

Absolute calibration of Jason radar altimeters from GPS kinematic campaigns over the Lake Issykkul

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IWPB (KG)
OCA (FR)
CPRM (BR)
OSU (USA)
GRGS (FR)
Univ Conception (CH)

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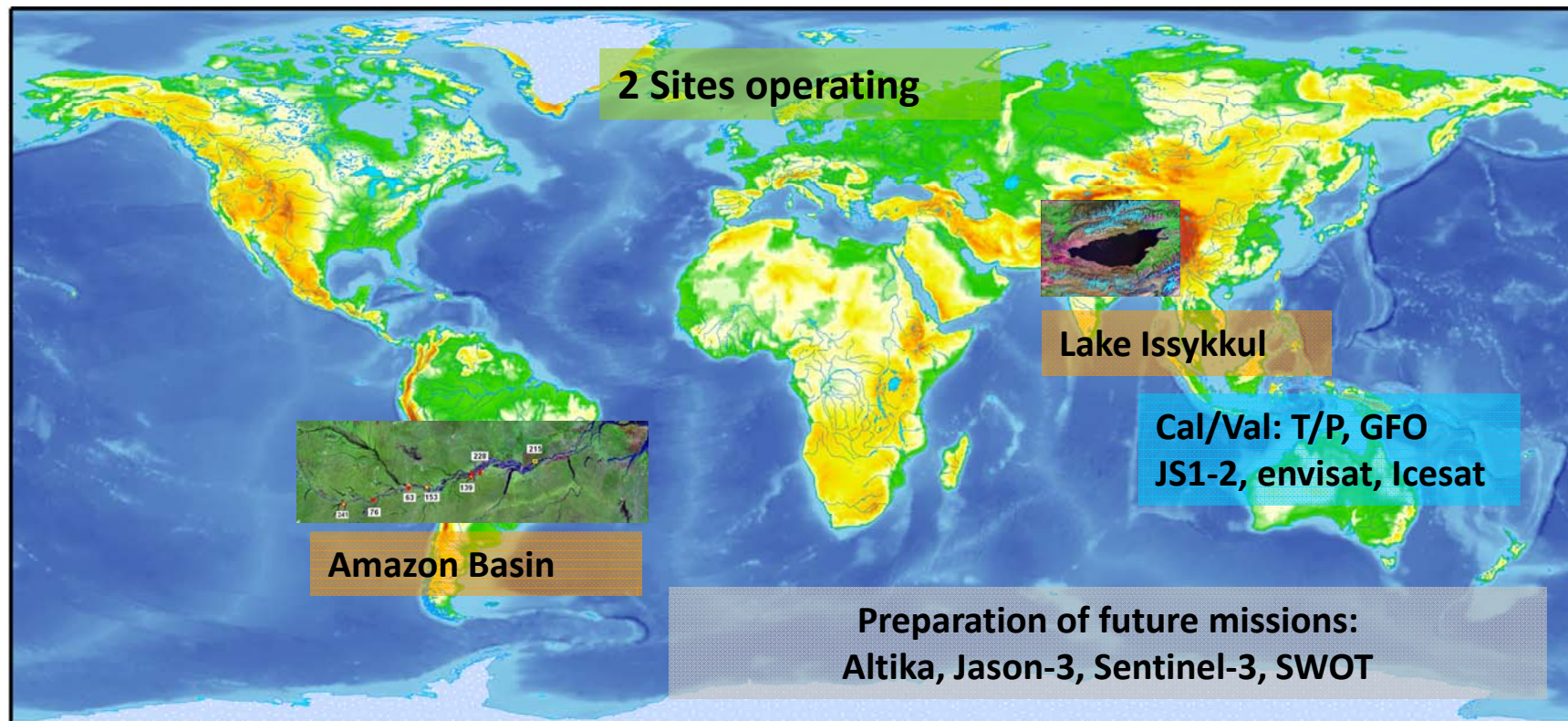
OSTST 2011, San diego, October 19-21

Cal / Val of radar altimetry for continental water at Legos

Ojectives:

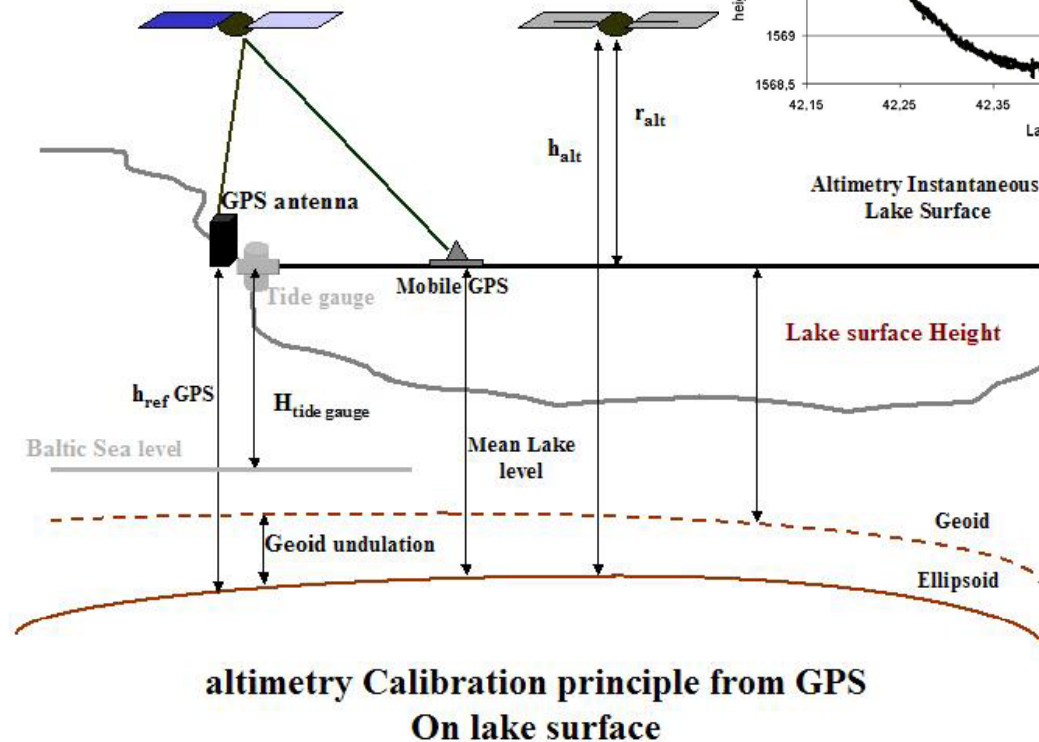
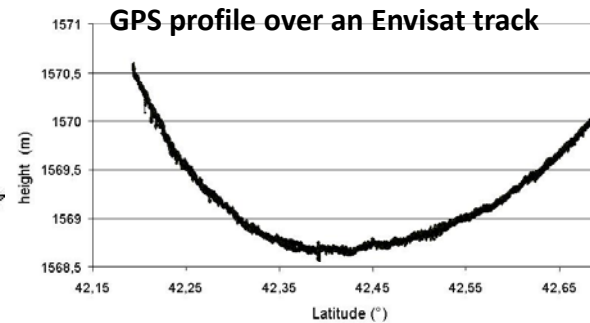
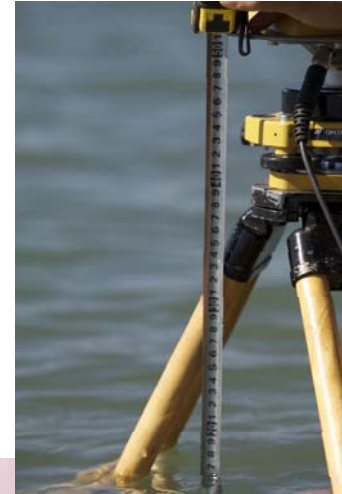
comparison of level time series deduced from altimetry and in situ level when available

