1. Introduction to the Problem

There are a number of advantages in using satellite radar altimetry for inland water applications. The stage measurements form a consistent data set that can enhance or validate existing measurements. Traditional gauge monitoring systems often lack the spatial and temporal extent provided by satellite monitoring. The GFO GDR data set is an important part of the radar altimetric data archives for inland water applications. The stage measurements from the T/P/Poseidon and Jason-1 satellite missions are used to infer river discharge. The discharge is calculated using the rating equation and altimetric-derived stage and gradients to infer river discharge. The stage measurements provide a consistent data set for evaluating the response of lakes and reservoirs to variations in climate and evaluate the impact of climate change on inland water bodies.

2A Product Limitations

Topex/Poseidon returned echo shape and the variation in radar backscatter. Assembling a combined GDR/SDR data set maximizes the use of the existing GFO data archives. Footprint size and along-track data rate (minimum target size), and instrument tracking logic, also restrict the quantity and quality of the data available. Footprint size and along-track data rate are important factors in determining the quality of the data available. Instrument tracking logic, which is necessary for the accurate determination of the position of the target, is also important. The combination of all these factors results in a limitation on the quantity and quality of the data available.

2B Instrument Limitations

TOPEX/POSEIDON, Jason-1, ERS and ENVISAT satellites has contributed to many science projects and enhanced one technical and two science-related programs. The technical program is linked to an ongoing, semi-operational, reservoir-monitoring project that has evaluation of regional drought and irrigation potential as part of its overall goal. The science programs are linked to a number of projects, including the development of new methods for evaluating the response of lakes and reservoirs to variations in climate and the development of new methods for evaluating the impact of climate change on inland water bodies.

3. Jason-1 data problem

Extra echo-shape filtering by the ground data processing system is rejecting the majority of narrow-peak radar echoes out of the Jason-1 data set. This means a major loss of data for the main river systems, wetlands and small (sheltered) lakes. This has had a detrimental effect on several science programs and the operational reservoir program, affecting 50% of the routinely monitored lakes.

5. Mission Strategy

While investigations probe the ‘missing Jason-1’ data problem, the various projects are turning to the data acquired during the TOPEX/POSEIDON tandem phase (2002-2005) and to data acquired by the NLR GFO (2006-2009) and by the ESA ERS and ENVISAT missions. The mission strategy is to use the best possible combination of data to enhance the operational reservoir program, to evaluate the impact of climate change on inland water bodies, and to evaluate the response of lakes and reservoirs to variations in climate. The mission strategy is to use the best possible combination of data to enhance the operational reservoir program, to evaluate the impact of climate change on inland water bodies, and to evaluate the response of lakes and reservoirs to variations in climate.

References

1. NASA NN-H46Z-065-D: Decision Support. For the evaluation of the NLR GFO data set.
2. NASA NEA-ID-065-Gun Surface Topography Team. For the evaluation of TOPEX/POSEIDON, TOPEX/Tandem and Jason-1 data sets and for the longer term analysis of the ESA ERS and ENVISAT mission data.

Exploration of Multi-satellite Altimetric Data over Inland Water

A multi-disciplinary program utilizing radar and laser altimetry from the NASA/CNES Jason-1 and TOPEX/POSEIDON, NRL GFO, ESA ERS and ENVISAT, and the ICESat satellite missions. Charon M. Birkett (ESSIC, University of Maryland, birkett@umd.edu), With co-authors below in each section.

C) Jason-1 data problem

Extra echo-shape filtering by the ground data processing system is rejecting the majority of narrow-peak radar echoes out of the Jason-1 data set. This means a major loss of data for the main river systems, wetlands and small (sheltered) lakes. This has had a detrimental effect on several science programs and the operational reservoir program, affecting 50% of the routinely monitored lakes.

5. Mission Strategy

While investigations probe the ‘missing Jason-1’ data problem, the various projects are turning to the data acquired during the TOPEX/POSEIDON tandem phase (2002-2005) and to data acquired by the NLR GFO satellite missions (post-2000) and by the ESA ERS and ENVISAT missions program. For detailed echo analysis however, GFO SDR data is sparse, being only recorded in limited quantities over Africa. The fact that the GFO satellite overpassed the lake targets at different locations, and the fact that only 65% of data are available (cf.10yrs) to form a GFO mean reference datum, poses problems when the Topex/poseidon, Jason-1 and GFO data are combined. Datasets, elevation bias etc need to be further investigated and results validated, before the new operations products (below) can be released or the GFO data applied in various river dynamic projects (Beckley, Birkett).

References

1. NASA NN-H46Z-065-D: Decision Support. For the evaluation of the NLR GFO data set.
2. NASA NEA-ID-065-Gun Surface Topography Team. For the evaluation of TOPEX/POSEIDON, TOPEX/Tandem and Jason-1 data sets and for the longer term analysis of the ESA ERS and ENVISAT mission data.