Regional Calibration/Validation

Wednesday, October 21, 2015

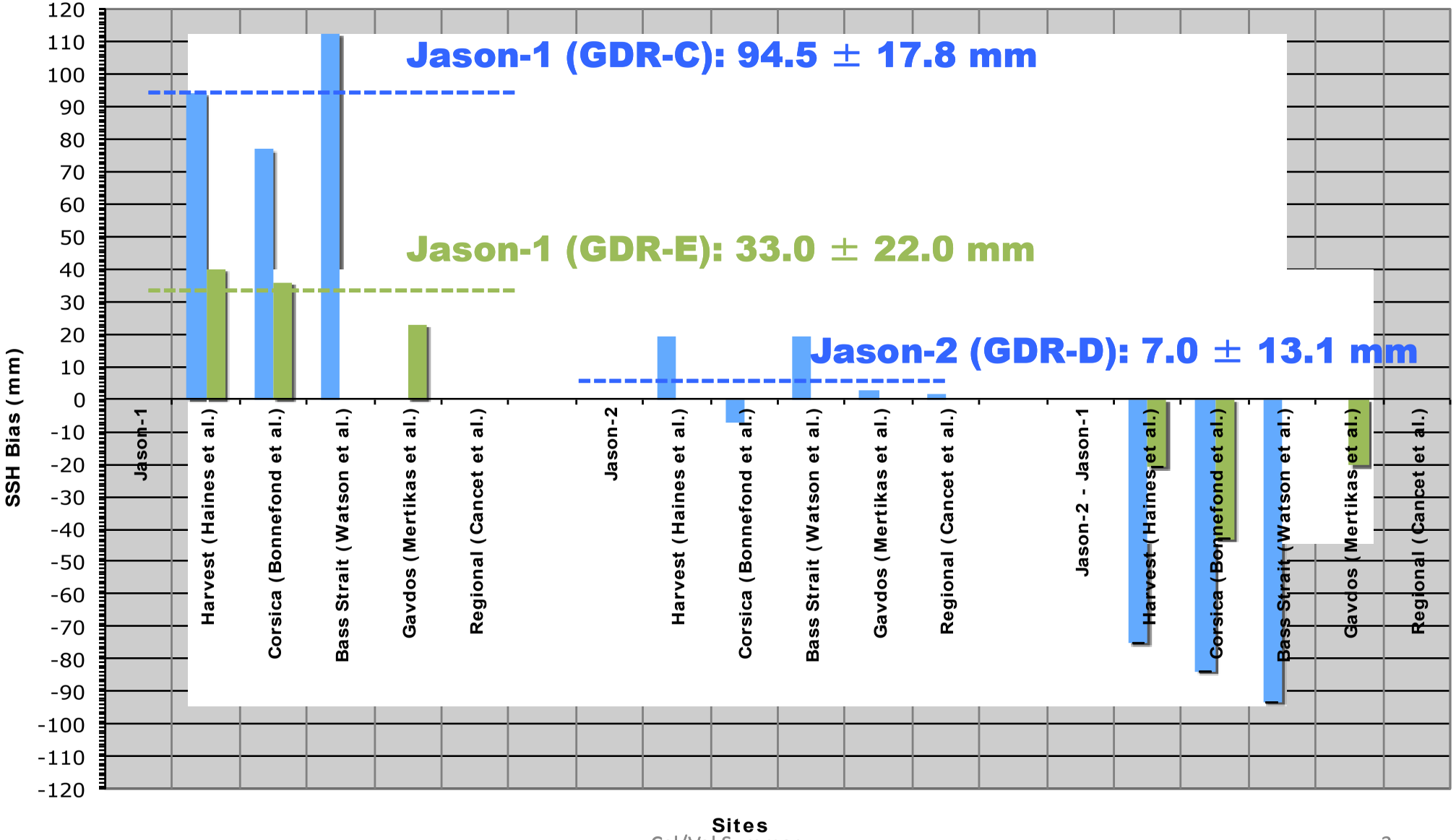
6 oral presentations.