Perform GPS field campaigns (rivers and lakes) for establishment of error budget for different parameters (impact of retracking mode, geophysical correction) and to compute absolute /relative altimetric bias

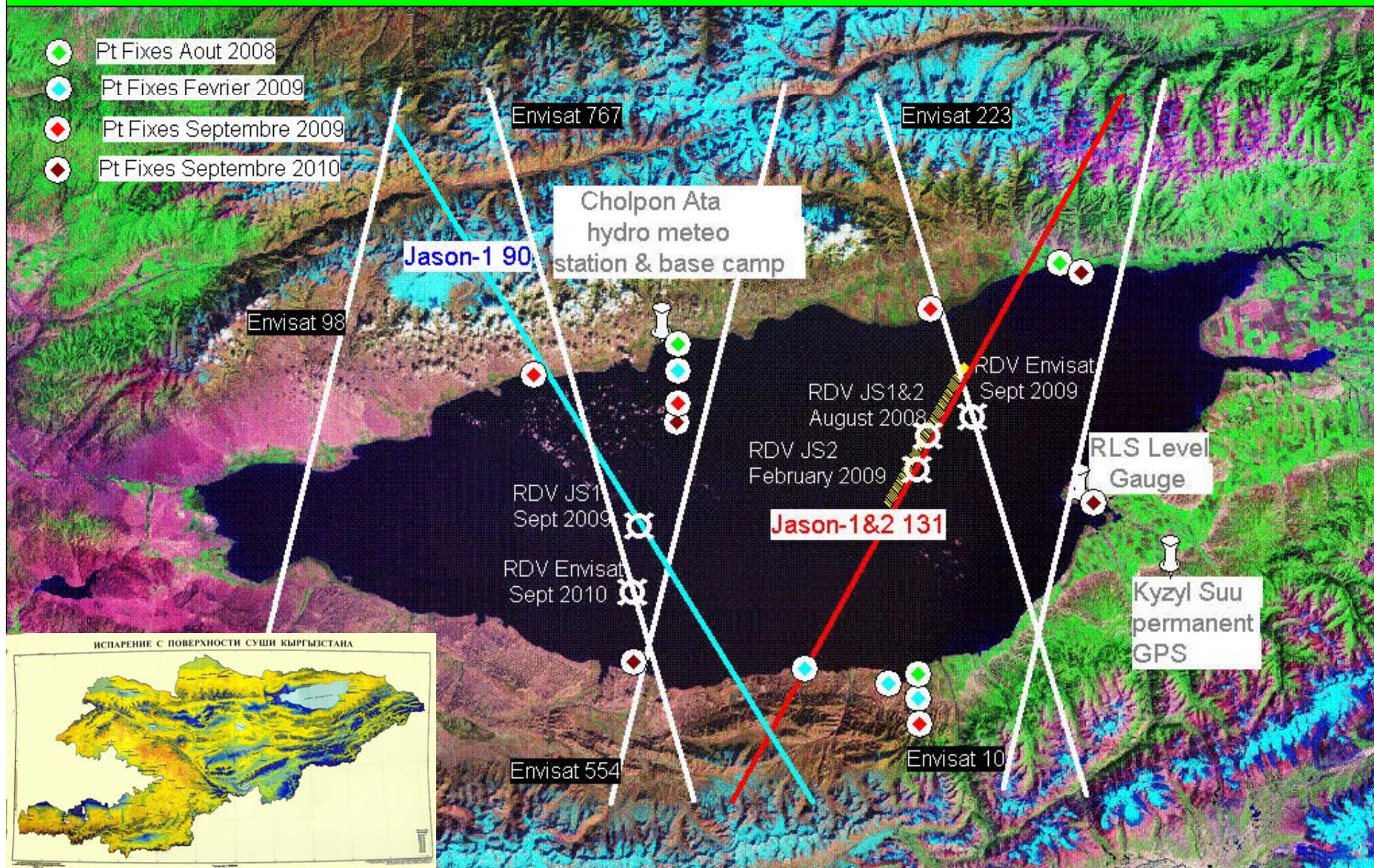


Absolute calibration on lakes: characteristics and advantages

- Waves, Electromagnetic Bias, tides and inverse barometer negligible
- In-Situ data (limnigraphs) are useful for comparison and easy to install
- Multi satellite calibration is possible on one single site
- Possibility to quantify errors in the corrections (wet and dry troposphere)
- Assessment of performance of tracking/retracking algorithms
- densification of absolute calibration sites in continental area / oceanic sites

