



EUMETSAT

Ocean Surface Topography Science Team Meeting (OSTST)

October 20-23, 2015



Jason-1, Jason-2, SARAL/AltiKa and HY-2 altimeter calibrations over a decade at the Gavdos/Crete Cal/Val sites

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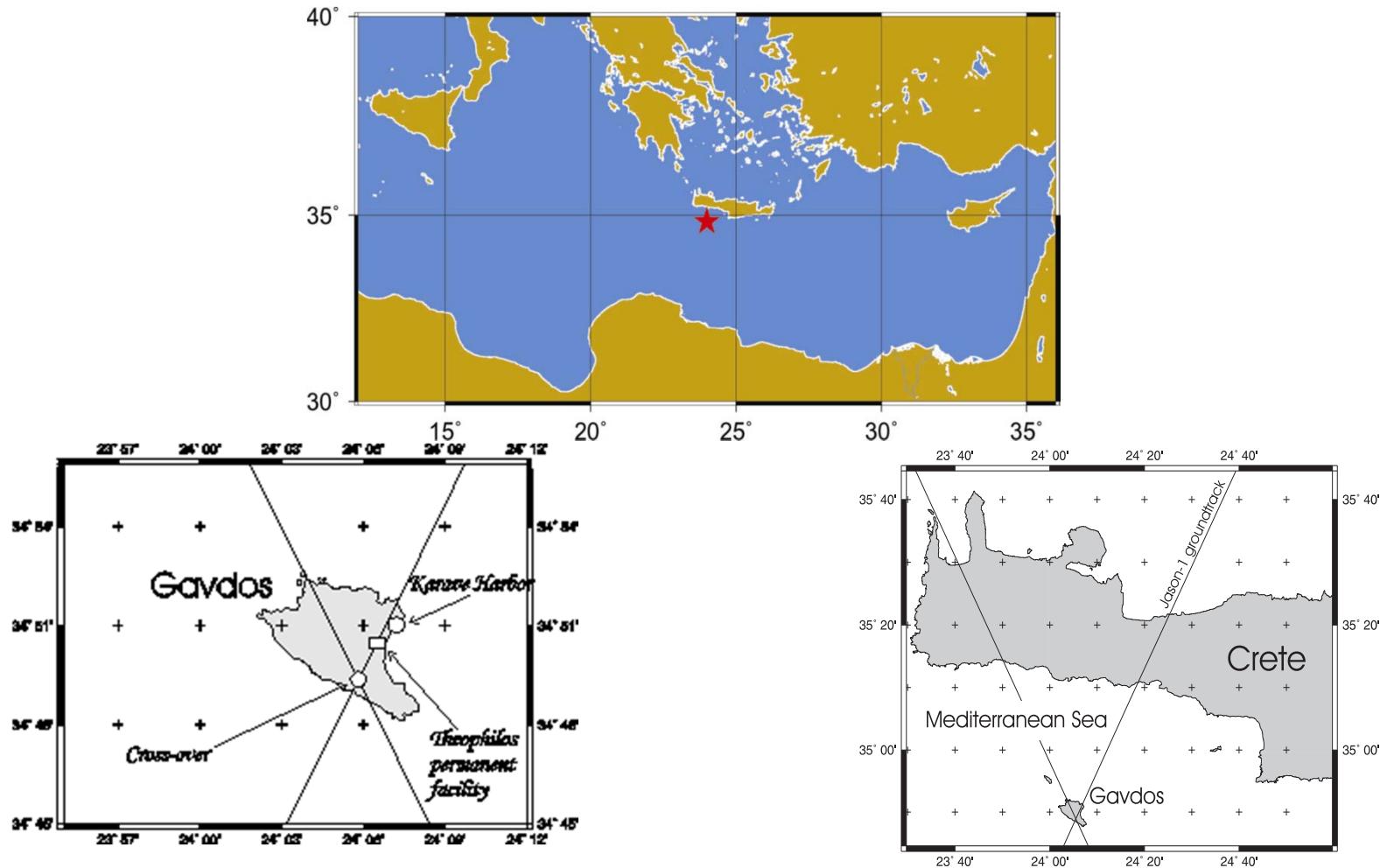
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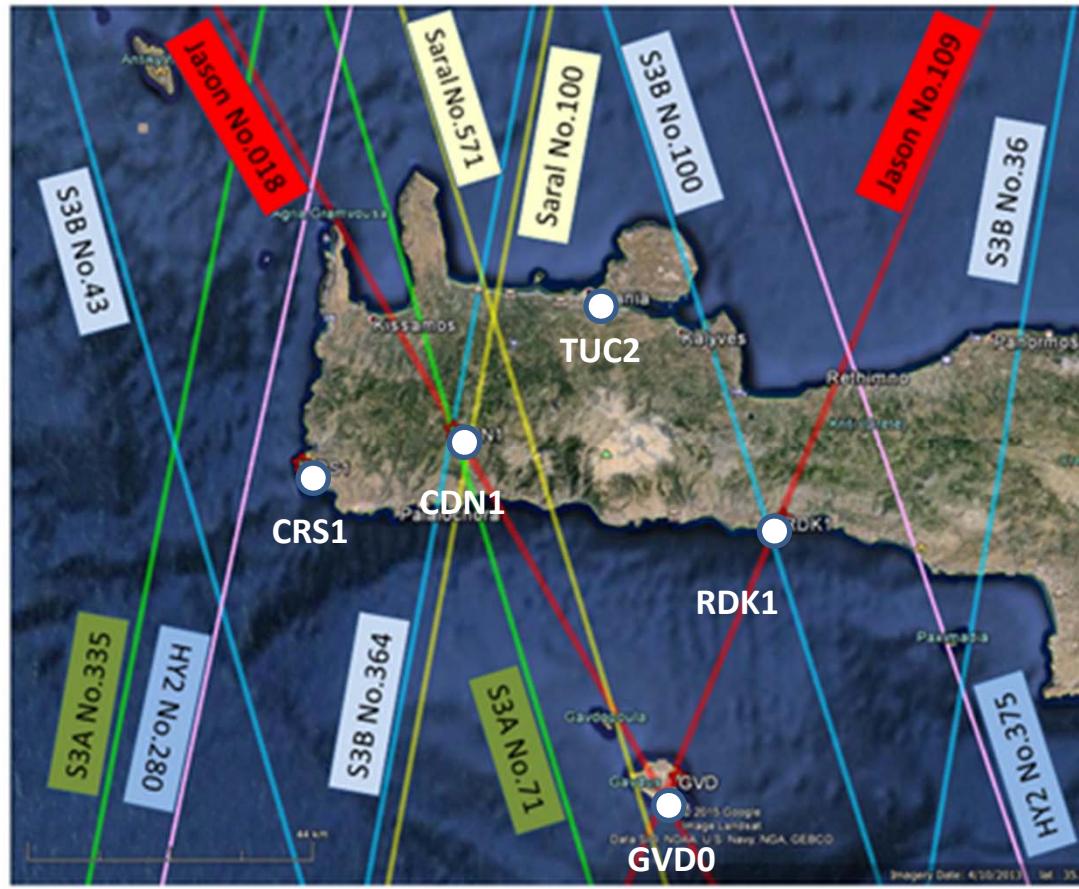
⁶ Danish Space Center, Denmark,

⁷ESA/ESTEC, The Netherlands.

