

Tide gauge and intersatellite calibrations of Jason-1 and Jason-2 geophysical data records

Eric Leuliette

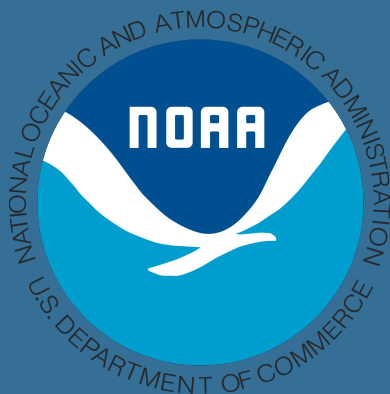
NOAA/Laboratory for Satellite Altimetry

Remko Scharroo

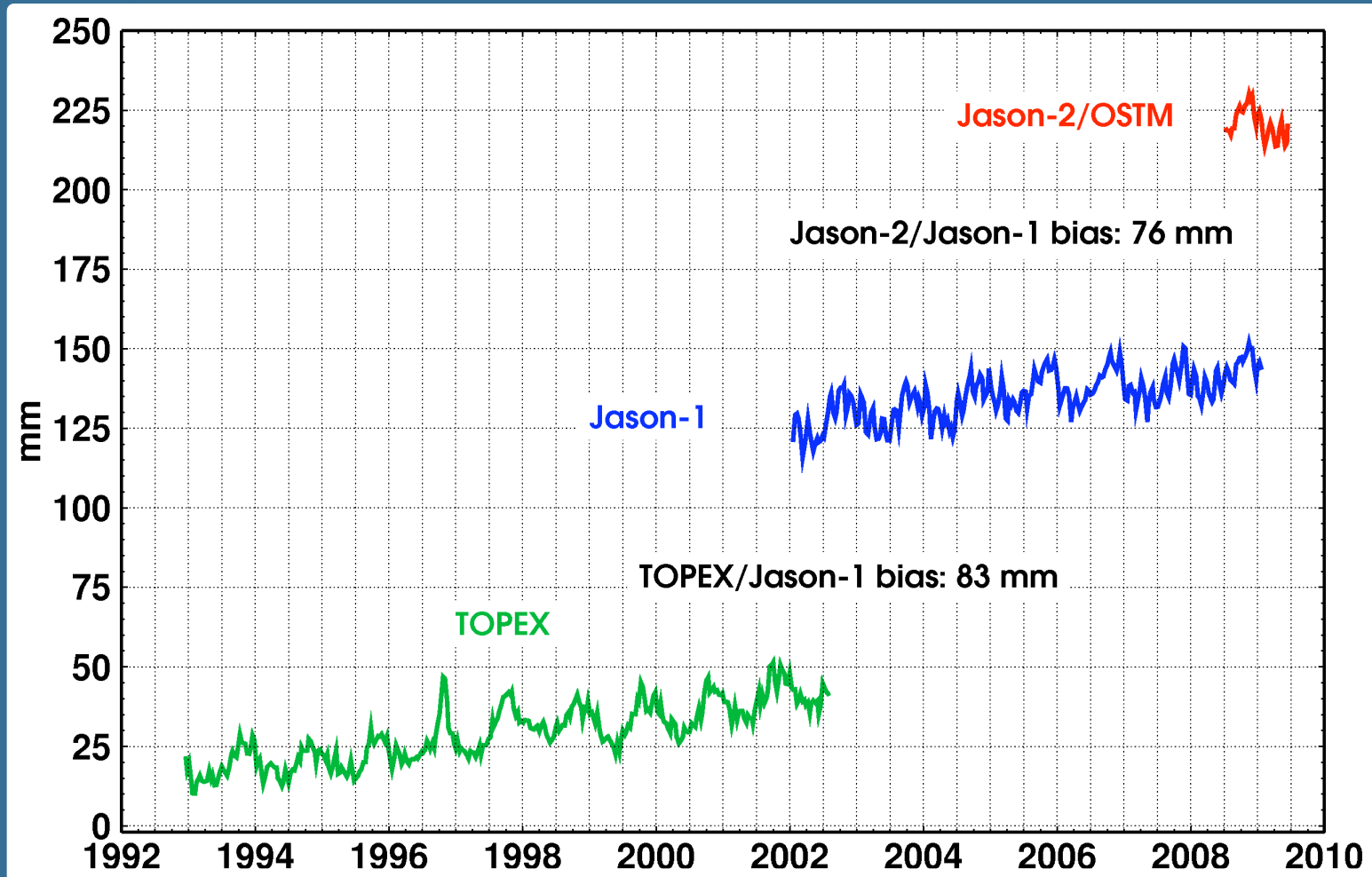
Altimetrics LLC

Gary Mitchum

