TOPEX/Poseidon and Jason-1 absolute calibration in Bass Strait, Australia

Abstract

The Bass Strait site, under descending pass 088, is the sole in-situ calibration facility for TOPEX/Poseidon and Jason-1 in the Southern Hemisphere. Our calibration activities include the regular deployment of two GPS buoys approximately 60 km from Burnie. Data from each buoy deployment has been used to solve for the vertical datum of an oceanographic mooring array, which was deployed for the duration of the Jason-1 calibration phase. The GPS buoy constrained mooring SSH time series allows the computation of absolute bias on a cycle by cycle basis. The continuous mooring SSH time series has been used to correct the Burnie tide gauge, effectively translating the tide gauge of absolute bias on a cycle by cycle basis. The continuous constrained mooring SSH time series allows the computation of better long-term estimates of absolute bias. Our results are slightly different from the results from the other dedicated sites. While these differences are of similar magnitude to the error bars, they are also consistent with geographically correlated differences seen in other analyses.

TOPEX/Poseidon altimeter processing, MGDR-B data with all path-length corrections:

- TMR brightness temperature calibration and yaw state correction
- TMR troposphere correction extrapolated inshore because of near-shore contamination
- Ionosphere correction (smoothed)
- Dry troposphere
- Sea-state bias
- Centre of gravity

Jason-1 altimeter processing, GDR data with all path-length corrections:

- JMR wet troposphere correction extrapolated inshore because of near-shore contamination
- Ionosphere correction (smoothed)
- Dry troposphere
- Sea-state bias

Oceanographic processing:

- Atmospheric pressure (adjusted to pressure gauge pressure)
- Pressure converted to SSH using density profile

GPS processing – two main processing stages:

- Absolute positioning of the GPS reference sites in a global terrestrial reference frame using GAMIT/GLOBK in a regional network solution
- Kinematic positioning of the GPS buoys on an epoch-by-epoch basis using MIT’s TRACK software. Independent GPS buoy solutions were produced allowing some level of quality control of the resulting sea surface height time series

IEOS2000 standards were used for loading corrections (earth body tides, ocean loading, etc)

Conclusions

The data from the period when the oceanographic instruments were deployed (the same as the initial Jason-1 calibration period) has improved our knowledge of the geoidal slope and of the height differences between the coastal tide gauge and the off-shore comparison point, allowing us to produce better long-term estimates of bias. Our results are slightly different from the results from the other dedicated sites. While these differences are of similar magnitude to the error bars, they are also consistent with geographically correlated differences seen in other analyses.

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Contact: Neil.White@csiro.au