

Recent Tests of an Internet-Based Global Differential GPS on NASA's DC-8 AirSAR Flights

Ronald J. Muellerschoen,
Michael Armatys
Yoaz Bar-Sever

*Jet Propulsion Laboratory, California Institute of Technology
4800 Oak Grove Drive, Pasadena, CA 91109*

ABSTRACT

Differential GPS (DGPS) positioning is performed in real-time during NASA's DC-8 AirSAR flights. Preliminary results show dual-frequency real-time RMS (root-mean-square) precision in the horizontal components to be better than 6 cms RMS, and better than 8 cms RMS in the vertical relative to a truth solution. Additionally, the absolute accuracy of these position measurements is better than 25 cms in all components.

GPS orbits and clocks are computed in real-time with data from NASA's global GPS network to form a global correction message. The dissemination of the correction message is over the Internet, and through a signal-in-space (SIS) provided by America's Inmarsat satellite. The inherent latency in providing the corrections to the user through the geosynchronous satellite is shown to have little impact on true real-time positioning.

GPS data are obtained from Ashtech Z-12 and Navcom NCT receivers, and the global corrections are obtained from an LBM Inmarsat receiver provided by NavCom. The measurements and global corrections are combined on a Linux laptop in real-time.

A truth solution is formed by post-processing the GPS data along with precise, IGS-quality GPS orbits and 1-Hz GPS clock corrections computed from a small network of terrestrial GPS receivers. Additionally, external pressure recorded from the DC-8's Icats flight data system is used to model the dry-zenith troposphere delay.

ACKNOWLEDGMENT

The work described in this paper was carried out ^{RT} by the Jet Propulsion Laboratory, California Institute of Technology, under contract with the National Aeronautics and Space Administration.

REFERENCES

- Muellerschoen, R. J., W. I. Bertiger, Flight Tests Demonstrate Sub 50 cm RMS. Vertical WADGPS Positioning, Proceedings of ION GPS-99, Nashville, Tenn. September 1999.
- Muellerschoen, R. J., W. I. Bertiger, M. F. Lough, Results of an Internet-Based Dual-Frequency Global Differential GPS System, Proceedings of IAIN World Congress, San Diego, California, June, 2000.