Estimation of the Altimetry Bias for the Jason satellites using Gavdos

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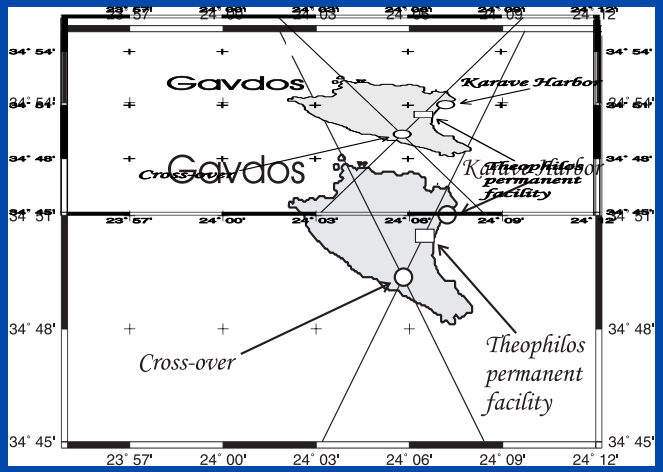
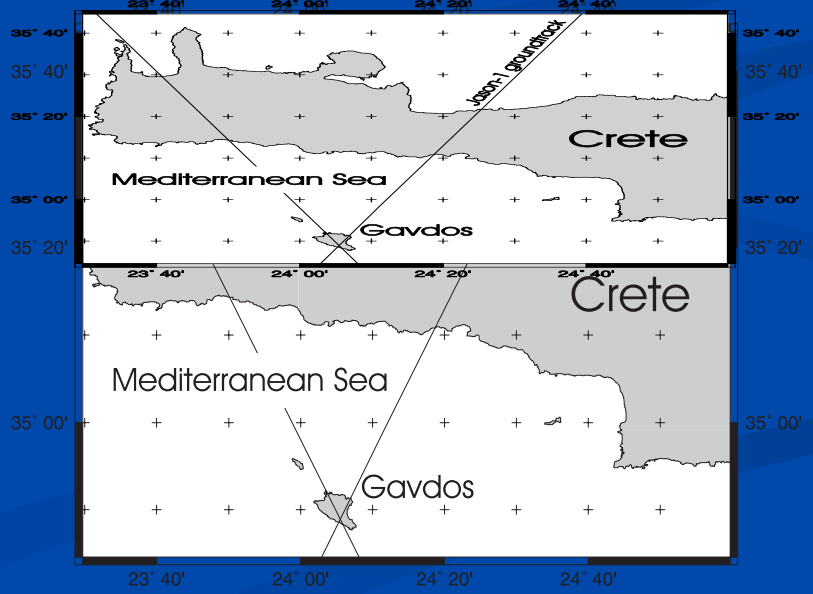
Laboratory of Geodesy and Geomatics Engineering