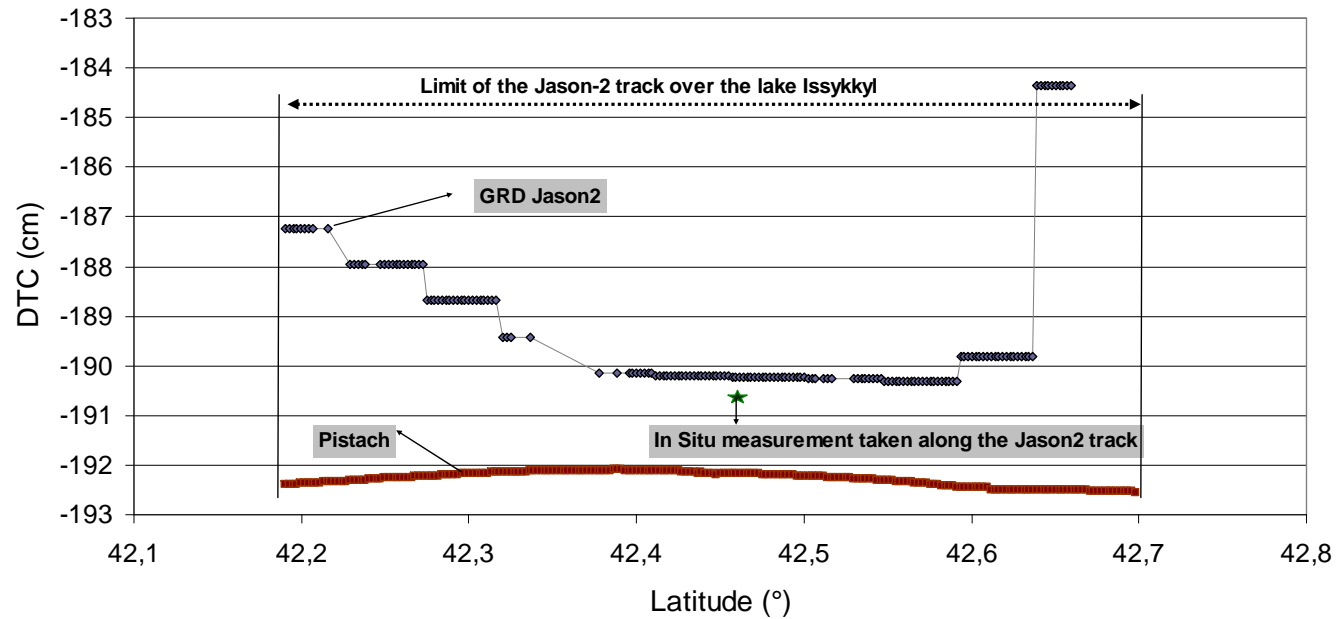


6 field campaigns between 2004 and 2010 for multi satellite Cal/Val
 Results for Jason-1 and Jason-2 over 2 campaigns in 2009
 In the frame of the FOAM project funded by CNES



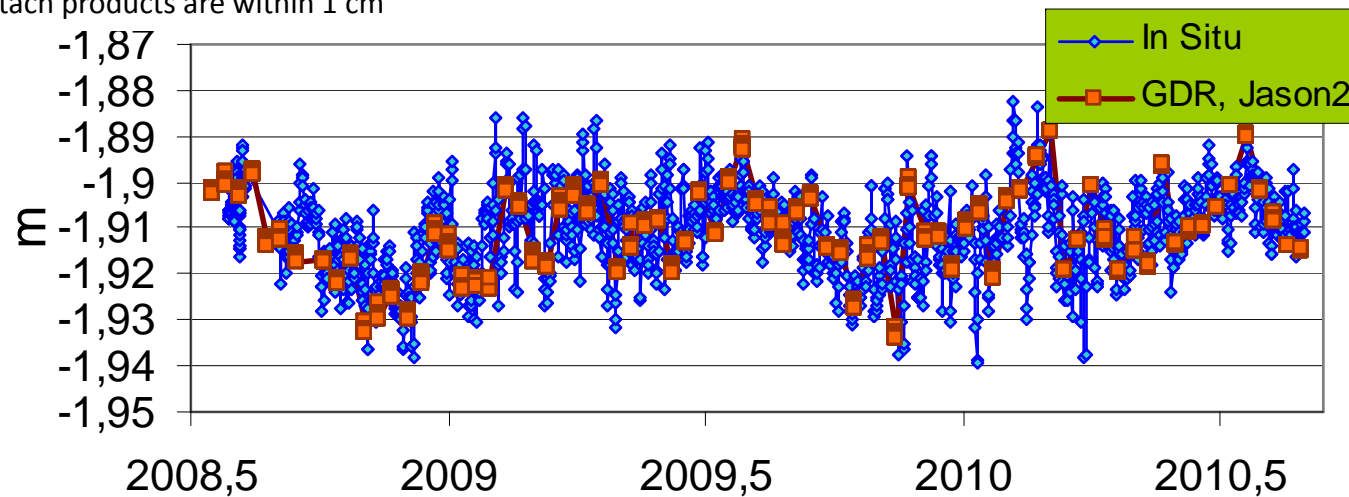
Dry Tropospheric Correction (DTC)

2 weather stations were installed in Cholpon Ata (North coast: permanent) and on the Vessel (Multur) for the time of the campaigns. Another one installed permanently in June 2011 on the East coast near an Envisat / altika track



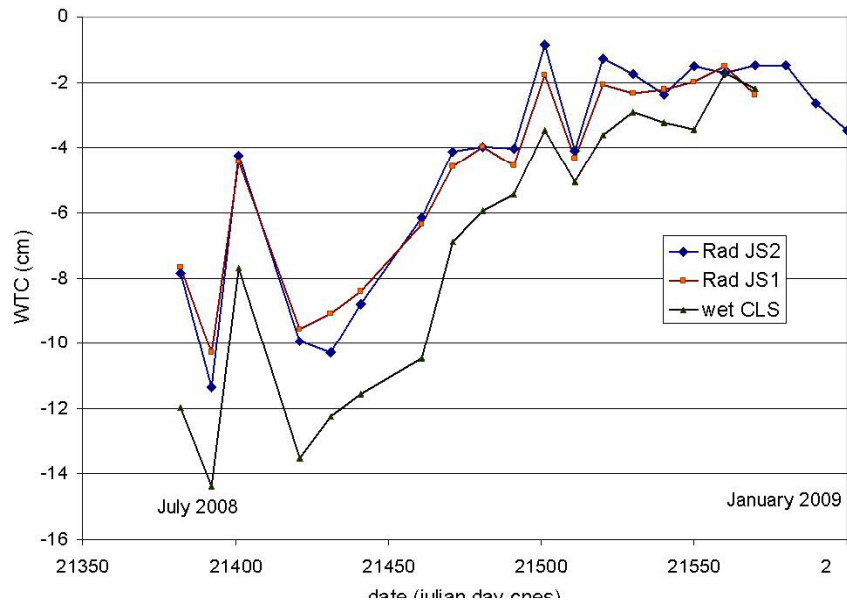
Discrepancies between In situ , GDR of JS2 and Pistach products are within 1 cm

