

Precise orbit determination for GEOSAT Follow-On Using Satellite Laser Ranging Data and Intermission Altimeter Crossovers

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The U.S. Navy's GEOSAT Follow-On Spacecraft was launched on February 10, 1998 and the primary objective of the mission was to map the oceans using a radar altimeter. Following an extensive set of calibration campaigns in 1999 and 2000, the US Navy formally accepted delivery of the satellite on November 29, 2000. The spacecraft is tracked by satellite laser ranging (SLR) and Doppler (Tranet-style) beacons. Although a limited amount of GPS data were obtained, the primary mode of tracking remains satellite laser ranging. In this paper, we report on progress in orbit determination for GFO using GFO/GFO and TOPEX/GFO altimeter crossovers. We have tuned the nonconservative force model for GFO and the gravity model using SLR, Doppler and altimeter crossover data spanning over one year. Preliminary results show that the predicted radial orbit error from the gravity field covariance to 70×70 on GEOSAT was reduced from 2.6 cm in EGM96 to 1.9 cm with the addition of only five months of the GFO SLR and GFO/GFO crossover data. Further progress is possible with the addition of more data, particularly the TOPEX/GFO crossovers. We will evaluate the tuned GFO gravity model (a derivative of EGM96) using altimeter data from the GEOSAT mission. In January 2000, a limited quantity of GPS data were obtained. We will use these GPS data in conjunction with the SLR and altimeter crossover data obtained over the same time span to compute quasi-reduced dynamic orbits which will also aid in the evaluation of the tuned GFO geopotential model.