

GPS-ENHANCED ONBOARD NAVIGATION SYSTEM (GEONS/GEODE)

Goddard Space Flight Center

GEONS (Enhanced Onboard Navigation System) is a flight software package that provides onboard orbit determination and control in real time, with higher accuracy, without human intervention, and working within limited computing resources. It substantially improves definitive and predictive accuracy of GPS receiver point solution fixes, achieving accuracies of at least 20 meters and 3 cm/sec. It was developed to meet NASA's technology needs for: increased satellite autonomy, support for collaborative science missions, GPS navigation to satellites with limited GPS visibility (e.g., high-earth and geosynchronous missions), and proposed formation flying/constellation missions.

In 1999, having heard of GEODE's successes, Ball Aerospace and Technologies Corporation approached Goddard. They signed a licensing agreement in 2001.

Ball is incorporating GEONS into Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observations (CALIPSO). The CALIPSO project, scheduled for 2005, will provide data on cloud structure, heights, and distribution, enabling observationally-based assessments of the radiative effects of aerosol and clouds to greatly improve our ability to predict future climate change. GEODE will calculate altitude and allow onboard adjustments for instrument range gates to maximize science data yield while minimizing data saved and downlinked.

Another licensee, Orbital Sciences, incorporated GEODE code for the Solar Radiation and Climate Experiment (SORCE), a NASA-sponsored satellite mission addressing long-term climate change, atmospheric ozone, and UV-B radiation.

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- Russell Carpenter (GSFC): Current leader in development of the technology
- Cheryl Gramling (GSFC): Currently leading celestial navigation technology development
- Mike Moreau (GSFC): Currently leading high-altitude GPS technology development
- Bo Naasz (GSFC): Currently integrating GEONS into formation flying applications
- **Kathy Hartman (GSFC): Formerly involved in development of the technology**
- **Mark Beckman (GSFC): Formerly involved in development of the technology**

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