DTC, Jason 2, Track centered



Wet Tropospheric Correction (WTC)

JS2/JS1 tandem mission on Issykkul



computation from 3 different ways:

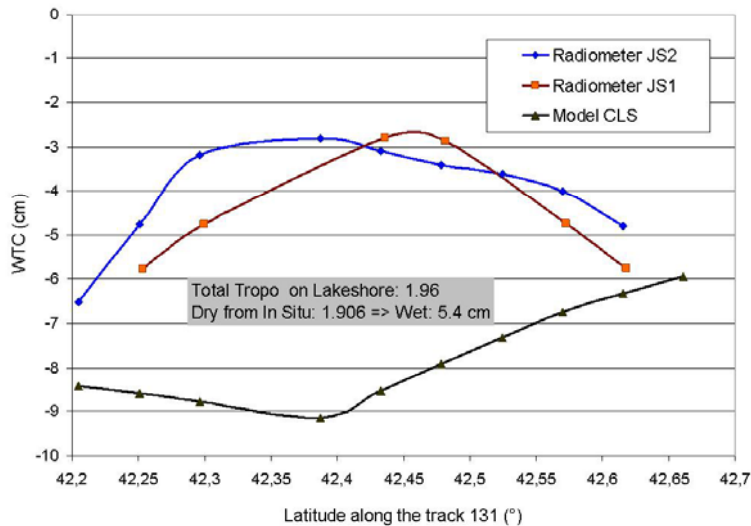
The radiometers (problem of footprint)

The models (CLS & GRGS)

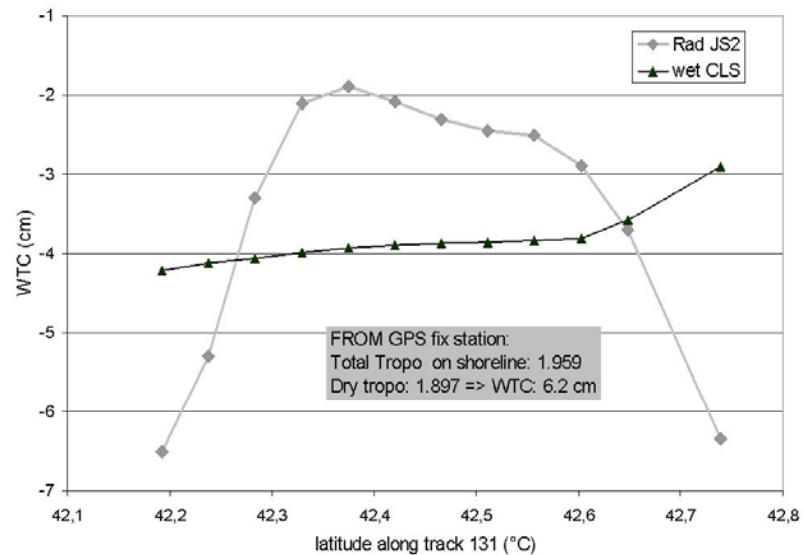
The GPS data along the coast (more precise but problem of spatial variability)

Best coherence were obtained using GRGS model and GPS data (better than 1 cm)

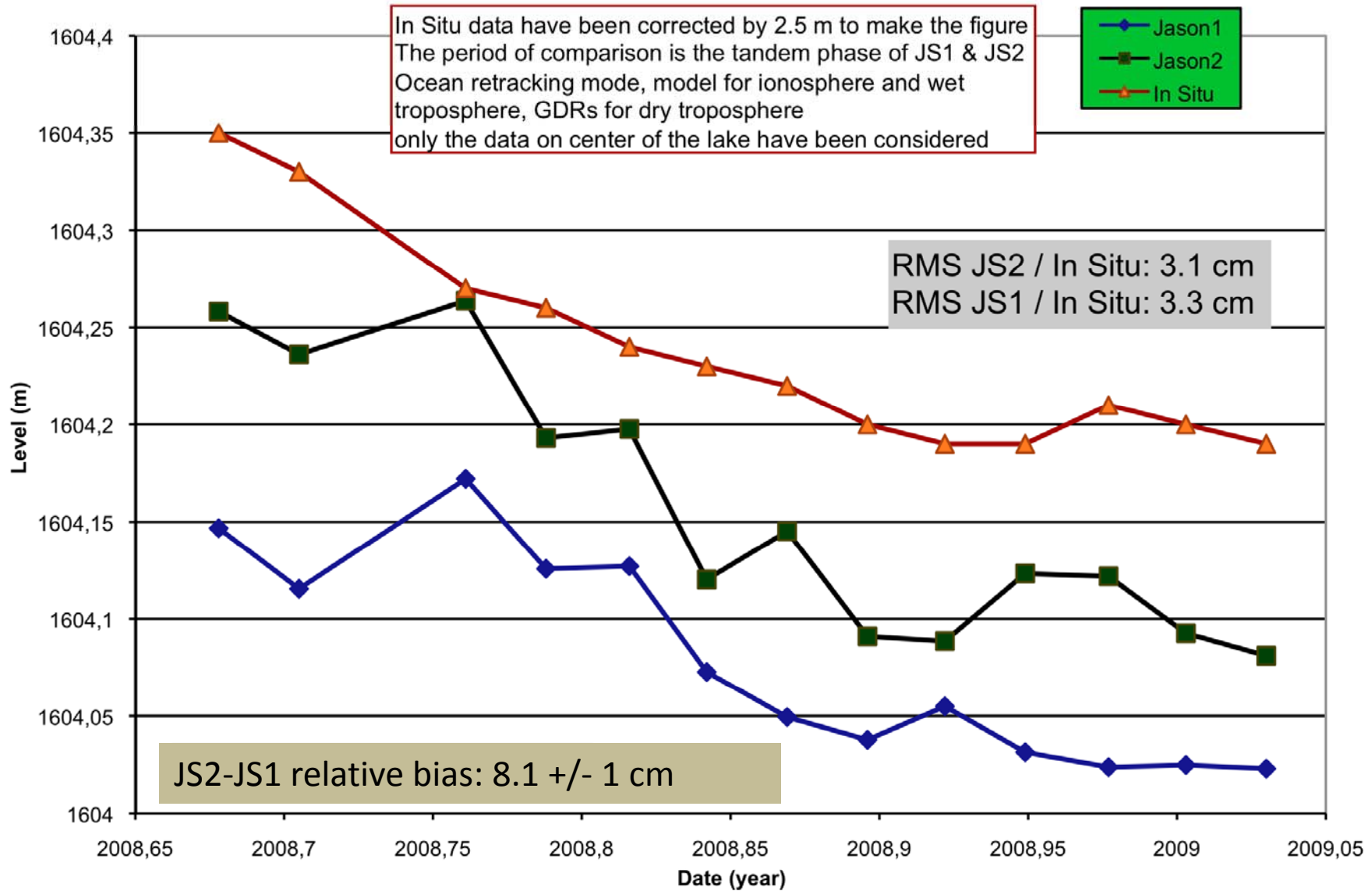
Cycle 3 / 242 (JS2/JS1)



cycle 23 (JS2)

