



**Abstract**

This work presents the first calibration results for the SARAL/AltiKa satellite altimeter, conducted by the Gavdos/Crete permanent facility. Results are based along ascending Pass No. 571. Calibration starts from 20 km and up to 7 km south of Gavdos at 40 Hz. The altimeter bias has been determined as  $B = -46\text{mm} \pm 11\text{ mm}$  (mean value) and  $B = -43\text{mm} \pm 11\text{ mm}$  (median value), cycles 1-11. Three GNSS receivers, along with 4 tide gauges, precise local geoid and MDT models have been used. Sea-surface heights when compared to a cross-over location Jason-2 show that SARAL/AltiKa measures lower sea surface heights in the order of **-4.6 cm** (preliminary values for reliable Cycles No. 5, 6, 9). Finally, the wet troposphere biases are estimated as  $-4.5\text{ mm}$  as compared against in situ measurements.

**Where**

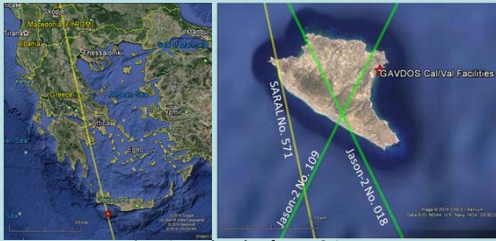


Fig.1: Ground tracks of Jason & SARAL



Fig.2: The Cal/Val facilities in Gavdos/ Crete.

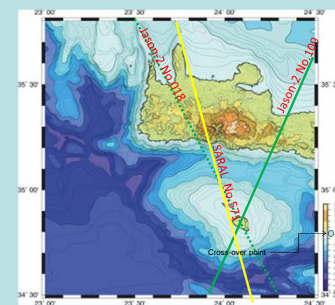
**What**

- Estimation of the absolute SARAL/AltiKa bias for ascending Pass No. 571, Cycles 1-11;
- Comparison of sea-surface heights against Jason-2 at the cross-over point;
- Validation of SARAL/AltiKa ionospheric GIM model products;
- Validation of SARAL/AltiKa radiometer wet troposphere model over Gavdos.

**How**

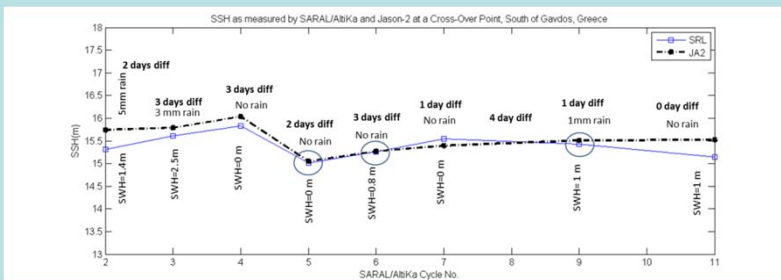
- The Gavdos/Crete calibration facilities are fully operational.
- The absolute bias is estimated by:  
Bias(k) = SLA(k) - SLA(k0)
- SLA(k) is the sea level anomaly, measured by the altimeter, and SLA(k0) is the sea level anomaly, measured by in-situ instruments.
- Sea-Surface heights of SARAL/AltiKa have been compared against Jason-2 at the cross-over point.
- 3<sup>rd</sup> order robust regression with weights to estimate SSH at cross-over location.

Local geoid and mean dynamic topography models are reference surfaces for estimating altimeter bias at specific calibrating regions.

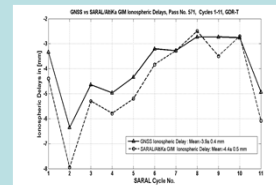


**Calibration Methodology & Models**

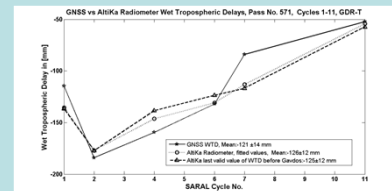
	Pass No. 571	Models applied
PCA	Satellite's Point of Closest Approach to the calibration site on Gavdos	
Calibration Area	South ground track (8-20 km)	
Iono Corrections	[-21 -1] sec from PCA	Average
Dry Corrections	[-7 -1] sec from PCA	Linear Fit
Wet Corrections	[-15 -3] sec from PCA	Linear Fit
SSB Corrections	[-10 +1] sec from PCA	Cubic
N (Geoid height)	Along track interpolation of local geoid values (averaged within footprint).	
MDT	Along track cubic interpolation of MDT (RioMed & GOCE models).	



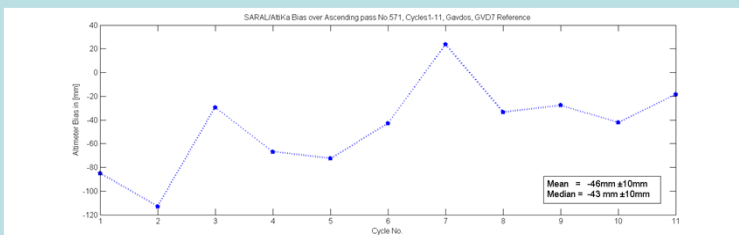
- SSH of SARAL/AltiKa against Jason-2 at the cross-over location south of Gavdos, Greece;
- Third-order polynomial of robust regression applied to estimate the SSH at cross-over location with weights
- Many SSH values are land contaminated because of the proximity to Gavdos coast.



SARAL GIM model versus GNSS ionospheric delay estimation for Pass No. 571, Cycles 1-11 (GDR-T Data).



AltiKa radiometer model versus GNSS wet tropospheric delays, Pass No. 571 Cycles 1-11, GDR-T.



**Conclusions & Future Plans**

- The Gavdos Cal/Val facilities are fully operational;
- Calibration is carried out for Jason-2 (No. 018 & 109), SARAL/AltiKa (No. 571);
- The altimeter bias values for the SARAL/AltiKa satellite during one-year period (April 2013, April 2014) have been determined as
  - $B = -46 \pm 11\text{ mm}$  (mean value) and,
  - $B = -43 \pm 11\text{ mm}$  (median value), over cycles N=1-11.
- Comparison between SARAL/AltiKa and Jason-2 sea-surface heights, within 1-3 day window at cross over, is estimated as **4.6 cm** less than what Jason-2 provides.
- Efforts to calibrate SARAL/AltiKa Pass No. 100 as well;