptualization of GEMS, illustrating both a global and local distribution of probes, with communications and networking between probes and data collectors.

Technological advancements in MicroElectroMechanical Systems (MEMS) have inspired ENSCO, Inc. to propose a revolutionary observing system known as Global Environmental MEMS Sensors (GEMS). The GEMS concept features *in situ*, micron-scale airborne probes that can measure atmospheric variables over all regions of the Earth with unprecedented spatial and temporal resolution. Environmental observations from a GEMS network have the potential to provide a quantum leap in our understanding of the Earth's atmosphere and improve weather forecast accuracy well beyond current capability. Our proposal responds directly to three of the NIAC grand challenges in aeronautics and space and several NASA Earth Science Enterprise initiatives. Resulting improvements in forecast accuracy would translate directly into cost benefits for weather-sensitive space launch and aviation industries, and mitigate the risk factors associated with life-threatening weather phenomena such as hurricanes, floods, tornadoes and severe storms.

Assessment of the optimum probe design and deployment requires an interdisciplinary collaboration to examine complex trade-off issues such as the number of probes required in the network, development and manufacturing costs, and the impact of probe observations on forecast accuracy. We propose to explore these trade-offs within the framework of a design simulation cycle, which will allow us to validate the viability of GEMS and define the major feasibility issues for the meteorological and MEMS disciplines necessary for system design and development. ENSCO has assembled a team consisting of personnel with extensive weather expertise and a world-renowned MEMS consultant from the University of California-Berkeley. We will use observing system simulation experiments to explore issues relating to the deployment and dispersion of probes as well as the impact of probe data on regional meteorological forecasts. Our consultant will provide baseline parameters and realistic assessments/projections of MEMS technological progress to achieve probes on the order of 100 μm in size.