GeoMatLab

Ground tracks of Jason





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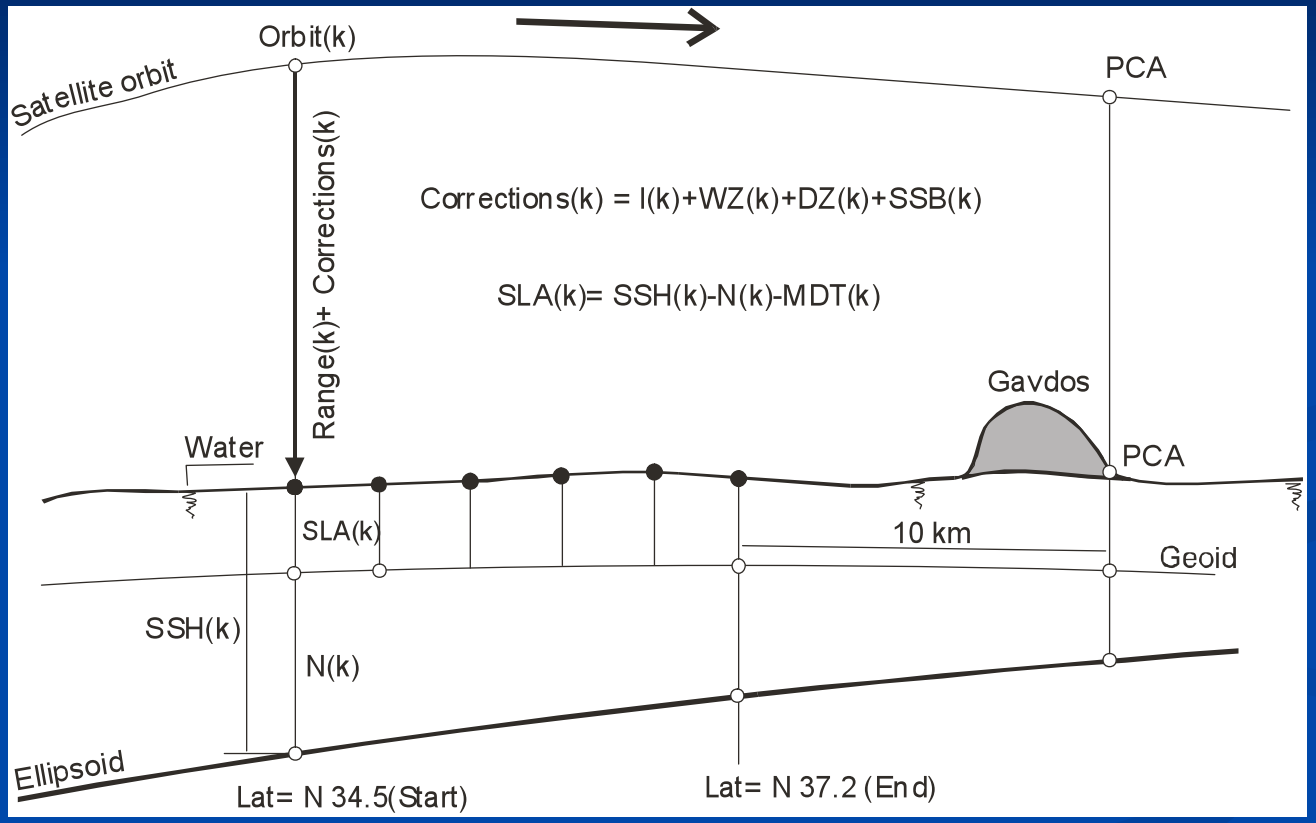
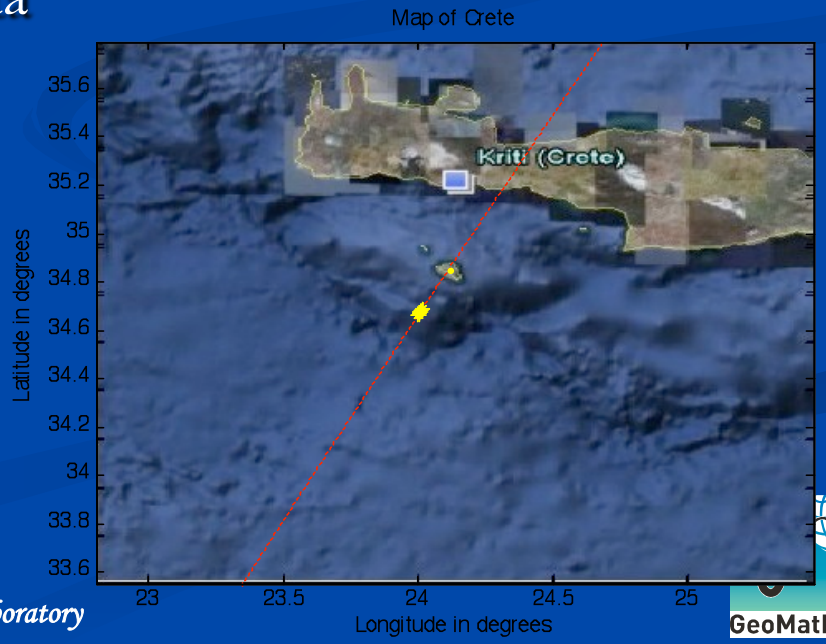
Principle of operation Pass 109



TUC-ALIBRIT Tool

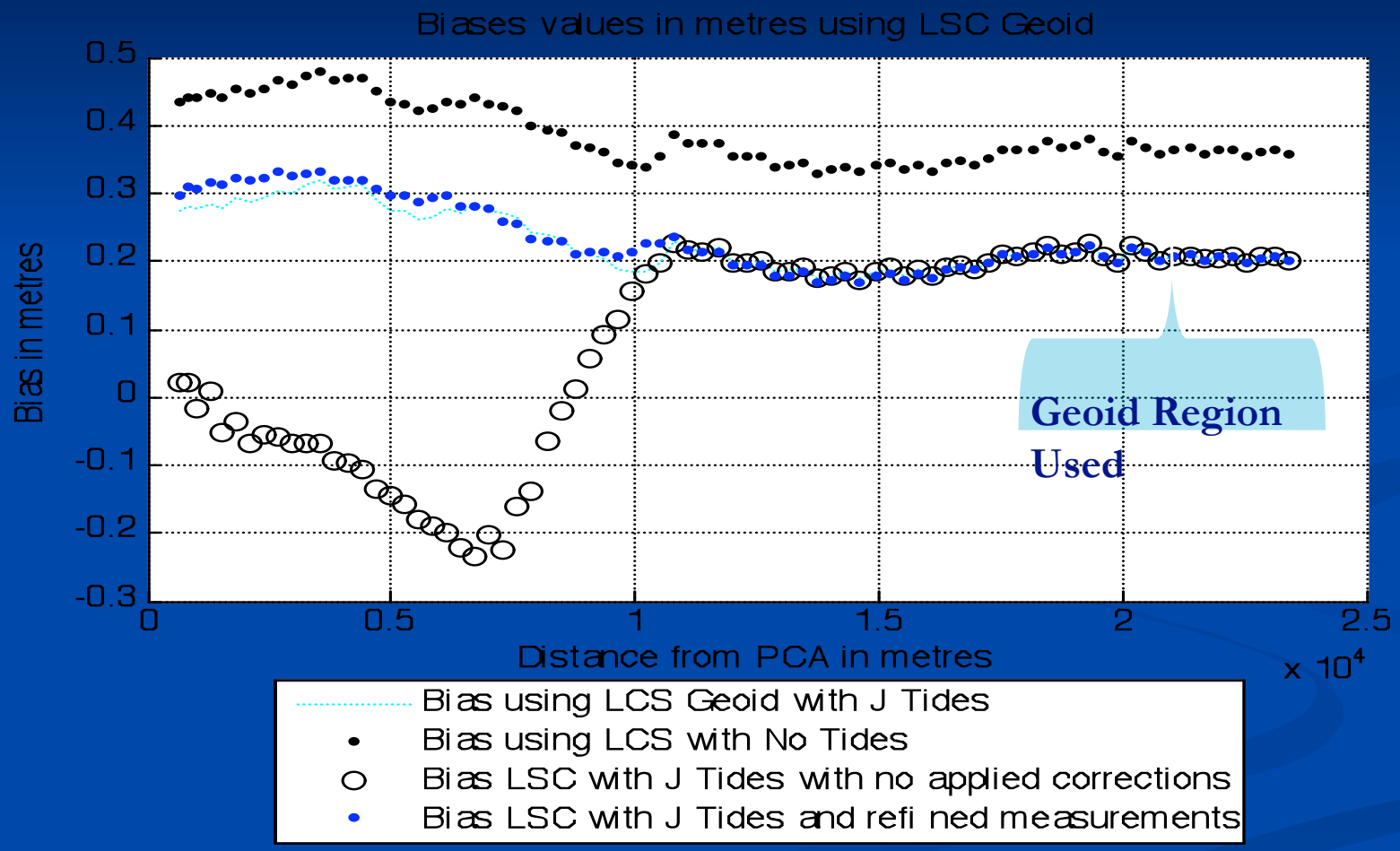
- Currently based on Matlab
- Capability of using various different data processing strategies
- Completely automated process (Requires only the choice of (I)GDR, TG data and PCA point info)
- Integrated tool
- Built-in routines to perform statistical analysis of data with capability to 'improve' smoothing/filtering of data
- Plots, stores, displays
- Logging errors or 'inadequate' data
- Alerts the user for any 'strange' data