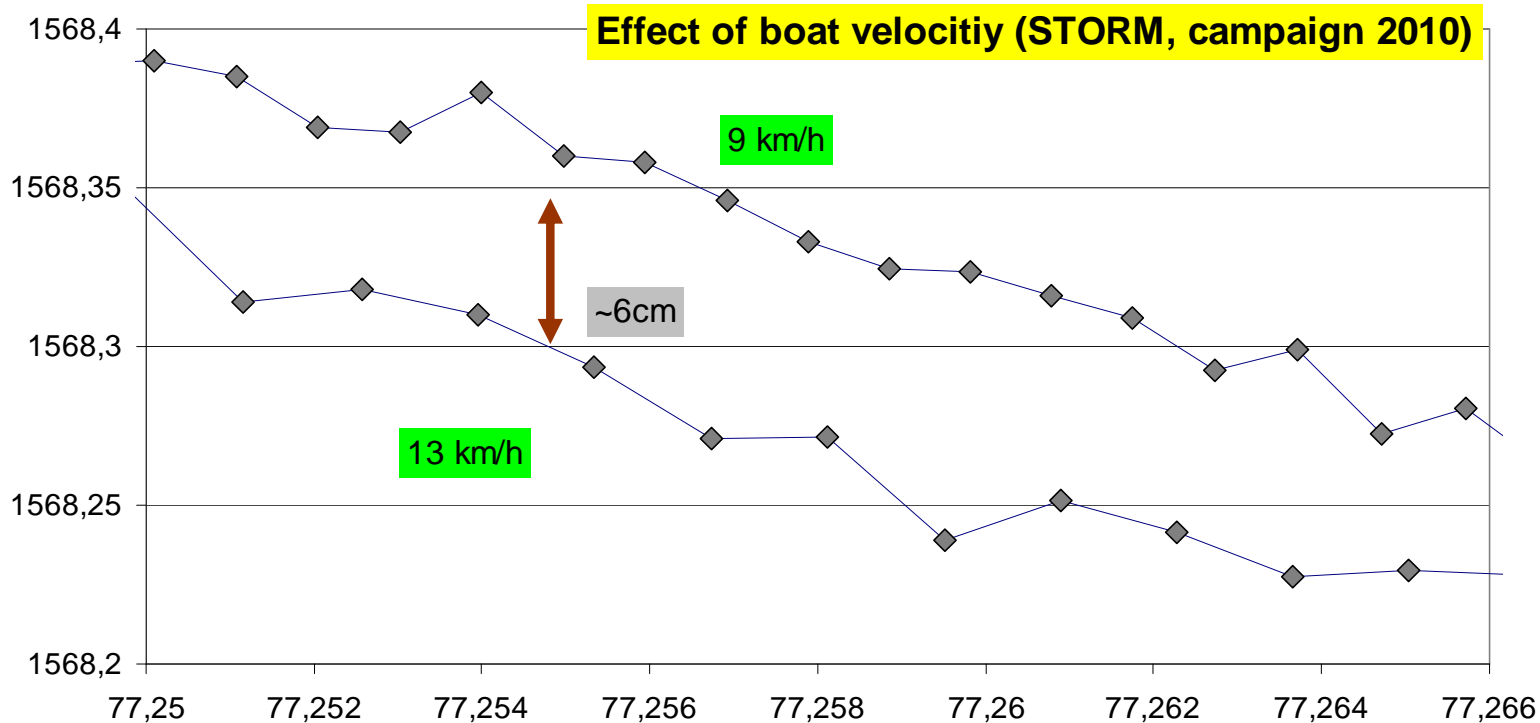


Relative bias between Jason-1 and Jason-2 during tandem phase



GPS data processing

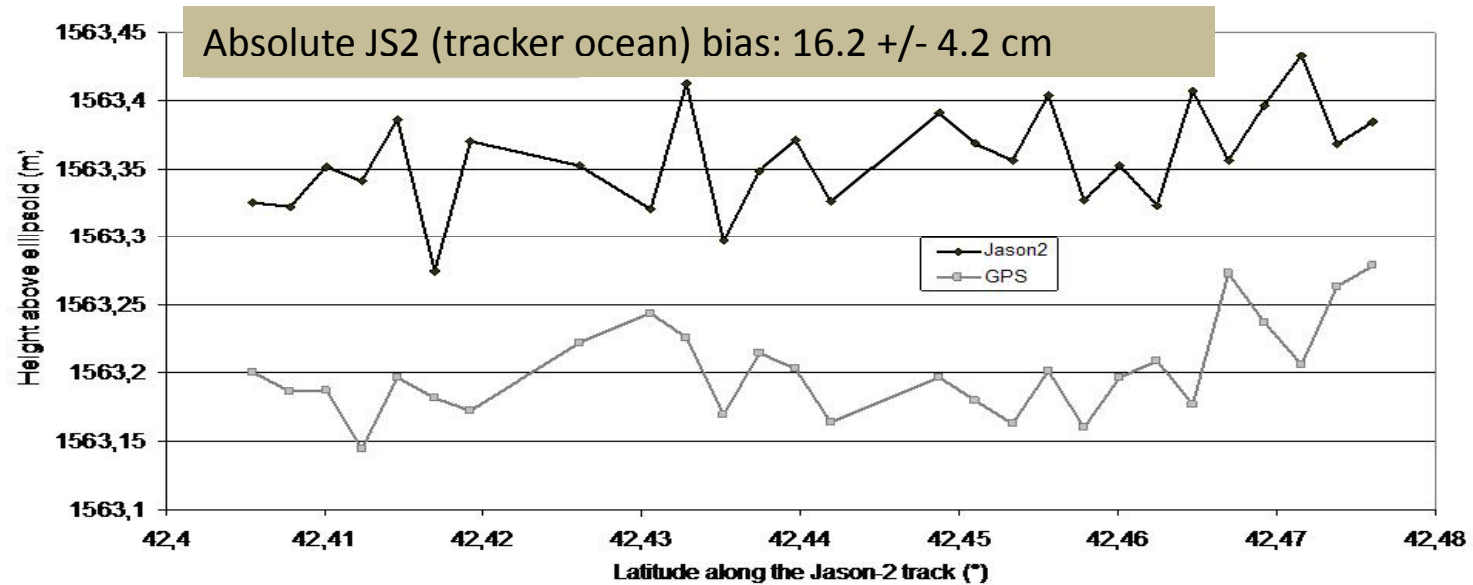
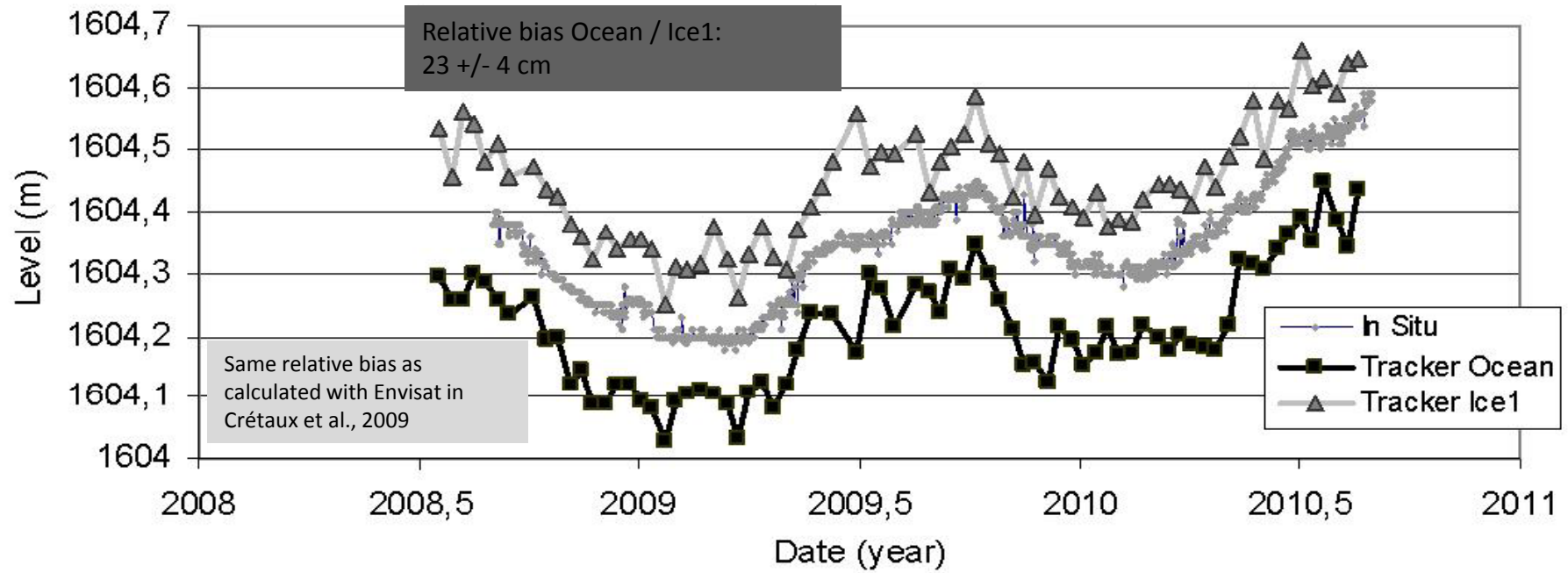
- Fixed reference point from GINS software (GRGS)
- Mobile point from TTC and now from GINS in PPP mode
