Improving the Complete TOPEX/POSEIDON and Jason-1 Orbit Time Series: Current Status OSTST 2007 meeting

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ABSTRACT

Orbit error is a major component in the overall error budget of altimeter satellite missions. Jason-1 is no exception and a 1 cm tidal orbit accuracy goal has been set, which represents a significant improvement over what is currently being achieved by TOPEX/Poseidon. The Jason-1 mission planning team is committed to achieving highly-accurate orbit information in order to improve the overall quality of products derived from Jason-1 altimetry. However, it is essential to take into account the high-accuracy orbit information provided by Jason-1 to improve the accuracy and consistency of SLR/DORIS orbit data. Current analysis also indicates that the history of TP orbit may be used to further improve our understanding of orbit errors and this work would be valuable in both TP and Jason-1 orbit modeling efforts. Our work will result in a complete and coherent feedback of Jason-1 orbit information through the 2007 orbit solution. Tests show that the improved integrity of the Jason-1 orbit data will, in combination with Jason-1/TOPEX orbit information, further improve the accuracy and quality of Jason-1 orbit solution for both TP and Jason-1 trajectories.

Table 1. TOPEX & Jason-1 Orbit Modeling Summary

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<tr>
<th>Model</th>
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Table 2. Jason-1 orbit accuracy

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Improving the Jason-1 Orbit Time Series

For Jason-1, the modeling upgrades described in Table 1 were implemented to update the POD solution models and strategy outlined in Luthcke et al., 2003. We have computed a new Jason-1 orbit time series (cycles 1 through 185) based on a dynamic solution reduction of SLR/DORIS data. We have also evaluated the DORIS SSA correction (J.M. Lemoine and H. Capdeville 2000) and tested several models to better understand the unexpected long-term and systematic orbit differences noted in between our centers. Our goal is to provide the most accurate Jason orbits which are most consistent with our most accurate TP orbit.

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Future: Future analyses, as well as model and solution strategy improvements will be made in order to further reduce the orbit uncertainties. The success of the large mission will depend on the continued support of the OSTST POD team members: Cnes, NASA GSFC, JPL, UTCSR. The Jason-1 mission planning team is committed to achieving highly-accurate orbit information in order to improve the overall quality of products derived from Jason-1 altimetry. However, it is essential to take into account the high-accuracy orbit information provided by Jason-1 to improve the accuracy and consistency of SLR/DORIS orbit data. Current analysis also indicates that the history of TP orbit may be used to further improve our understanding of orbit errors and this work would be valuable in both TP and Jason-1 orbit modeling efforts. Our work will result in a complete and coherent feedback of Jason-1 orbit information through the 2007 orbit solution. Tests show that the improved integrity of the Jason-1 orbit data will, in combination with Jason-1/TOPEX orbit information, further improve the accuracy and quality of Jason-1 orbit solution for both TP and Jason-1 trajectories.

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