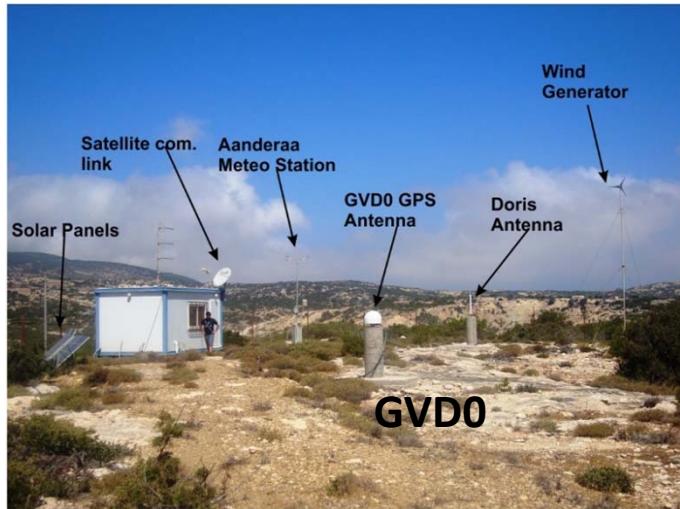
Gavdos Permanent Facility



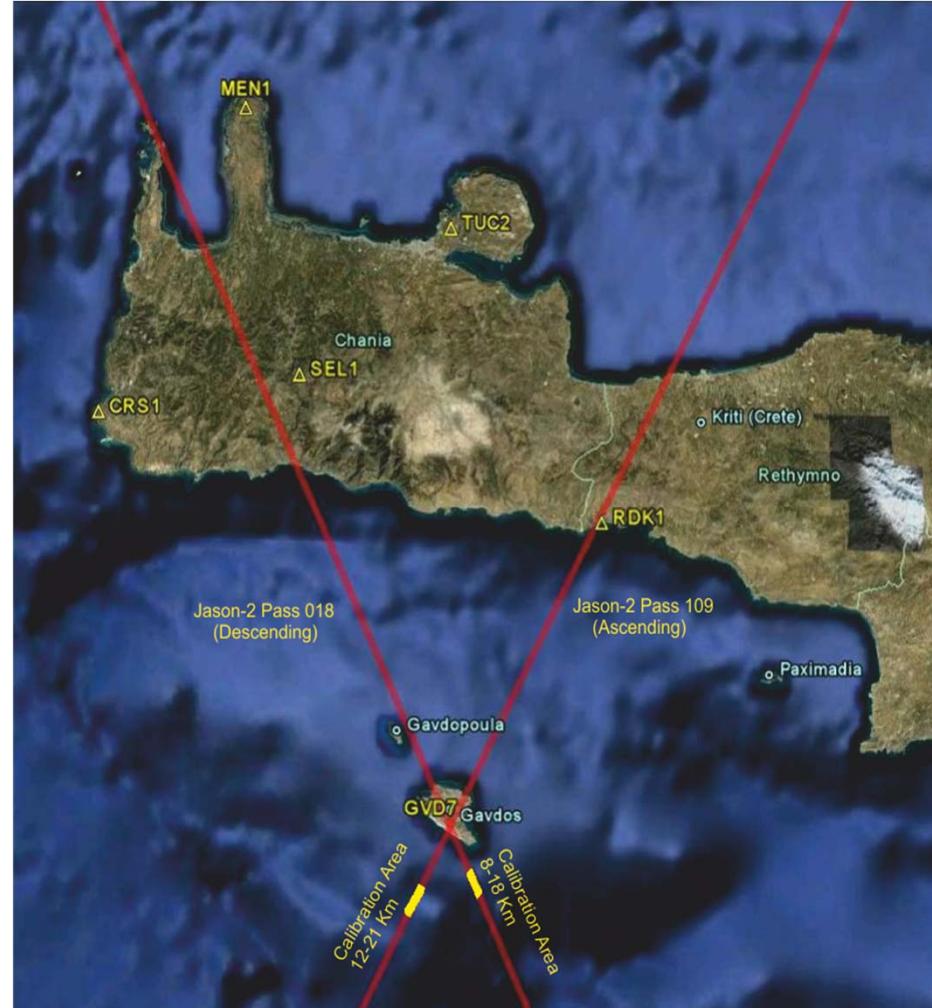
Tracks around Gavdos & Crete



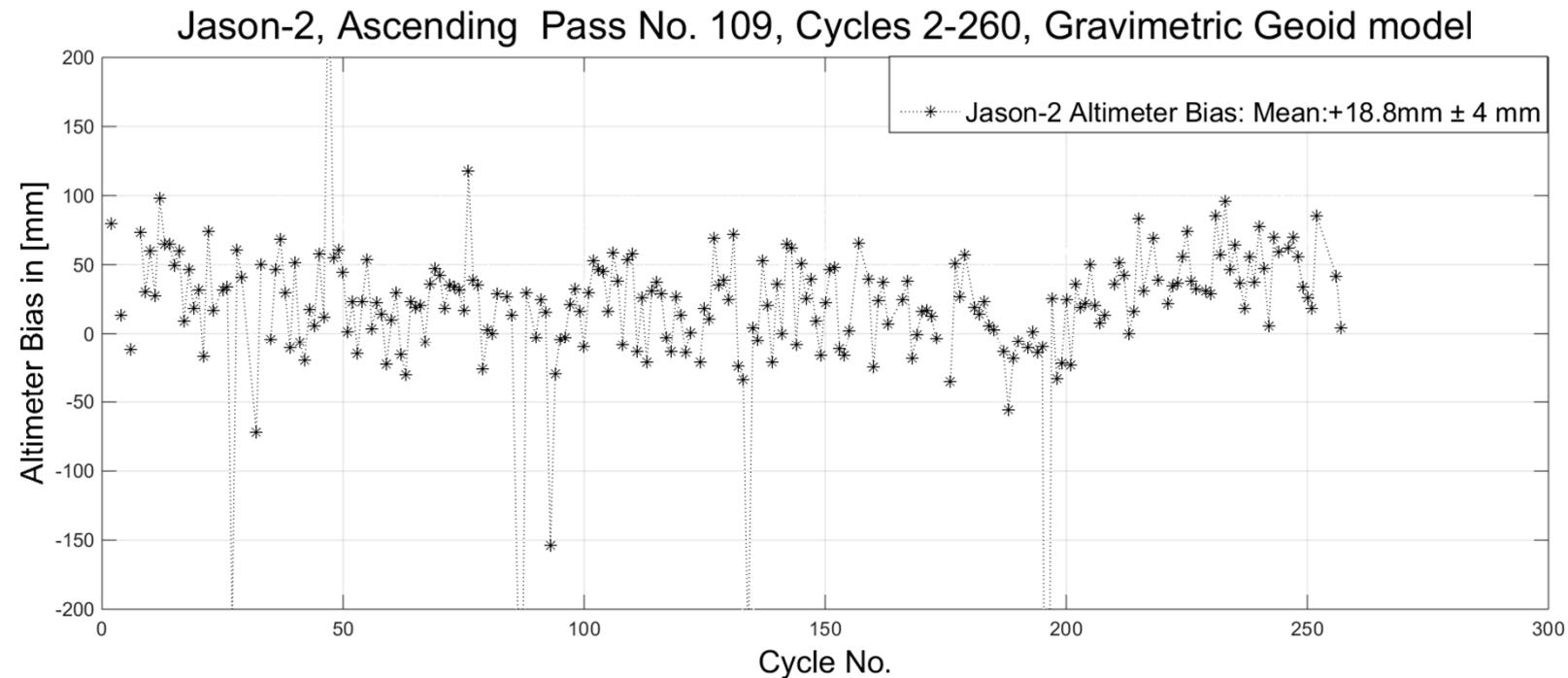
Gavdos and West Crete Facilities



Jason-2 Calibrating regions



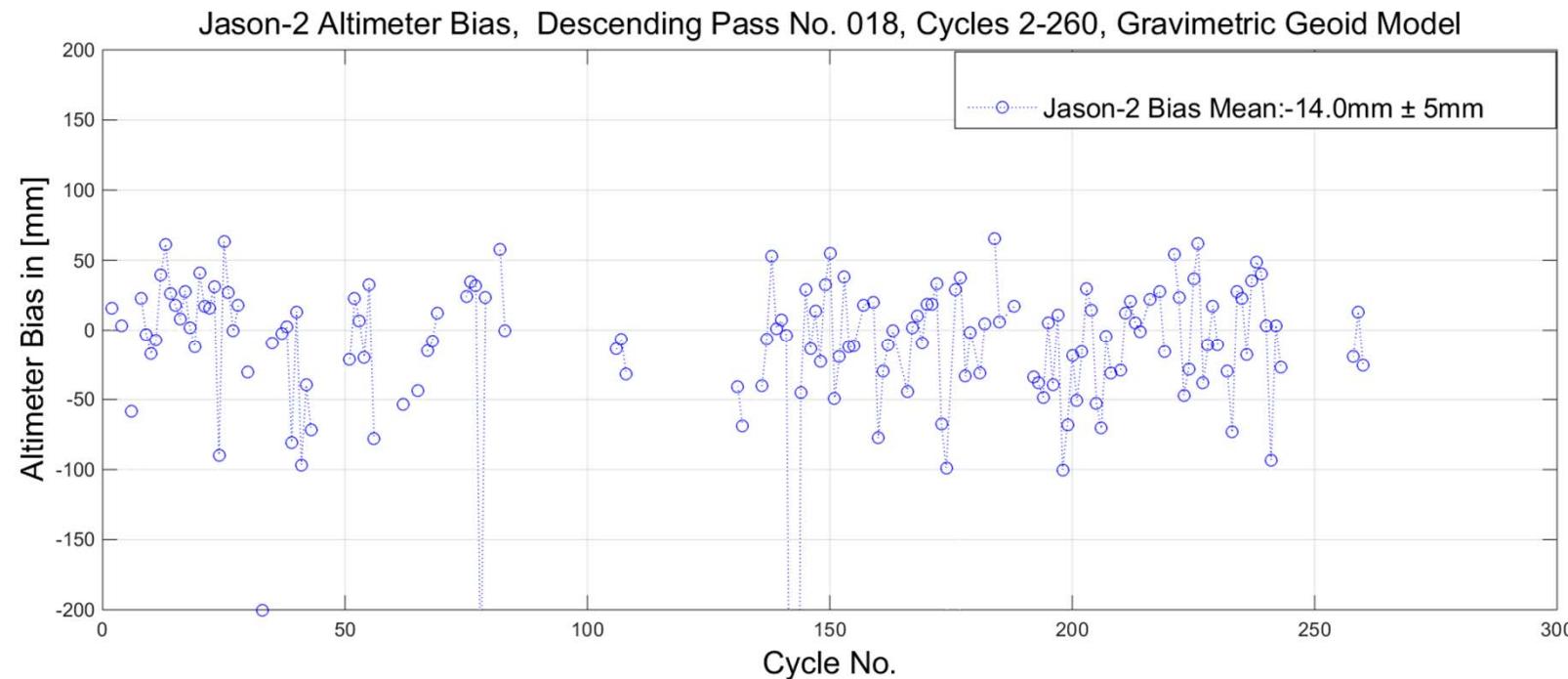
Jason-2 bias, Ascending pass No.109