10 posters (for both sessions).

Local Cal/Val Summary report

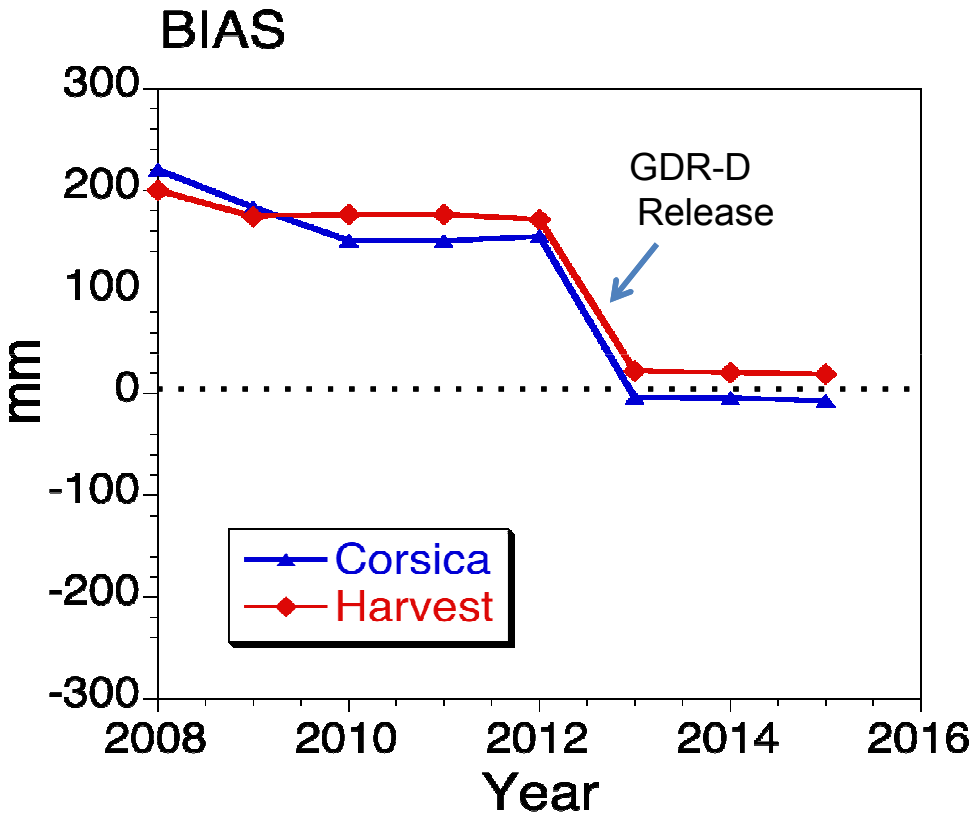
- **Ensemble results from dedicated sites and regional campaigns indicate**:
  - Current Jason-2 (GDR-D) SSH unbiased or slightly biased (questionable significance).
  - Current Jason-1 (GDR-C) SSH bias high by 9 cm.
  - Preliminary analysis of Jason-1 GDR-E SSH confirms significant reduction in SSH bias, due mainly to correction for Poseidon-2 internal path delay. The residual SSH bias (+3 cm) is larger than predicted at last year's meeting, due mainly to the selection of the SSB model.
  - Legacy (T/P) systems unbiased. However RGDR diverges significantly with MGDR and tide gauges prior to mid-1995 and warrants investigation.
  - SARAL/AltiKa results support that the SSH measurements are biased low by 4 cm.
- **Jason-2 drift estimates from dedicated sites continue to improve**
  - Harvest and Bass Strait now yield estimates ≤ 1 mm/yr (statistically indistinguishable from zero), but….
  - Systematic patterns in calibration series from all sites remain, and drift at Corsica is -4 mm/yr.
  - Raises questions on regional stability of altimetric measurements, and on the stability of the in-situ observations (of water level and vertical land motion).
  - Spurious drift in Jason-2 C-Band range at Harvest warrants investigation.