- Correction of Height antenna from regular comparisons between shoreline reference point or permanent GPS at Kyzyl Suu, and the mobile GPS
- Correction of floatability of the boat depending on the velocity



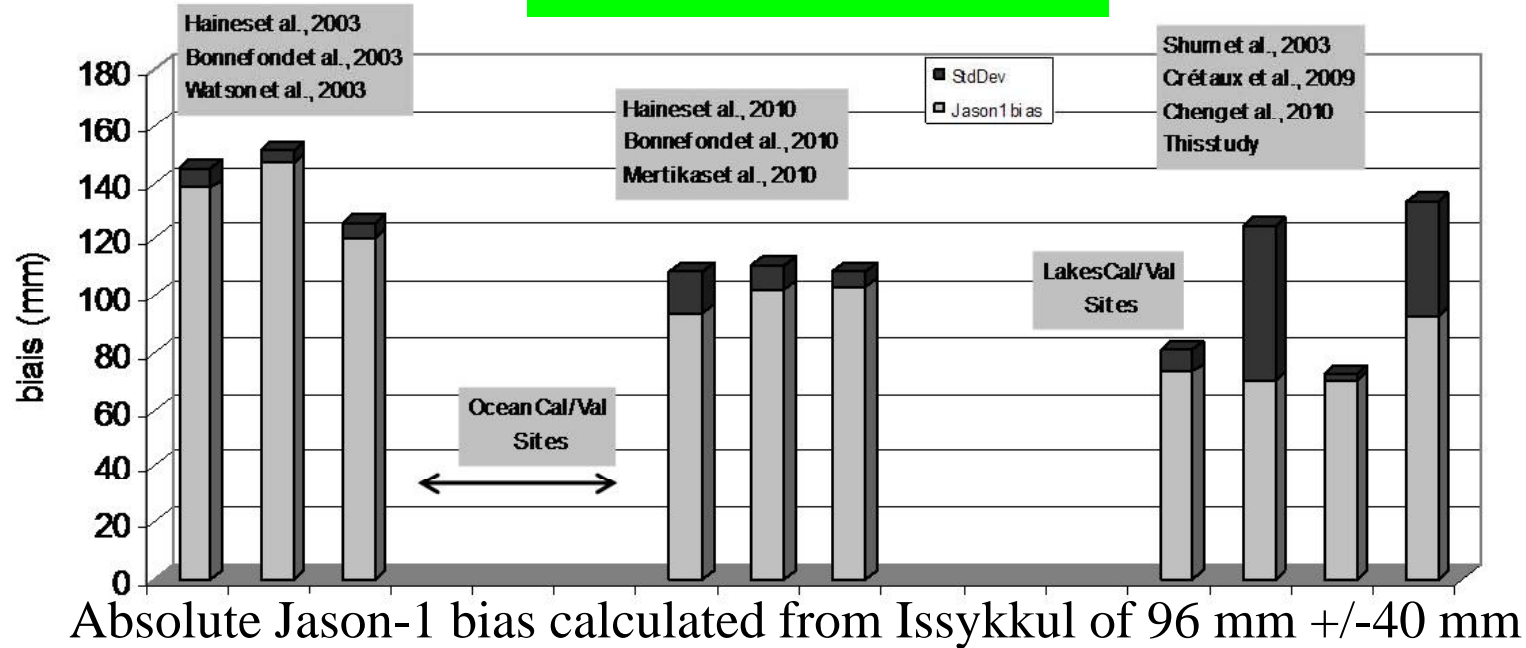
For 2010 campaign, a correction of 1.5 cm/km/h must be applied