- Ascending Pass No.109, GDR-D , Cycles: 2-260;
- Calibration region **14.5km-24 km**;
- **Bias= +18 mm ±4 mm**, using local gravimetric geoid model;



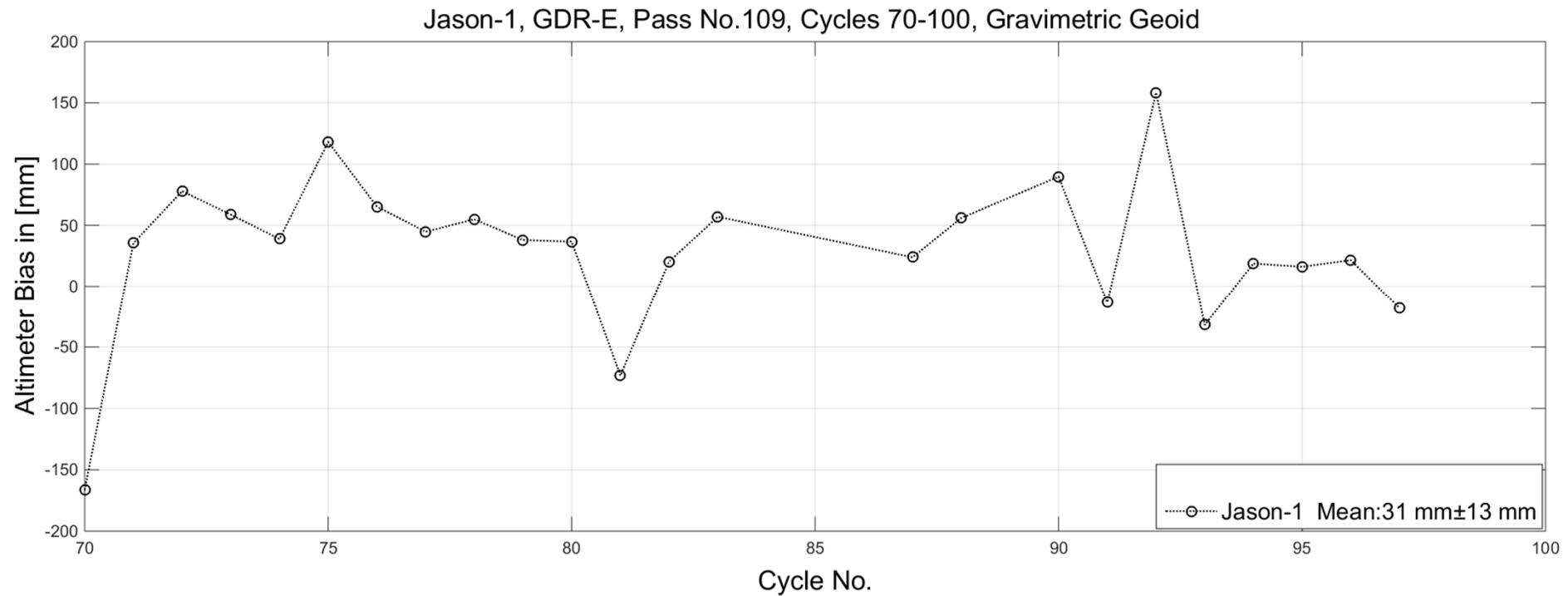
Jason-2 bias, Descending pass No.18



- Descending Pass No. 18, GDR-D , Cycles: 2-260;
- GOCE dynamic topography; Cal region **9km-20 km**;
- Bias= **-14 mm ±5 mm**