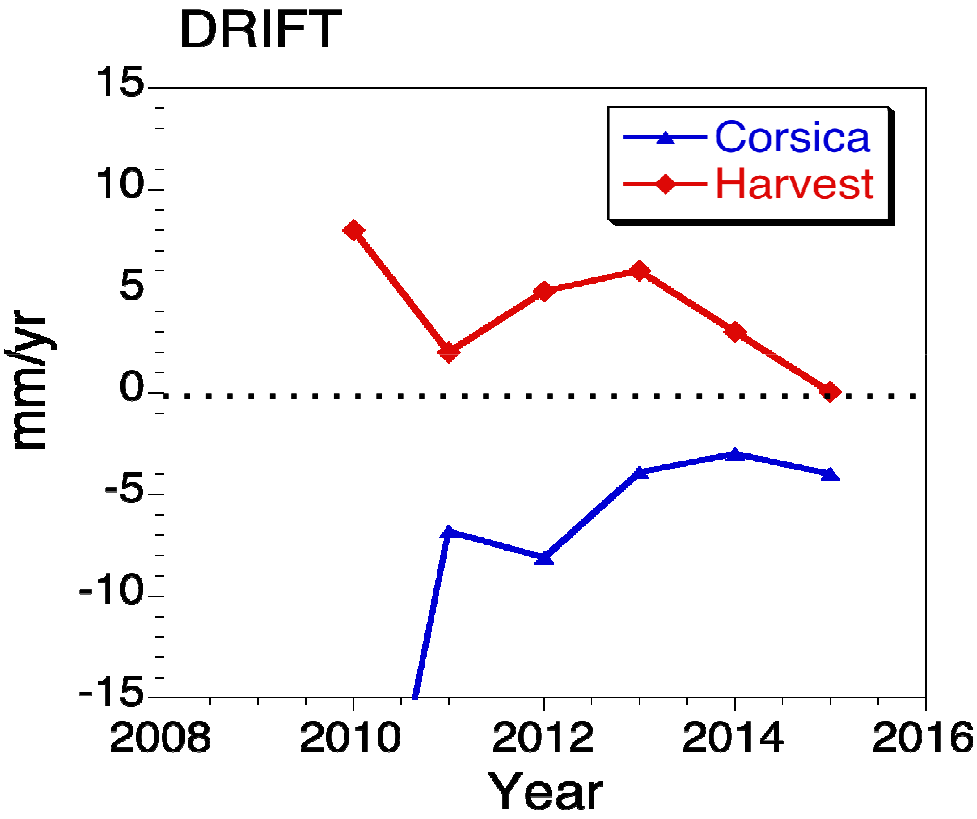
In-Situ Bias Estimates for Jason-1 and Jason-2



Evolution of Jason-2 Estimates of SSH Bias and Drift

AS REPORTED AT OSTST MEETINGS





Regional Cal/Val summary report

- **Regional calibration methods (Cancet et al.)**
  - **Employed for the first time at all three historical calibration sites (Corsica, Harvest and Bass Strait). This technique shows great promise for reducing errors (through increasing numbers of overflights), expanding the calibration footprint of each site and improved linking of in-situ and global calval results.**
- **Evolution of tide gauge/altimeter comparisons has led to new insights**
  - **Leads to lower estimate for GMSL in one study, due principally to TOPEX Side A.**
  - **Questions on the Jason-2 drift have been largely resolved (close agreement between all teams).**
  - **Highlights importance of accurate land motion estimates.**
  - **Underscores importance of developing rigorous error budgets for competing solutions.**
  - **Different approaches also desirable to expose errors.**
- **Comparisons to ARGO and GRACE providing valuable new insights on stability - A good 'closing budget' is available for 2004-2014 period but there are still open questions on :**
  - **Impact of the deep layer thermal content – future ARGO network will improve the sampling of the deep layers content.**
  - **Sensitivity to the GRACE geoid solution has been emphasized**

Global Calibration/Validation
Wednesday, October 21, 2015

6 oral presentations.