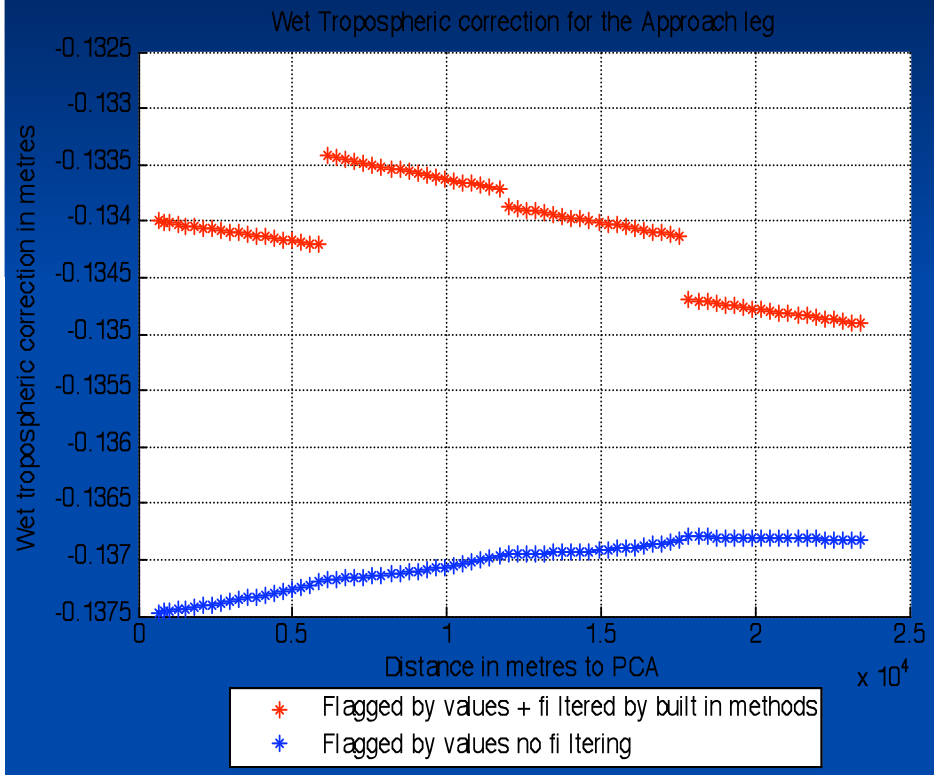
Towards a Homogeneous approach: Harvest – Corsica - Gavdos