For 2009 campaigns, the correction was lower (other boat): 5 mm/km/h

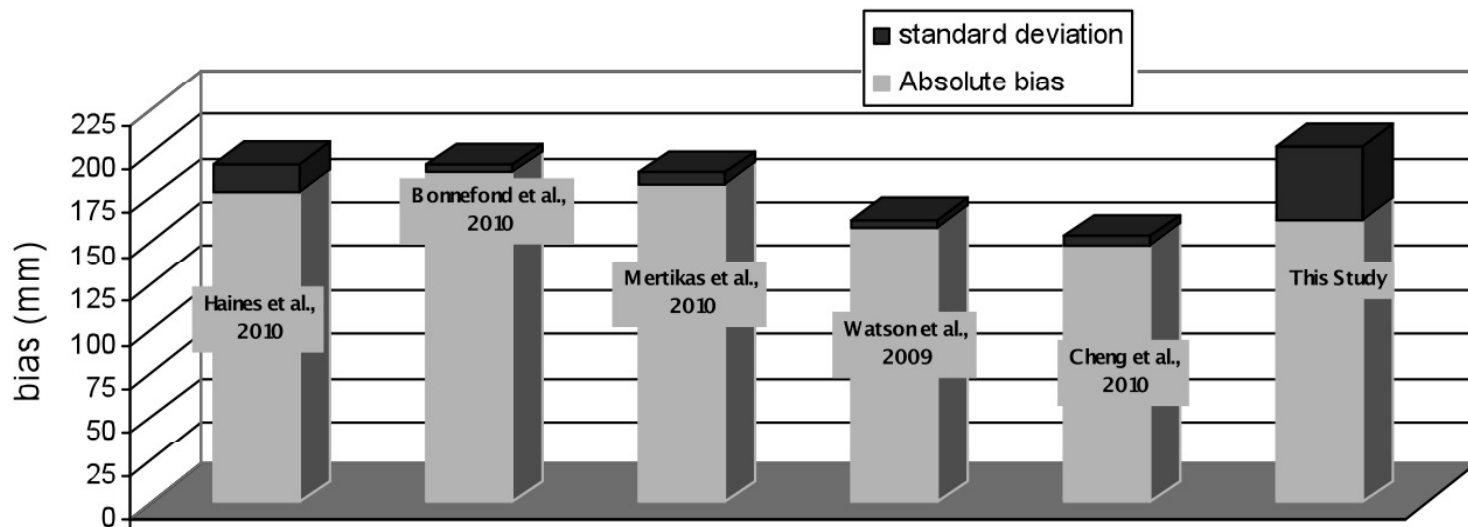
Relative Ocean / Ice1 retracker and absolute Jason-2 biases