10 posters (for both sessions).

Global Cal/Val summary report

- **Jason Missions**
  - Jason-1 **GDR-E processing ongoing:**
    - Improves (reduces) SSH crossover variance.
    - Improves consistency with Jason-2.
      - Relative bias expected to be < 1 cm when using consistent SSB.
    - Two anomalies identified, and will be fixed:
      - Applied ranges biases
      - GOT ocean tide model.
  - Jason-2 **data coverage and quality remain excellent.**
    - Sea surface height error 3.5 cm for temporal scales less than 10 days.
    - GMSL stability < 0.5 mm/yr
    - Version E orbit standards reduce errors on regional sea level rise.

Global Cal/Val summary report

- **SARAL Mission**
  - Excellent data coverage and quality, even slightly better than Jason-2.
    - Missing measurements due to rain are significantly fewer than anticipated.
  - Crossover performance is similar to Jason-2.
  - No significant drift relative to Jason-2.
  - Range bias of ~-5 cm still remains to be explained.
  - Improvements to current product standard foreseen in 2016 (TBC).
    - Sea state bias, wind LUT, radiometer wet troposphere correction, sigma0 atmospheric attenuation, orbit, ice2 retracking, … . Those are already implemented in PEACHI products.

- **Crysosat**
  - Excellent data quality in both LRM and SAR modes from all data centre (ESA GOP ie GDR like products are now routinely available, still processed on CNES side for SAR studies and DUACS needs)

- **HY2A**
  - Routinely processed on CNES side to allow data use in SALP/DUACS but …
  - Not a stable mission on the long-term basis

Cal/Val round-table discussion

- **Tide gauge/altimetry comparisons**
  - **It is recommended that the groups involved in the tide gauge/altimetry comparisons work collectively to further understand and document the strengths and limitations of the techniques, with the goal of reporting back to the community at OSTST 2016**. The group involved will agree on a set of milestones to achieve this undertaking.
  - The tide gauge/altimeter comparison group will work to define a set of sensitive tests including investigating site weighting strategies, network effects, and approaches for dealing with vertical land motion.
  - **We encourage the work of the IAG Joint Working Group 3.2 (Vertical motion of the Earth's crust and sea-level change) and tide gauge/altimeter group plan to work alongside them to provide a prioritized list of gauges that are most critical to the altimetry comparisons.**
  - We support efforts to investigate tide gauge / GNSS deployments and their optimization for current and future missions.
  - **We look forward to the release of ITRF2014 and continued efforts by the reference frame community to reduce the reference frame errors and improve the long-term stability.**

Cal/Val round-table discussion

SWOT preparation: From 1D to 2D Cal/Val

- How should we validate the along track SSH at scales from 30-150 km - with spatial distribution of in-situ observations or global analyses?
- Review of the existing means
  - In Situ measurements
    - Tide gauges, ADCP, drifters, CTD, GPS devices, moorings, gliders, transponders, air flight data, radar HF, …
    - Complementarity of these different measurements => multi-platform experiments (see Alborex experiment keynote by Ananda Pascual)
    - But a detailed description of each instrument is needed (advantages/disadvantages, error budget, how to link altimeter SSH and in situ, …)
  - Global Cal/Val
    - SAR measurements can help to increase the spatial resolution
    - Promising LRM processing (Dcore, Two pass, Filtering, …) should be analyzed
- An OSTST session dedicated to this in 2016?

Cal/Val round-table discussion

Other items

- Make a living document including all the altimetry (products, events, ...) history to defend the importance of continuity
- In situ data: make a recommendation to release the data (and the documentation …) to all to allow different groups to make their own study