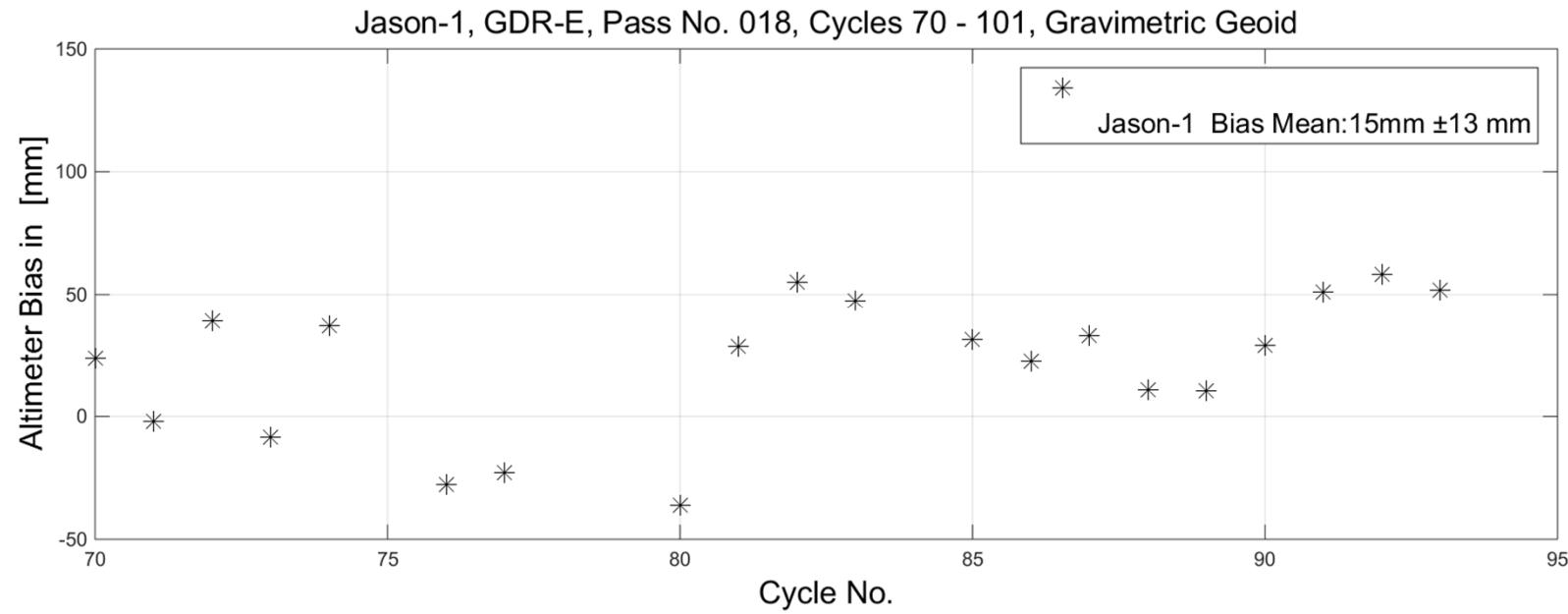
Jason-1, GDR-E, Ascending pass No.109



- Ascending Pass No.109, GDR-E , Cycles: 70-100;
- Calibration region **14.5km-24 km**;
- **Bias= +31 mm ±13 mm, using local gravimetric geoid model;**



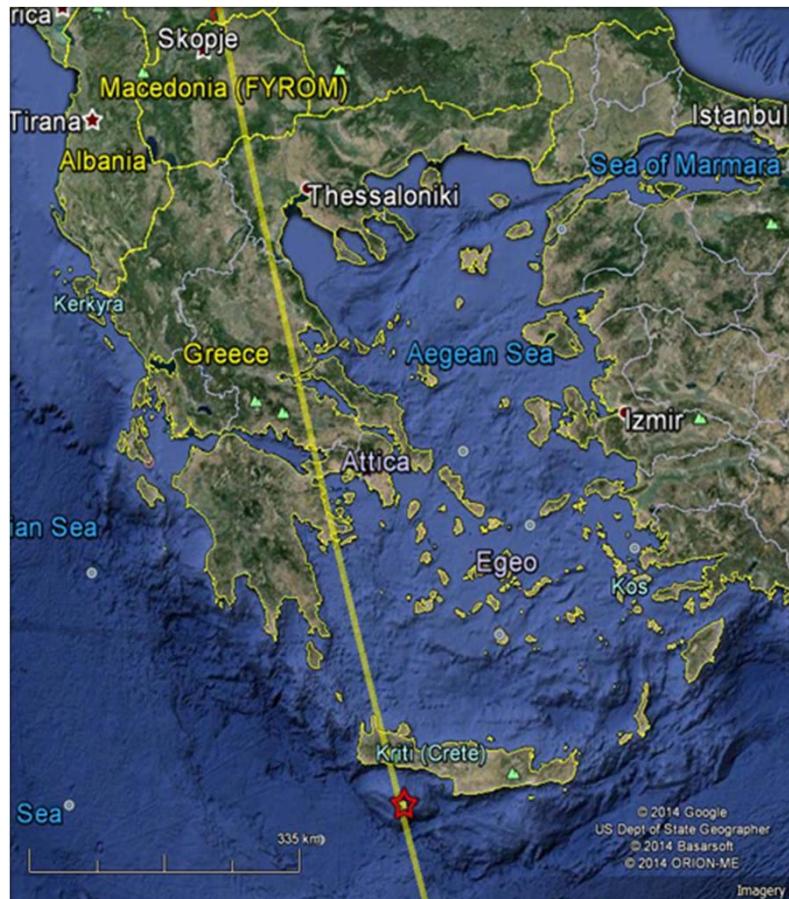
Jason-1, GDR-E, Descending pass No.18



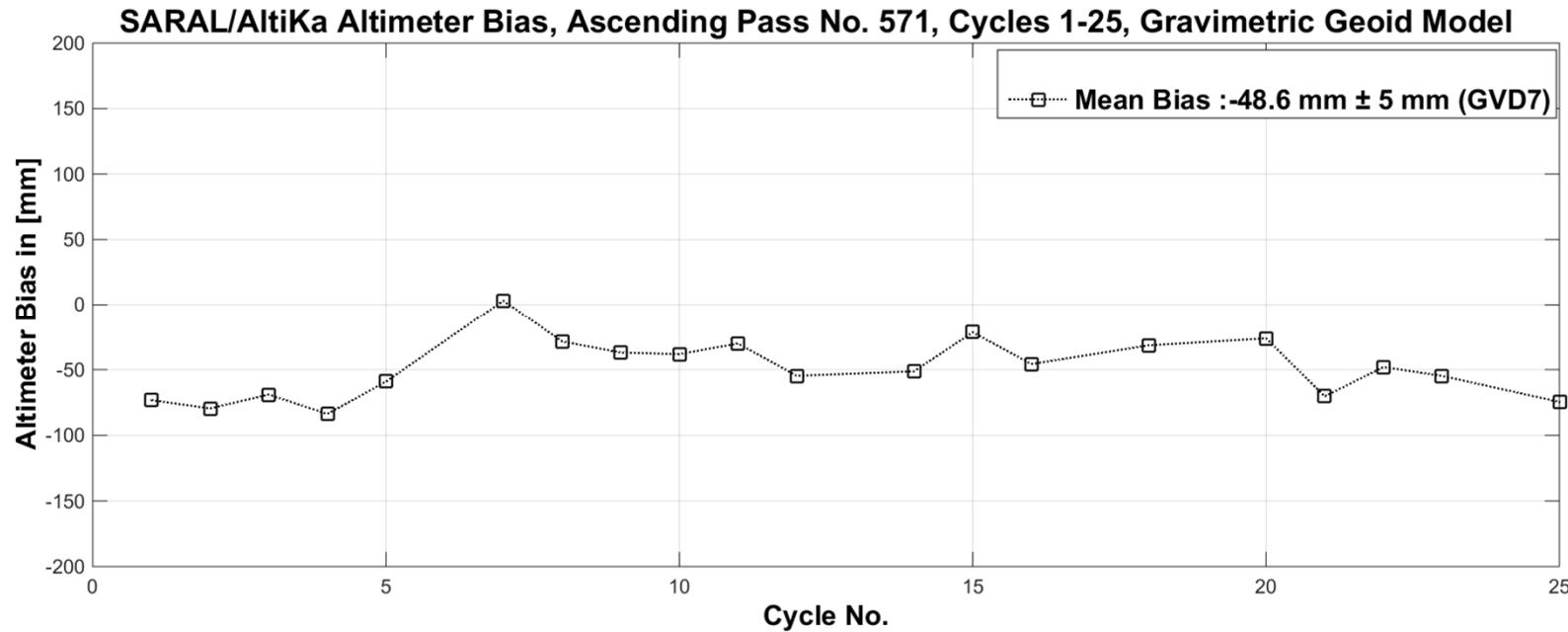
- Descending Pass No.18, GDR-E
- **Bias= +15 mm ±13 mm, using local gravimetric geoid model;**



