1. Introduction

MSODP (Multi-Object Orbit Determination Program) developed originally for the GPS data processing at UTCSR, but with the capability to simultaneously process various measurement types, was used for this research. MSODP is a software of a weighted least square batch estimation procedure which employs a numerical integration of the differential equations describing the motion of multi-satellite mission. This poster describes the GPS data processing and parameterization strategy to obtain orbit solutions, then assesses the quality of the orbits applying several analysis methods. This poster focuses mainly on the orbits of cycle 8, which is in the sinusoidal yaw mode.

2. GPS Data Process

TOGGAP software which the majority of TIOs GPS Analysis Programs was utilized to preprocess Jason-1 GPS data. Globally distributed 30 KI GPS ground stations were selected to form the dual-differenced configuration. Double-differenced center phase measurements formed by using about 40 KI stations for each day were sampled at 30 second interval.

With the information such as simultaneously observed range differences, the broadcast ephemeris messages including the GPS satellite clock information, the ground stations coordinates, the positions of the user and satellite accurately calculate GPS orbits, the receiver’s time tag correction was computed by subtracting the corrections from all reliable GPS satellites tracked. The remaining satellite and receiver clock errors in the phase measurement were removed by forming double-differenced phase measurements. The pairing of the GPS satellites for double difference mode is made software dependent on the pair during the preprocessing; ambiguity-free observation were identified and used by three times the standard deviation of the overall DD solution. Cycle-shafts were also detected by computing the differences between the consecutive data points in the DD residuals and identifying spike-like anomalies, then were fixed using linear combination. Performance of the Block-2 GPS receiver was found to be practically improved over the cycle as observed in Fig. 1. After that, the Raw GPS data were collected during cycle 8 and during the previous cycles. The quality of data has also improved compared with initial cycles.

3. Model

In this case, an orbit was eliminated to first order by forming a linear combination of observables with different frequencies. In practice, the cycle file was used for the coarse orbit. The standard deviation of the DD residuals is 0.64 cm and 0.03 cm for the mean of the SS3 residuals. The statistics of the residuals are not significant compared with initial cycles.

4. Strategy

The SLR, DORIS and GPS data for cycle 800 were processed with a dynamic approach. Orbits for both Week 10 were with nine-hour envelope within each cycle. The estimation results were found to be consistent with a particular cycle。

5. Model

The orbit solution from MSODP with the SLR/DORIS data was verified with the solution from UTOPIA. To do so, the dynamic and measurement models in MSODP for Jason-1 were synchronized with the models in UTOPIA (the University of Texas Orbit Processor).

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