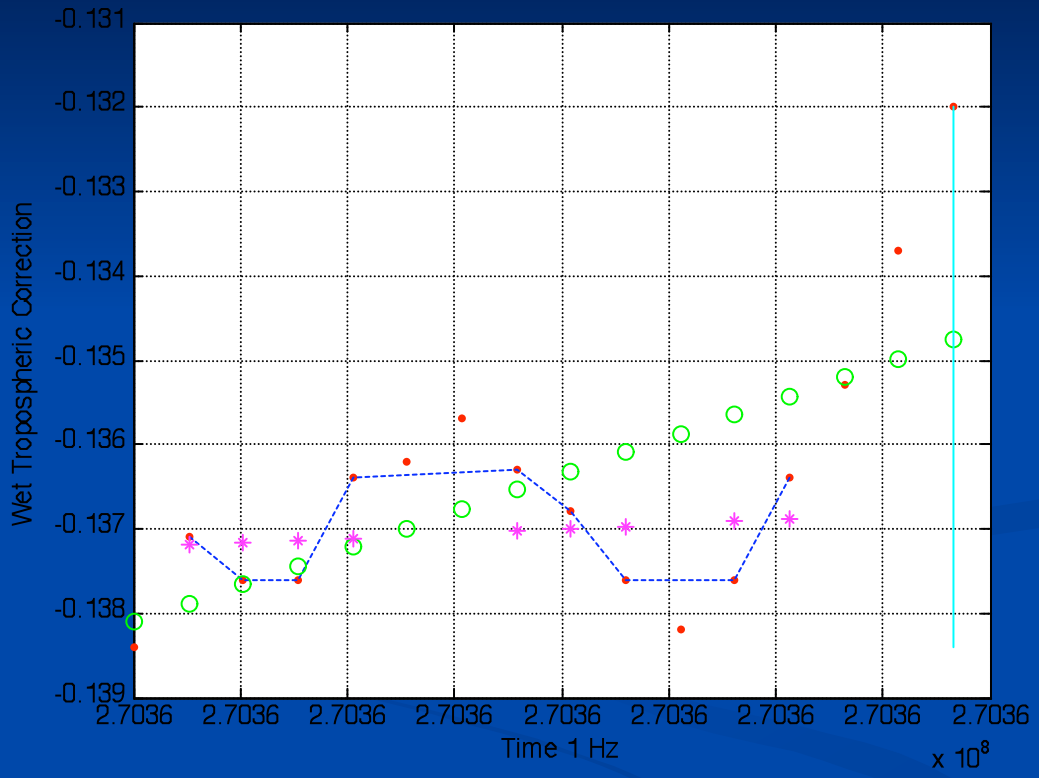
- I(k): **Mean** over -21 sec to -1 sec around the TCA.
- DZ(k): **Linear fit** over -5 to +2s around TCA.
- WZ(k):
  - Linear fit over -10 s to -5s of TCA (avoid land contamination ~30km),
  - Last fit value is used for all over-flight data.
- SSB(k): Cubic fit over -10s to -1 s of TCA used for all over-flight data till TCA-1s.
- Geophysical Corrections: GDR corrections for Ocean loading, solid/ permanent/pole tides, etc.
- Tide gauge: liner fit over 30 min centered on TCA (6-min sampling).
- TUC-ALIBRIT tool capable to use additional different methodology