SARAL/AltiKa Calibration



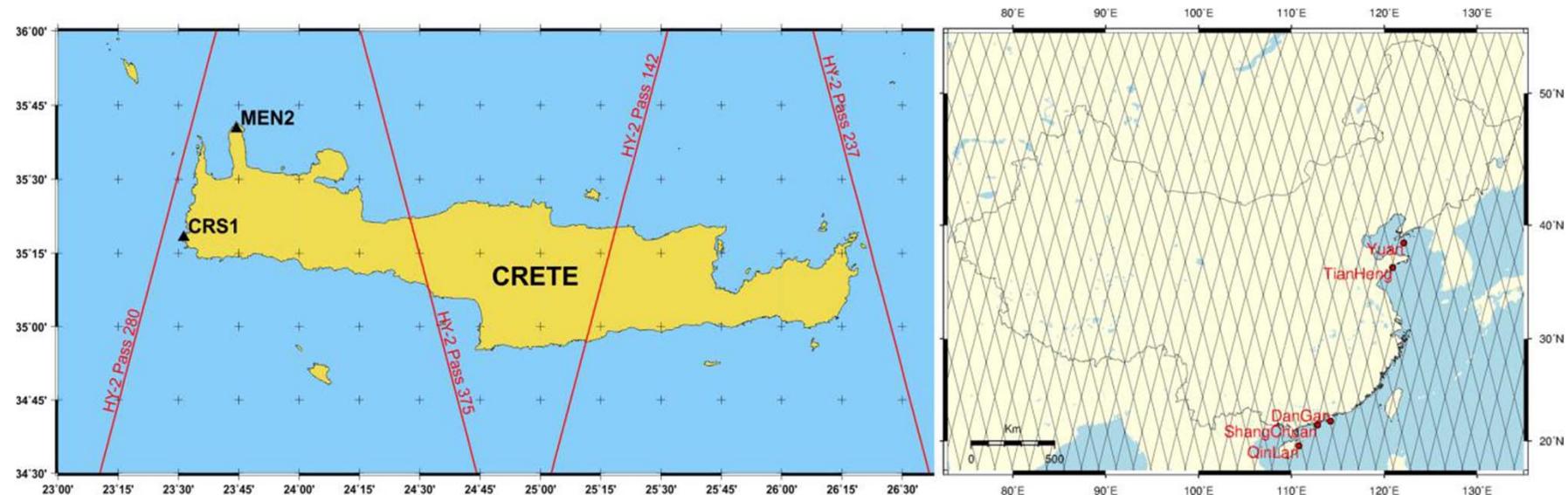
SARAL/AltiKa Altimeter Bias



- Ascending Pass No.571, GDR-T , Cycles: 1-25;
- **Bias= -48 mm ±5 mm, using local gravimetric geoid model;**

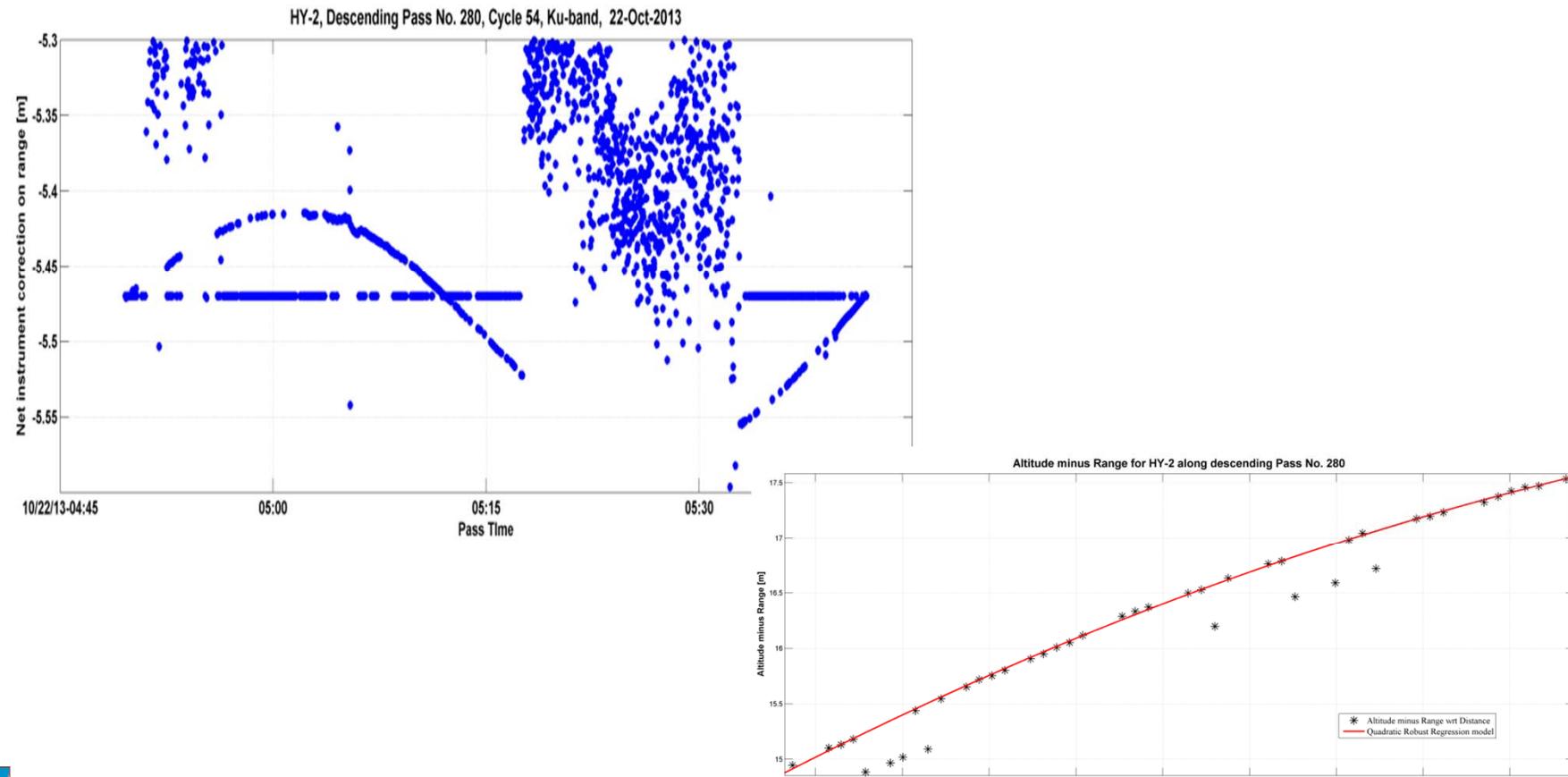


Chinese HY-2 calibration using CRS1



- ▶ 1-Hz Data , Time-tagging problems, Missing values in orbit.
- ▶ HY-2 Bias = +2.879 m (Preliminary in 2012, Pass No.280)