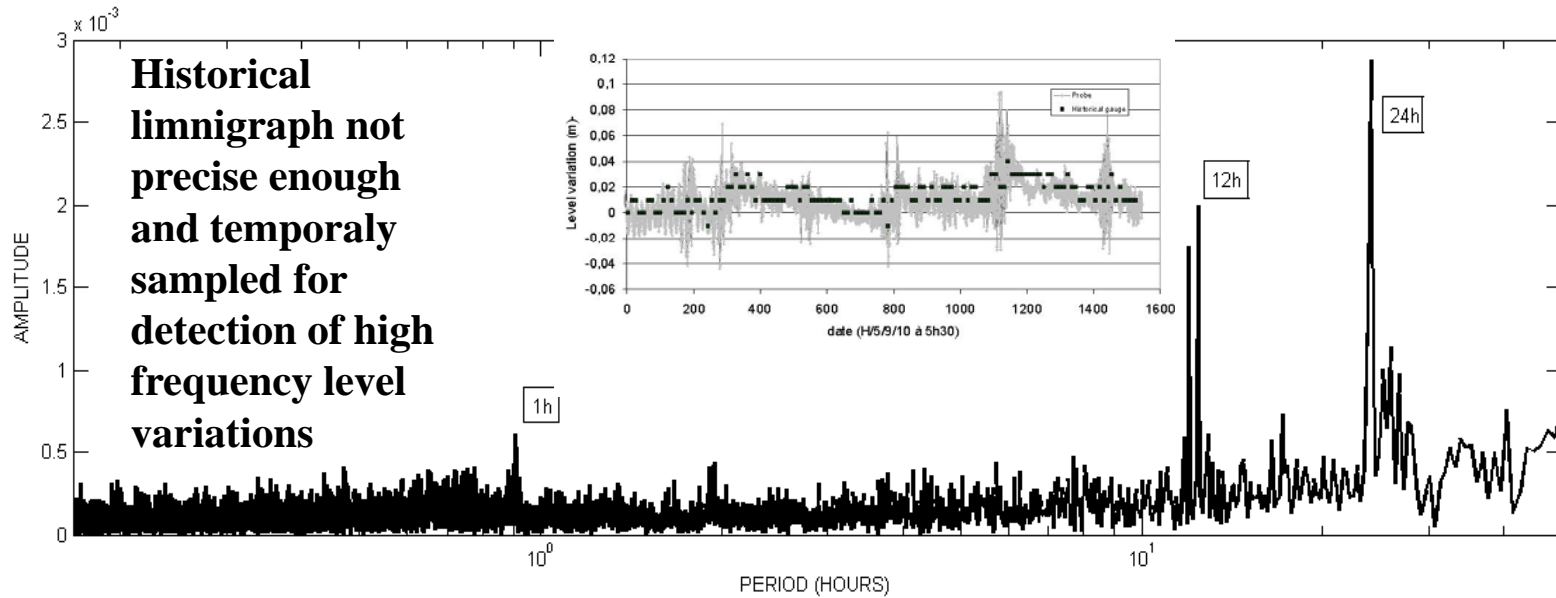
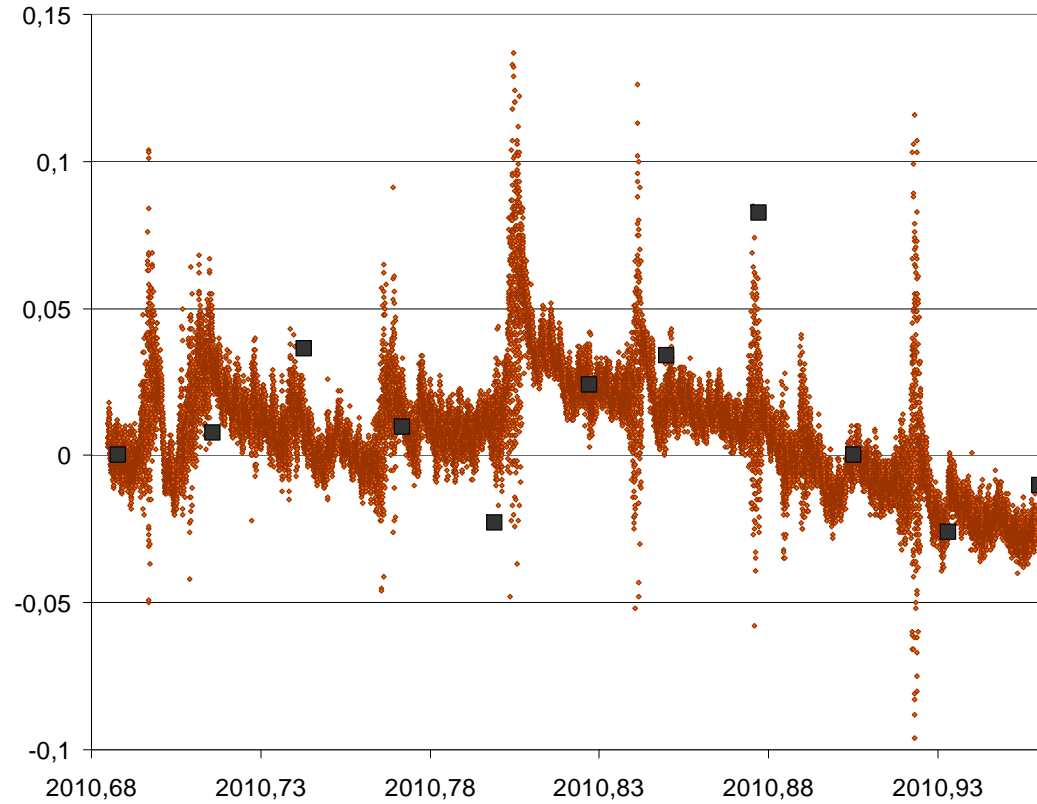
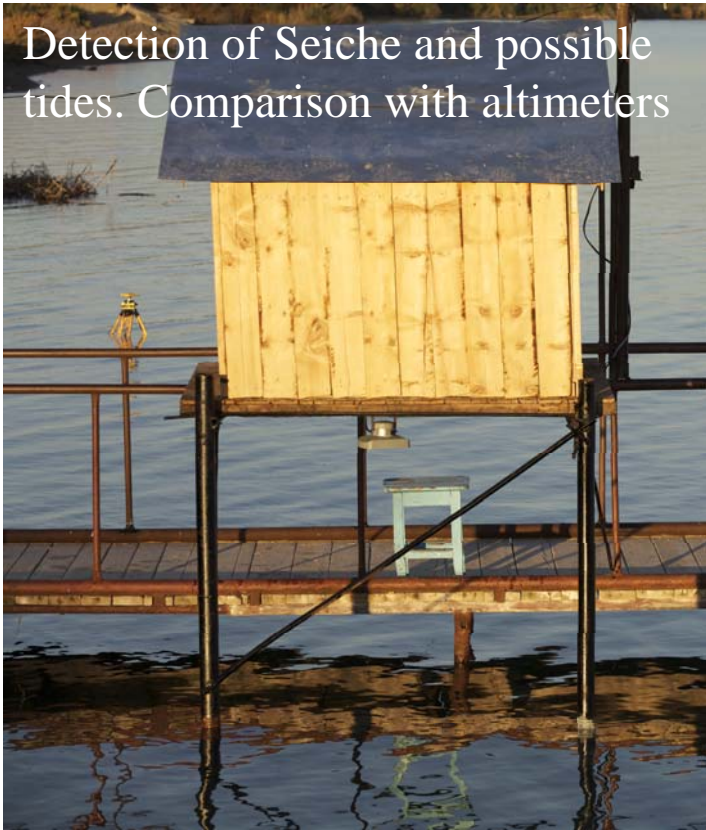
Absolute Bias of Jason-1



Absolute Bias of Jason-2



Detection of Seiche and possible tides. Comparison with altimeters



Future campaigns, instrumentations, and data processing

Spring 2012

- One new permanent GPS close to the lake shore along the north coast (cooperation with institute of seismology) with collocated weather station for troposphere assessment
- One new gauge on the west coast of the lake for level variation at high temporal resolution to better observe the Seiche effect and measure instantaneous water level
- Experiment with one GPS reflectometer for the observation of instantaneous lake surface in the frame of the preparation of SWOT mission
- One boat campaign along Altika tracks after the launch in April 2012

GPS data processing

- All computation (fixed and mobile) with GINS software in PPP mode

Other lakes

- Preparation of new in situ GPS campaign over an African lake (Victoria, Tanganyika, Malawi ?)

CONCLUSIONS

Potential of absolute calibration of multi-mission
Altimetry and interferometry over lakes

Operating Cal/Val sites needed
For next missions:
Altika, Jason-3, Sentinel-3 and SWOT

- Precision of few centimeters
- multi-year time series available
- In situ data available
- Information on geophysical correction & retracking algorithms and error budget
- Necessary redundancy with other Cal/Val sites
- Necessary of new site over lakes (Africa) to be investigated