Geoid Issues Addressed

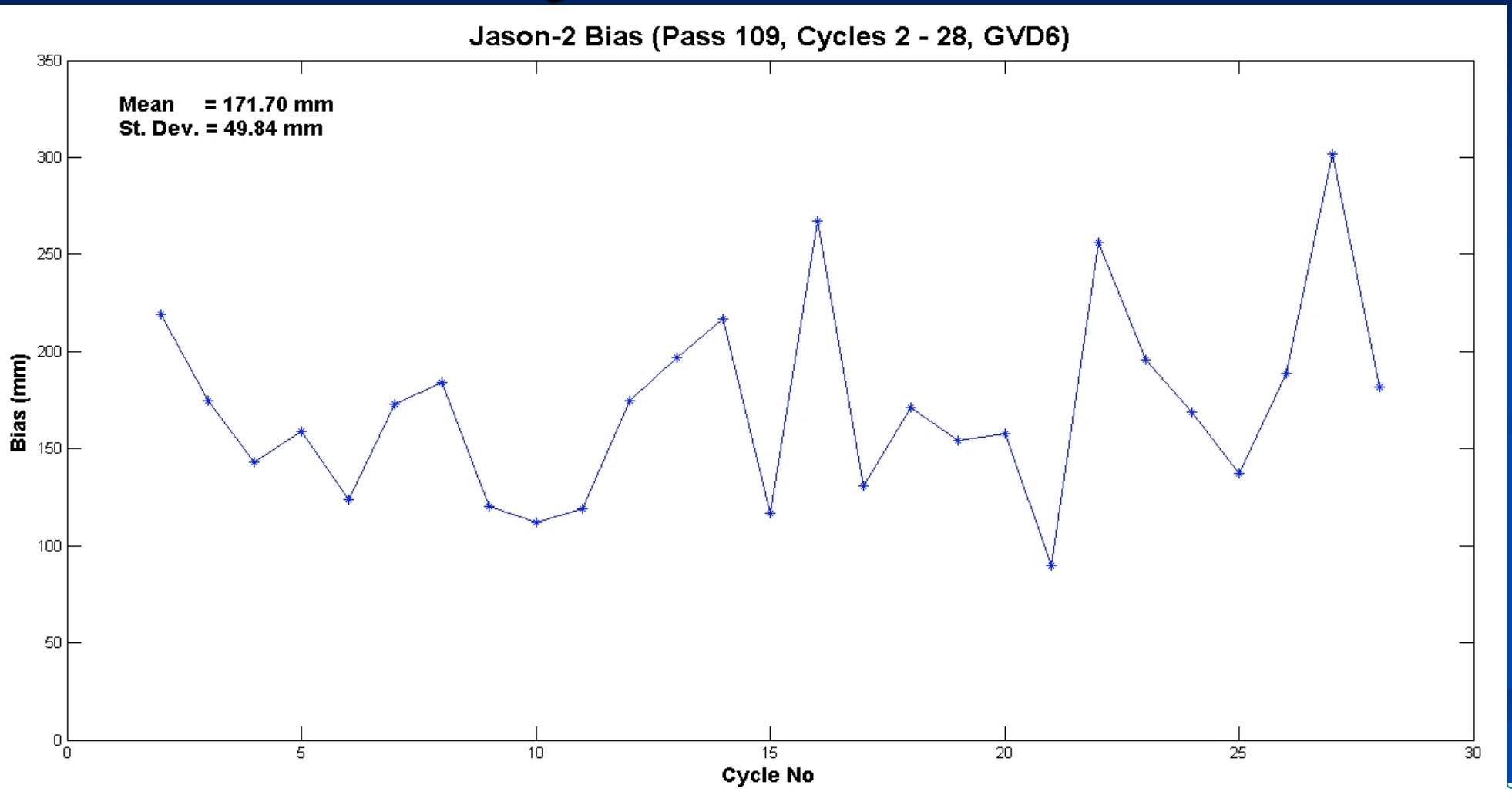


Effect of filtering

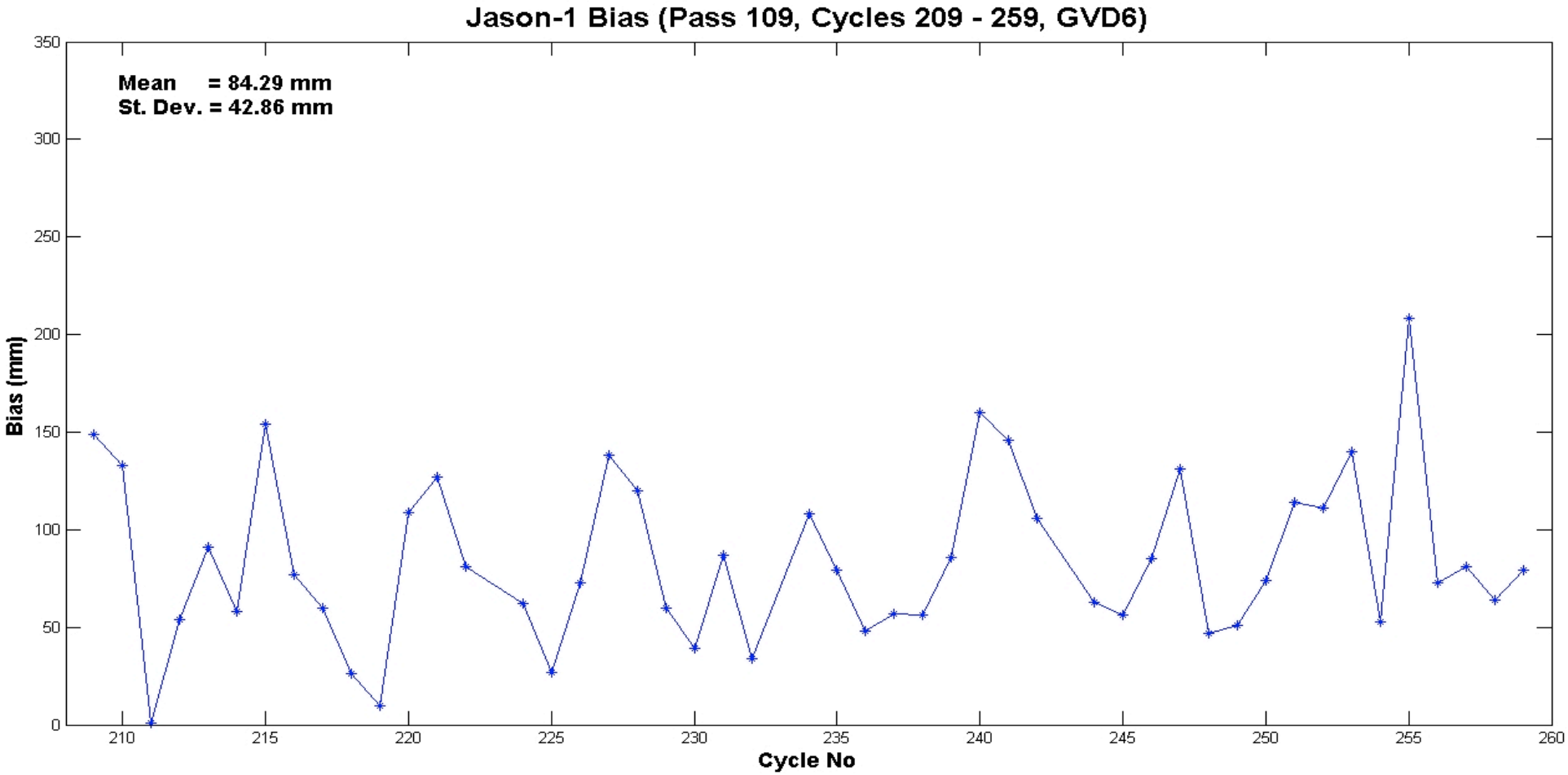




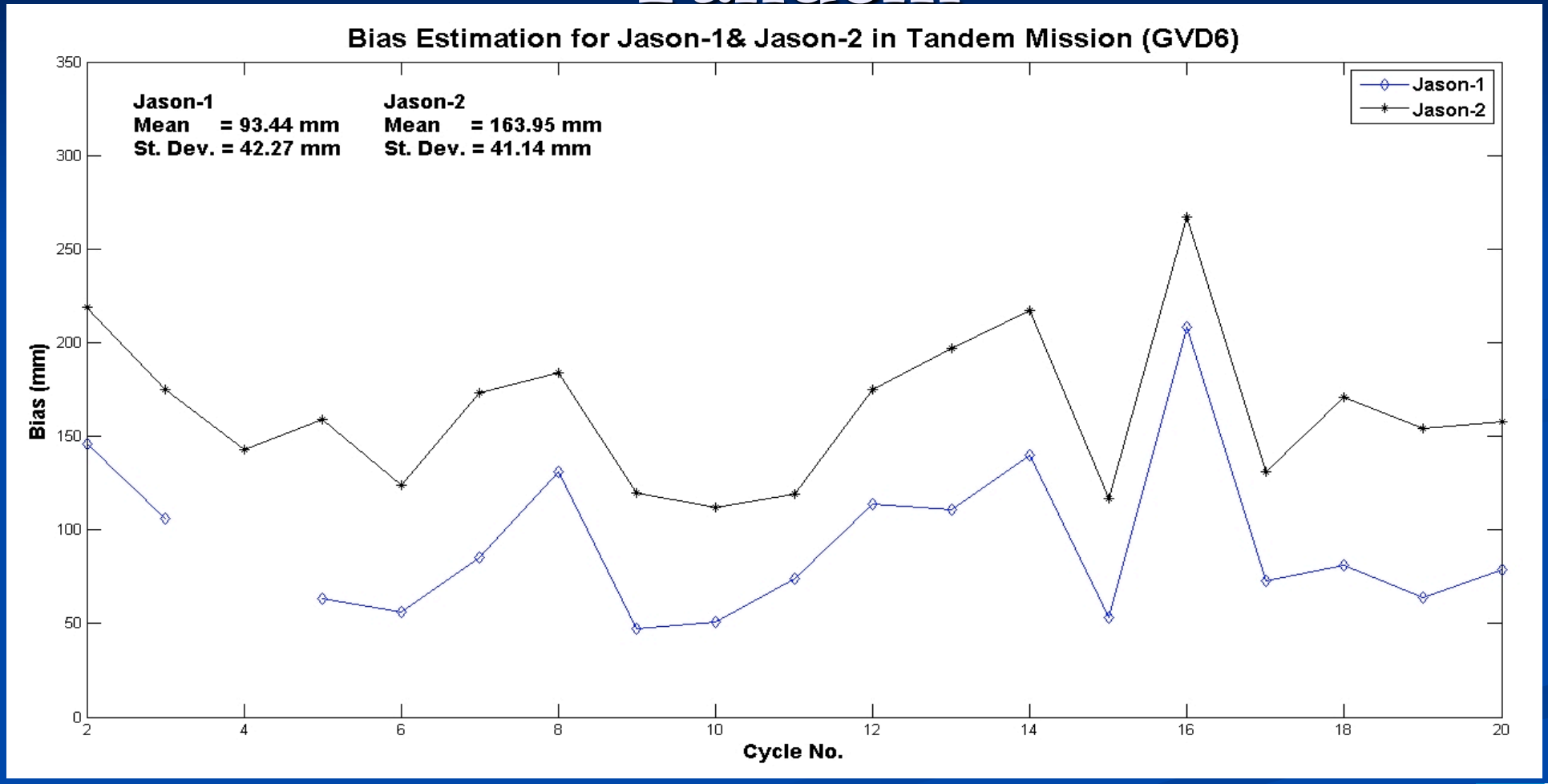
Jason-2 Bias


Jason-2 Bias (Pass 109, Cycles 2 - 28, GVD6)
Mean = 171.70 mm
St. Dev. = 49.84 mm
Bias (mm)
Cycle No
0
50
100
150
200
250
300
350
0
5
10
15
20
25
30