HY-2 problems with GDR



HY-2 Cal/Val sites

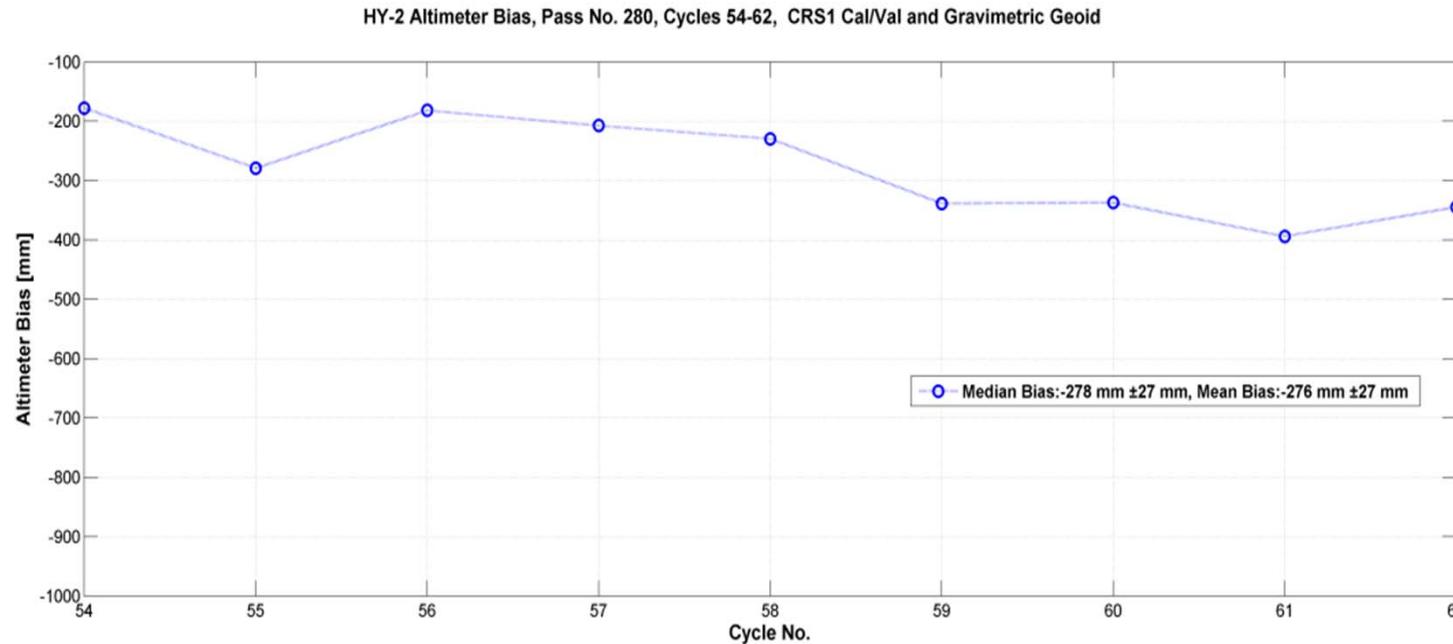


China



**Crete: CRS1 is the Cal/Val site for HY-2,
Only 10 km from PCA,**

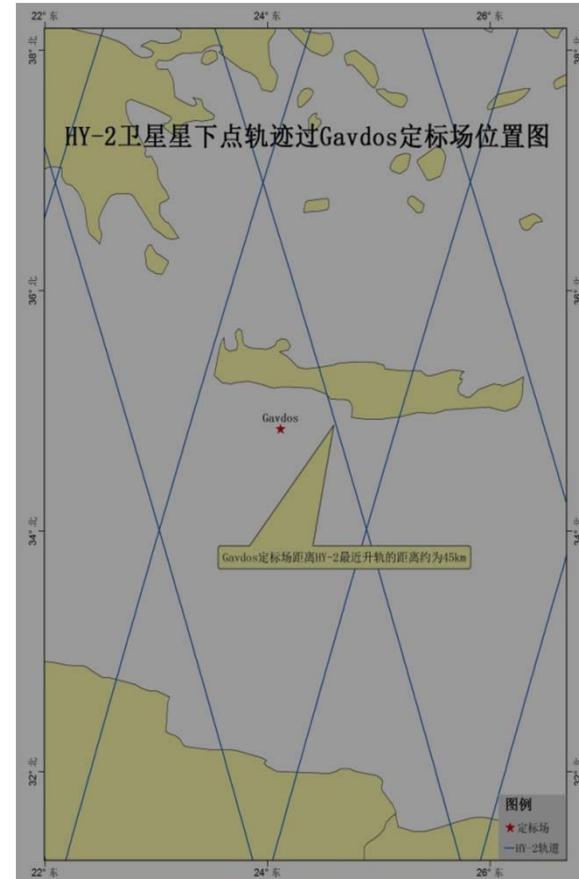
HY-2 altimeter bias with CRS1 in Crete



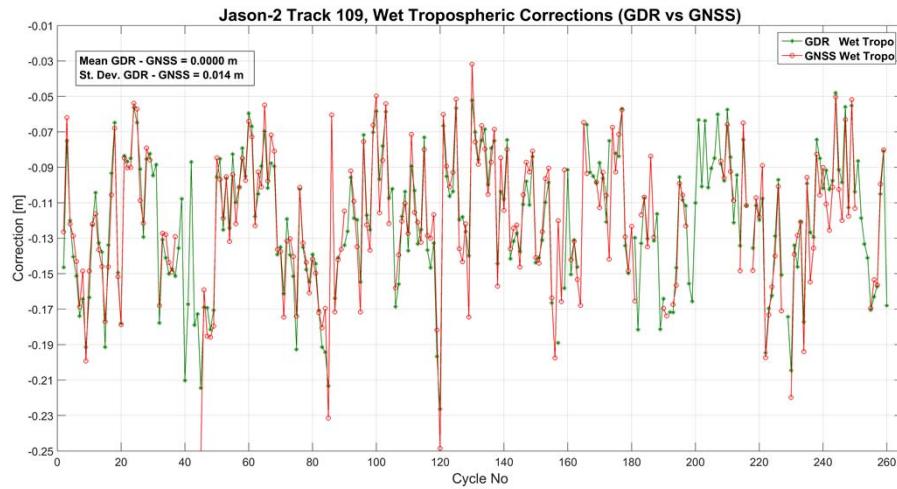
Descending Pass No. 280, Cycles 54-62 using S-GDR data at 20 Hz,
 Calibrating regions: **9-16 km (south), 10-18 km (north)**,
 Median bias= **-27.8 cm ±2.7 cm**, Mean = **-27.6 cm ±2.7cm**
B= -28.5 cm against Jason-2, Cycles 198, 204, 205, 207 (No. 018),
B= -23 cm against SARAL/AltiKa, 8 and 10 (No. 571)
 See [Advances in Space Research](#) paper.