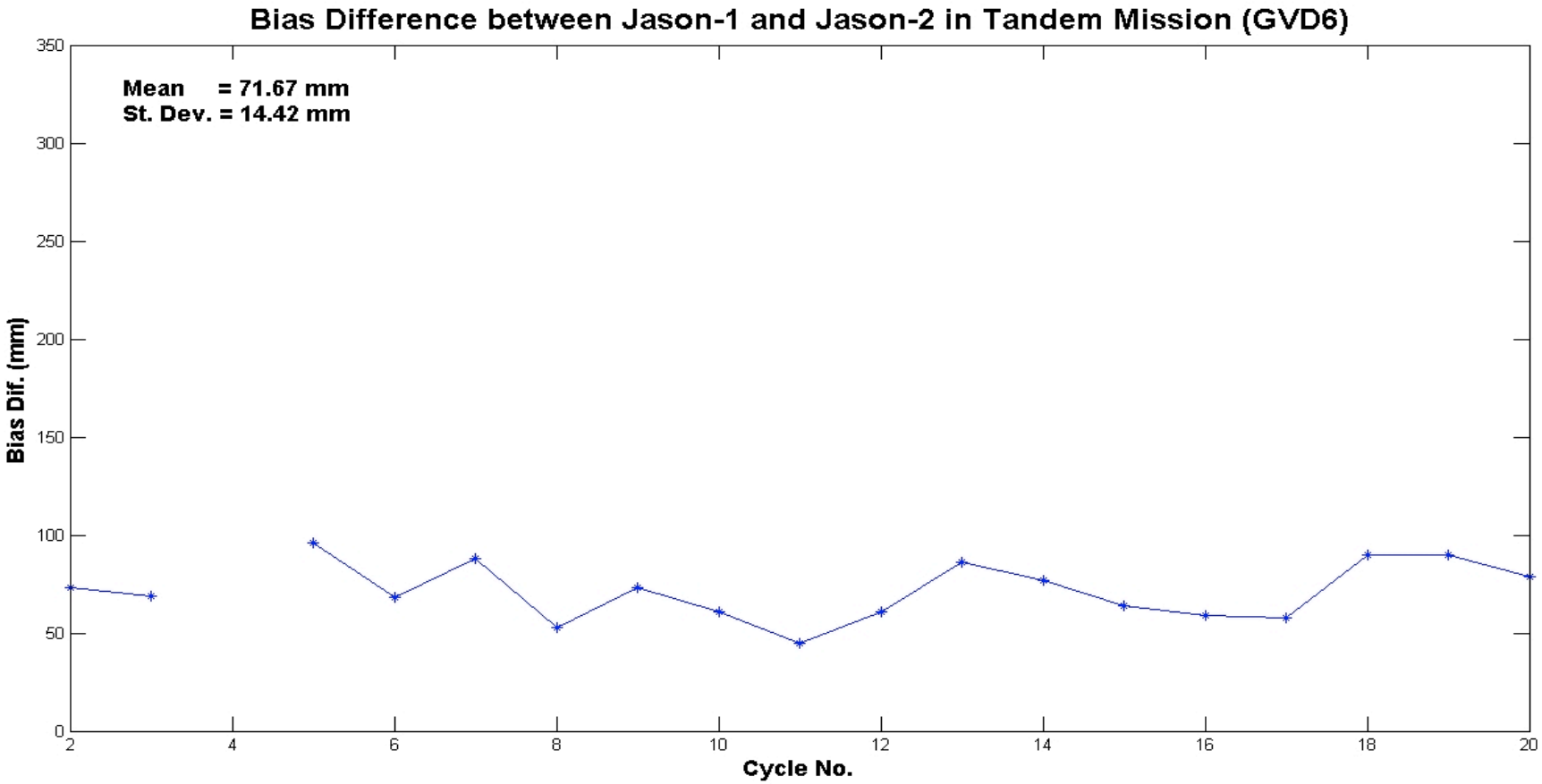
Jason-1 Bias


Jason-1 Bias (Pass 109, Cycles 209 - 259, GVD6)
Mean = 84.29 mm
St. Dev. = 42.86 mm
Bias (mm)
Cycle No
0
50
100
150
200
250
300
350
210
215
220
225
230
235
240
245
250
255
260

Jason-2 Bias Vs Jason-1 Bias Tandem



Jason-2 Bias minus Jason-1 Bias Tandem



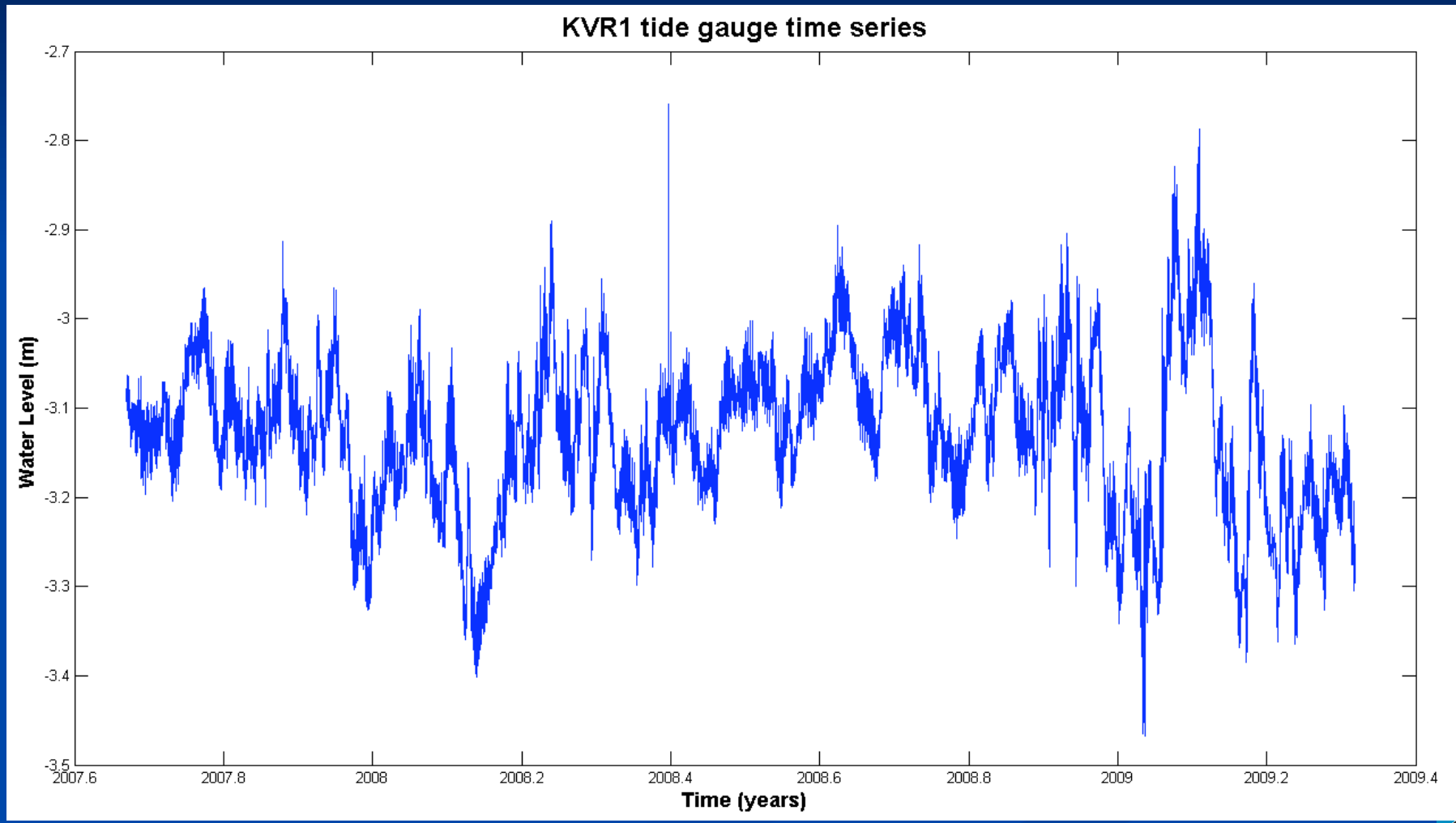
Conclusions

- The absolute bias of the Jason-2 altimeter between cycles No: 2-29 estimated B2 = 17.17 ±0.9 cm (20-Hz data).
- For Jason-1 Cycles 209-259 : B1= 8.4 ± 0.5 cm (20-Hz data).
- For Tandem (Cycles:2-20) Jason-2 Bias=16.4 ± 0.9 cm , Jason-1 Bias=9.34 ± 0.8 cm, difference= 7.16 ± 0.3 cm
- Gavdos is enhanced by another site RDK1 on the ground track (No.109) and in south Crete.
- Field surveys are being planned using survey boat, an ultra-sound height measuring device, a GPS and along ground tracks to improve Geoid.

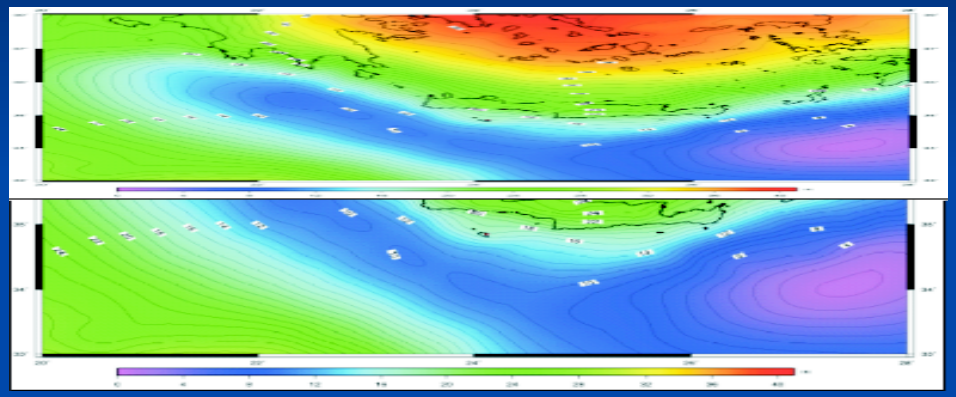
Future plans

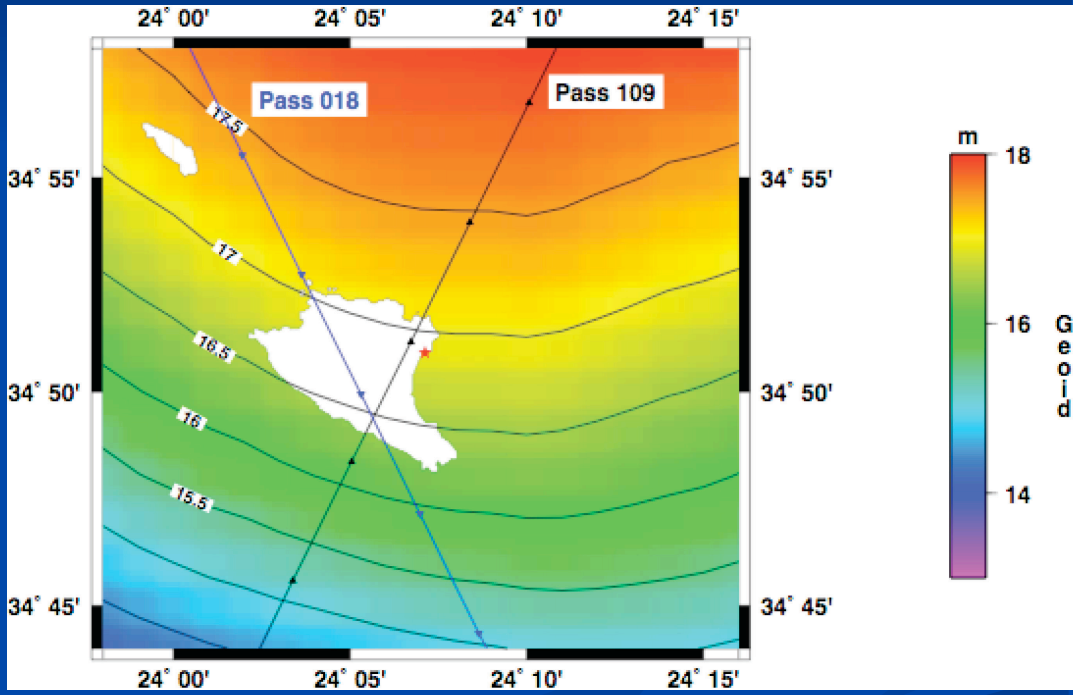
- Continue monitoring satellite altimetry for calibration/ Validation using TUC-Alibrit tool.
- Use Pass 18 South (and maybe North)
- Enhance TUC-Alibrit tool
- Transmit reliably, securely and immediately Cal/Val data.
- Develop procedures for automatic analysis and archiving of data.
- Extent capabilities to Cryosat-2, Sentinel-3, etc.

Tide Gauge Time series



Geoid map




24° 00'
24° 05'
24° 10'
24° 15'
34° 55'
34° 50'
34° 45'
Pass 018
Pass 109
17.5
17
16.5
16
15.5
m
18
16
14
Geoid

Geoid differences discovered