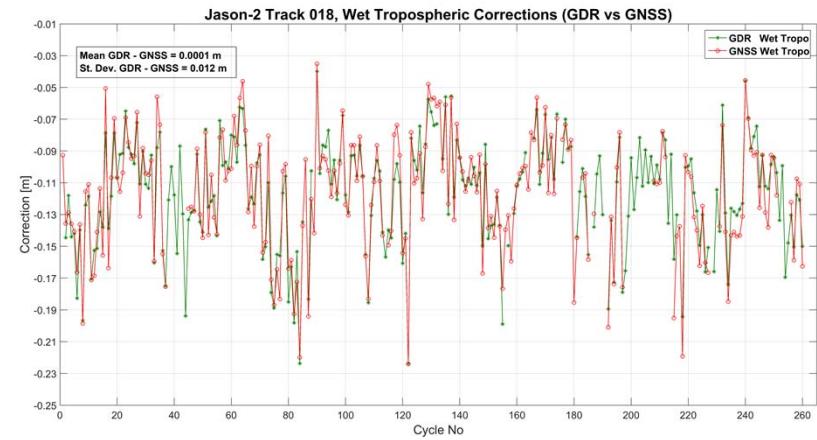
HY-2 ground tracks



Jason-2, Wet troposphere delays



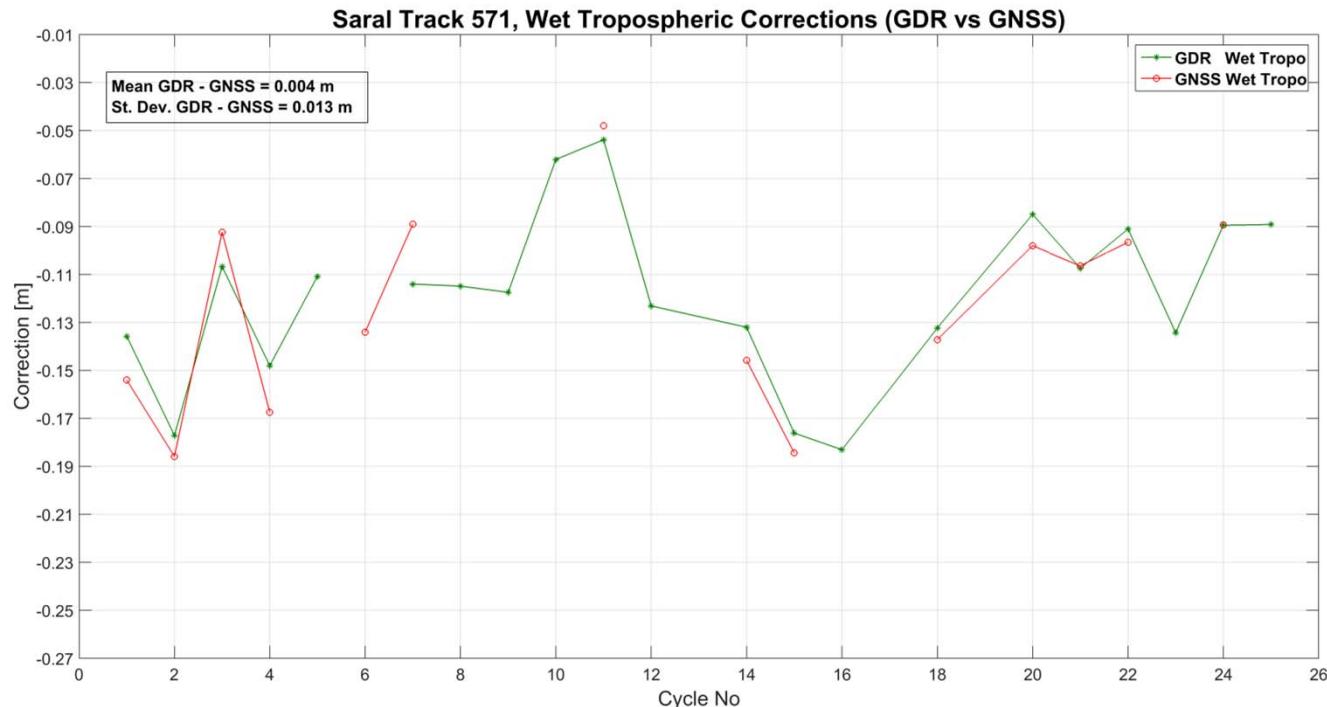
Pass No. 109, Ascending;
[AMR]-[GNSS wet tropo]= 0 mm ±1cm;



Pass No. 18, Descending;
[AMR]-[GNSS wet tropo]= +1mm ±1cm;

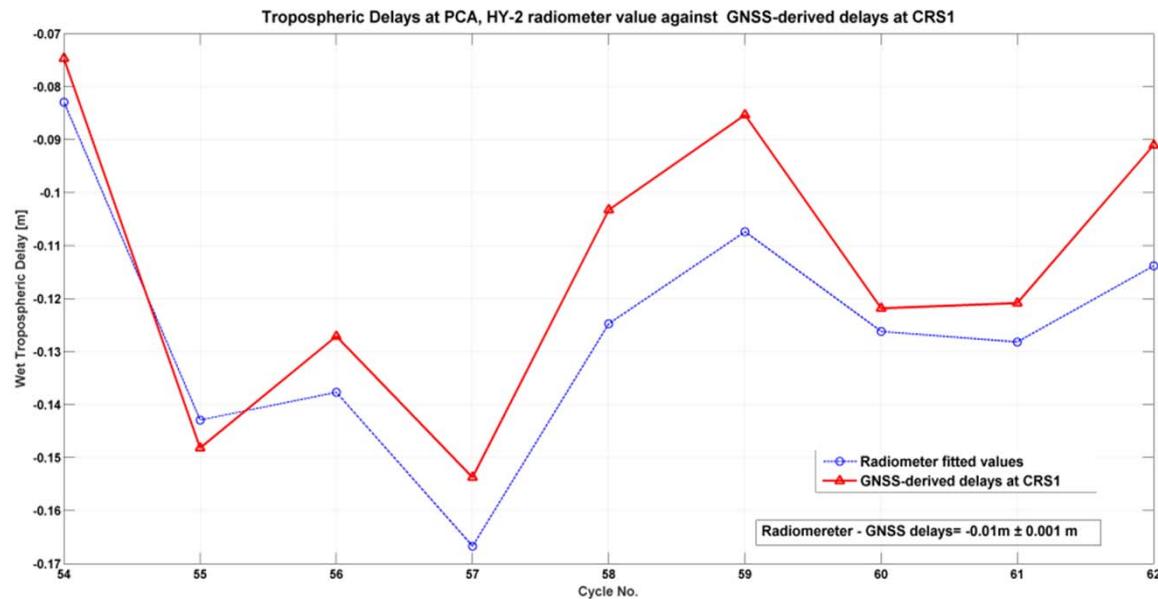


SARAL, Wet tropo delays



Pass No. 571, Ascending;
[AMR]-[GNSS wet tropo]= +4 mm ±13mm;
 8 cycles are missing values, instrument problems.

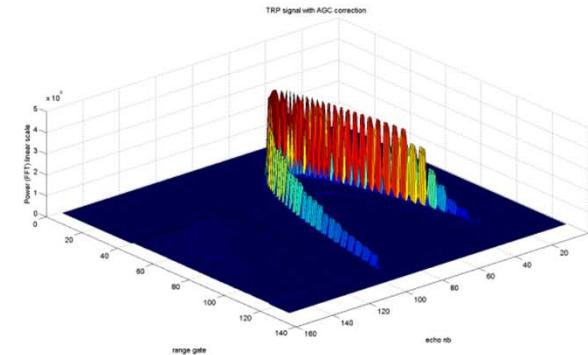
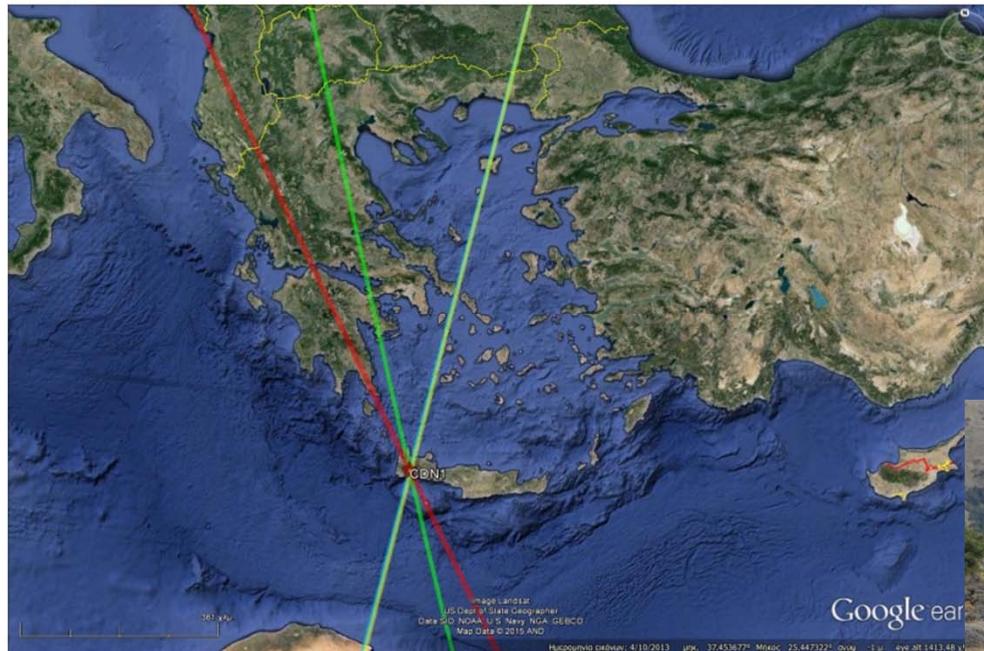
HY-2, Wet tropo delays



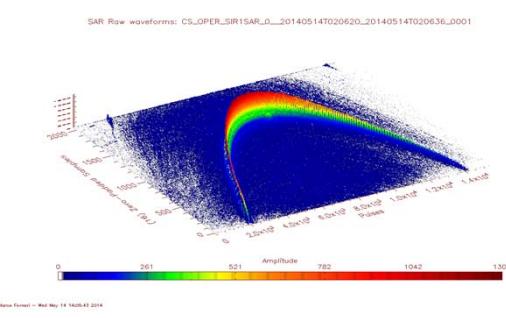
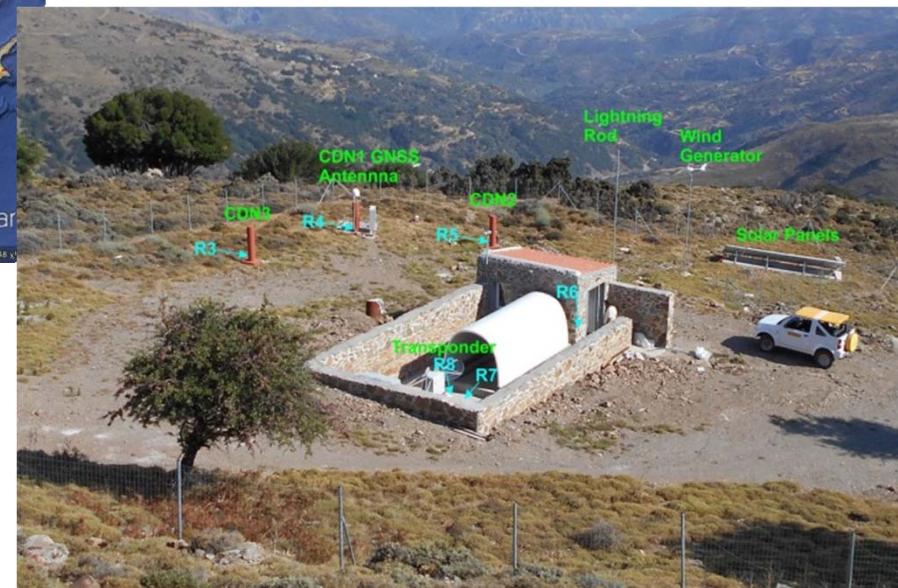
Pass No. 280, Descending;
 [AMR]-[GNSS wet tropo]= +10 mm \pm 1mm;



CDN1: An ESA Altimeter Calibration site



Jason-2: 2 Oct, 2015



CryoSat-2: 14 May 2014.

Conclusions

- **Jason-1** altimeter bias (GDR-E, Cycle=70-100, Gavdos):
 - $B(\text{No.}109) = +31 \text{ mm} \pm 13 \text{ mm}$, [Ascending];
 - **$B(\text{No. } 18) = +15 \text{ mm} \pm 4 \text{ mm}$, [Descending]**;
- **Jason-2** altimeter bias (GDR-D, Cycle=2-260, Gavdos):
 - $B(\text{No.}109) = +18 \text{ mm} \pm 4 \text{ mm}$, [Ascending];
 - **$B(\text{No. } 18) = -14 \text{ mm} \pm 4 \text{ mm}$, [Descending]; JA2=**
- **SARAL/AltiKa** altimeter bias (GDR-T, Cycle=1-25, Gavdos):
 - $B(\text{No.}571) = -48 \text{ mm} \pm 5 \text{ mm}$, [Ascending];
- **HY-2** altimeter bias (GDR-S, Cycle=54-62, Crete):
 - $B(\text{No.}280) = -278 \text{ mm} \pm 30 \text{ mm}$, [Descending];
- Wet Troposphere, radiometer against GNSS:
 - Jason-2 **almost zero**,
 - SARAL/AltiKa **+4mm**,
 - HY-2 **+10mm**.



Altimeter Bias Summaries

Satellite	Ascending	Descending	Average	Cycles
Jason-1	+31 mm	+15 mm	+23mm	70-100
Jason-2	+18 mm	-14 mm	+2 mm	2-260
SARAL/AltiKa	-48 mm		-48 mm	1-25
HY-2		+278 mm	+287 mm	54-62



CDN1 with transponder operational

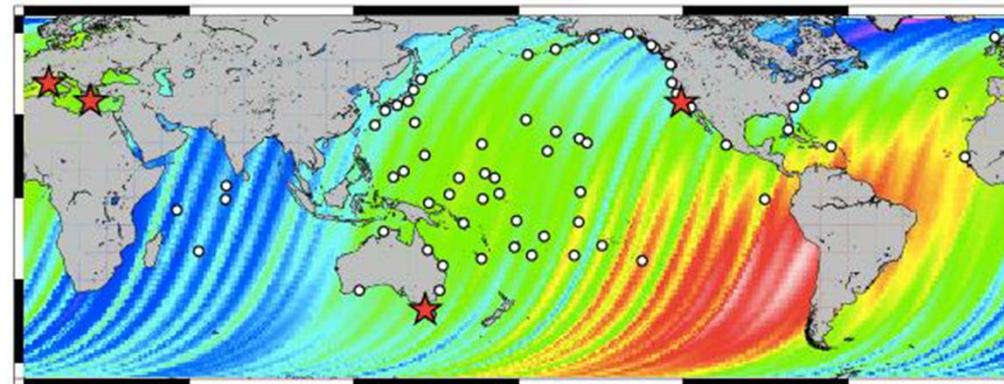
- An ESA permanent site, @ 1100 m elevation, West Crete
- to support mainly the Sentinel-3 Commissioning phase,
- Jason-2, Jason-3, Jason-CS, Cryosat-2, SARAL/AltiKa, etc.



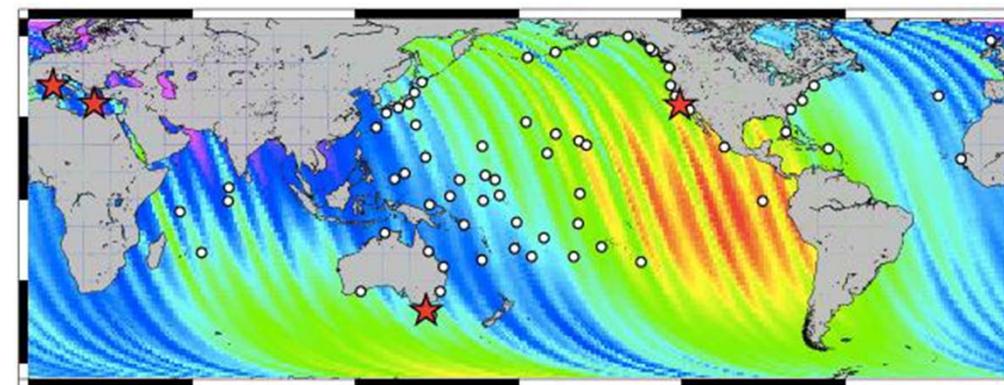
EU and ESA/ESTEC supported.

Ascending and Descending orbits

[OSTST Report 2013]



Ascending



Descending