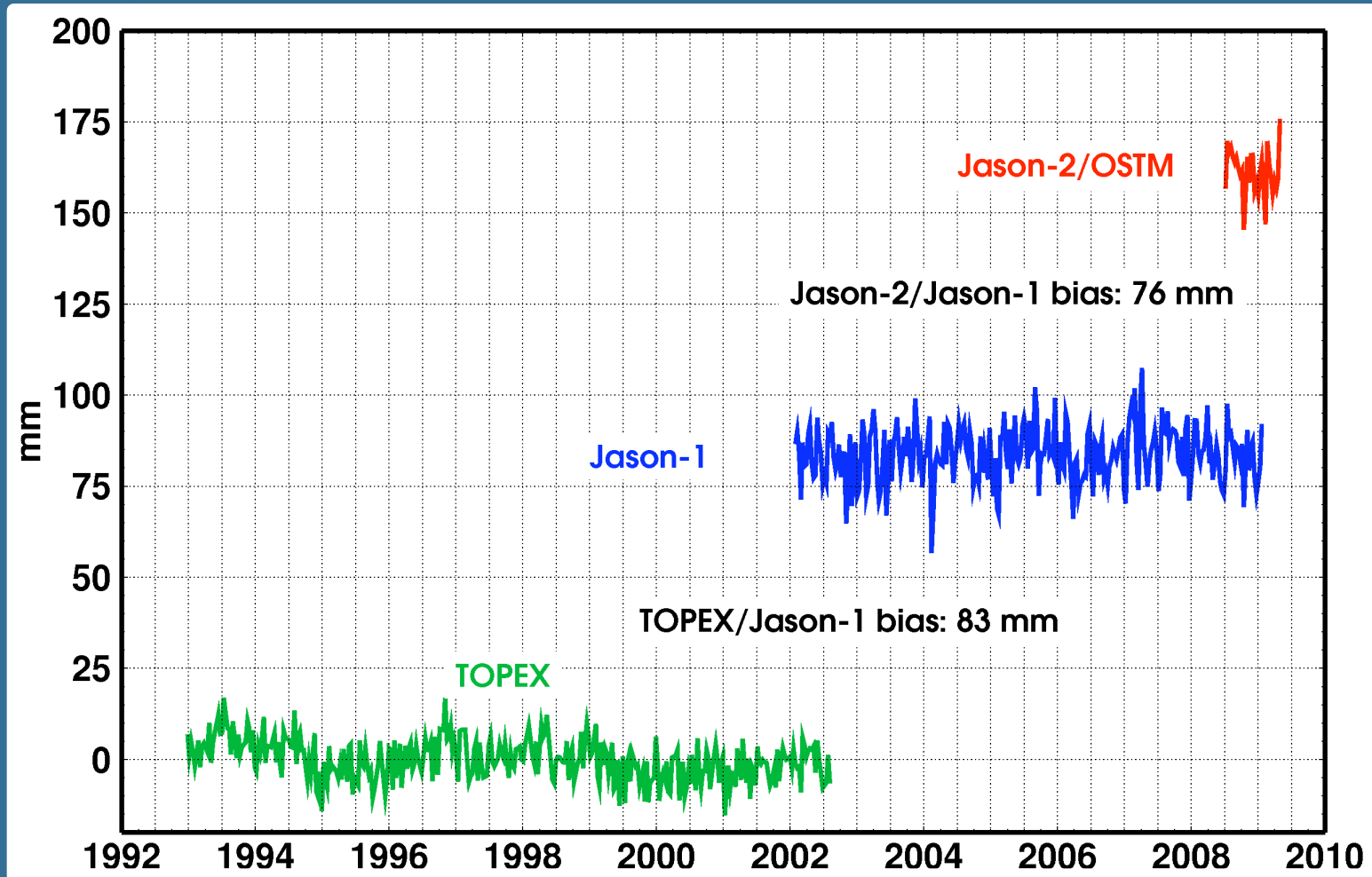
University of South Florida



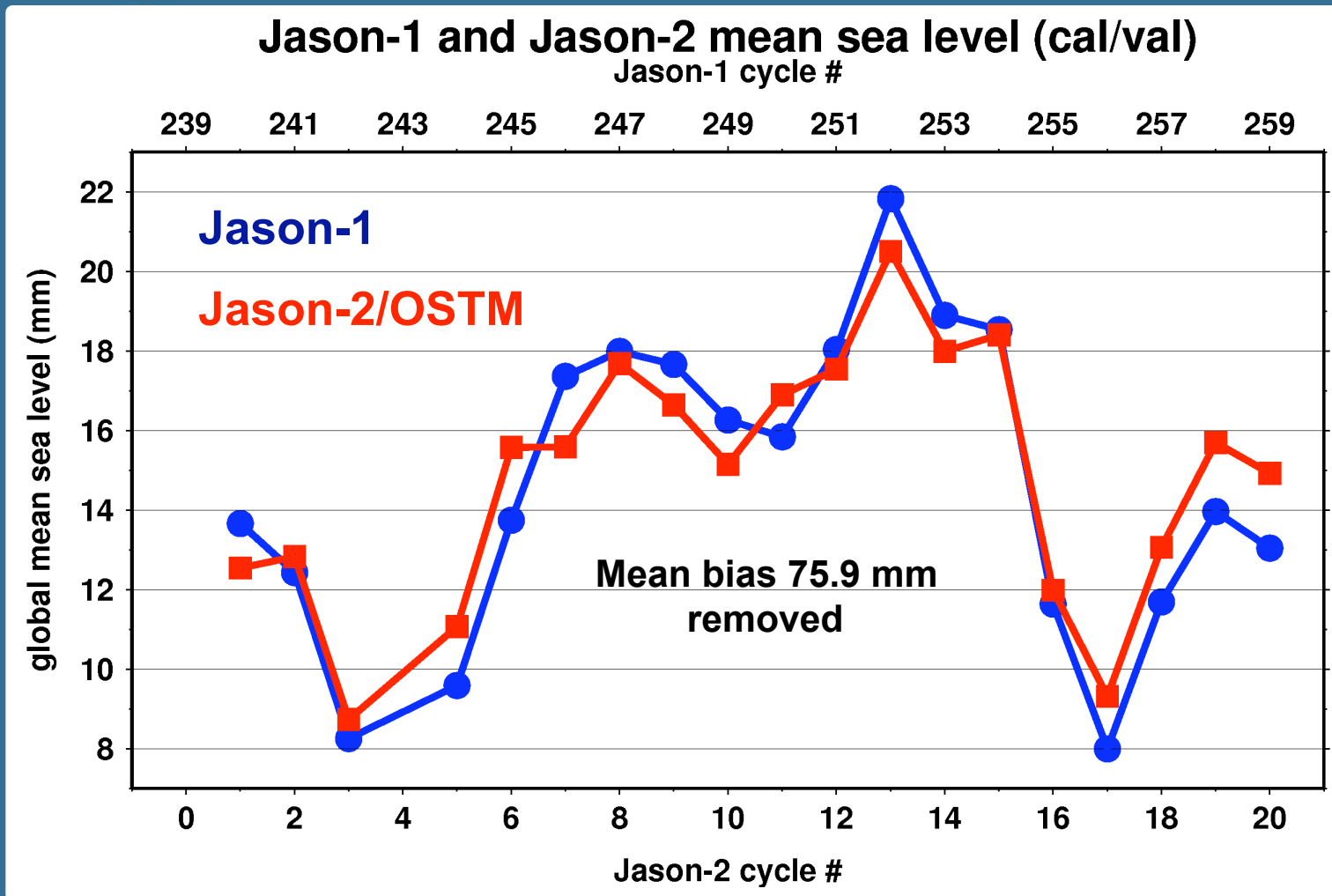
Biases from 1-second intersatellite differences



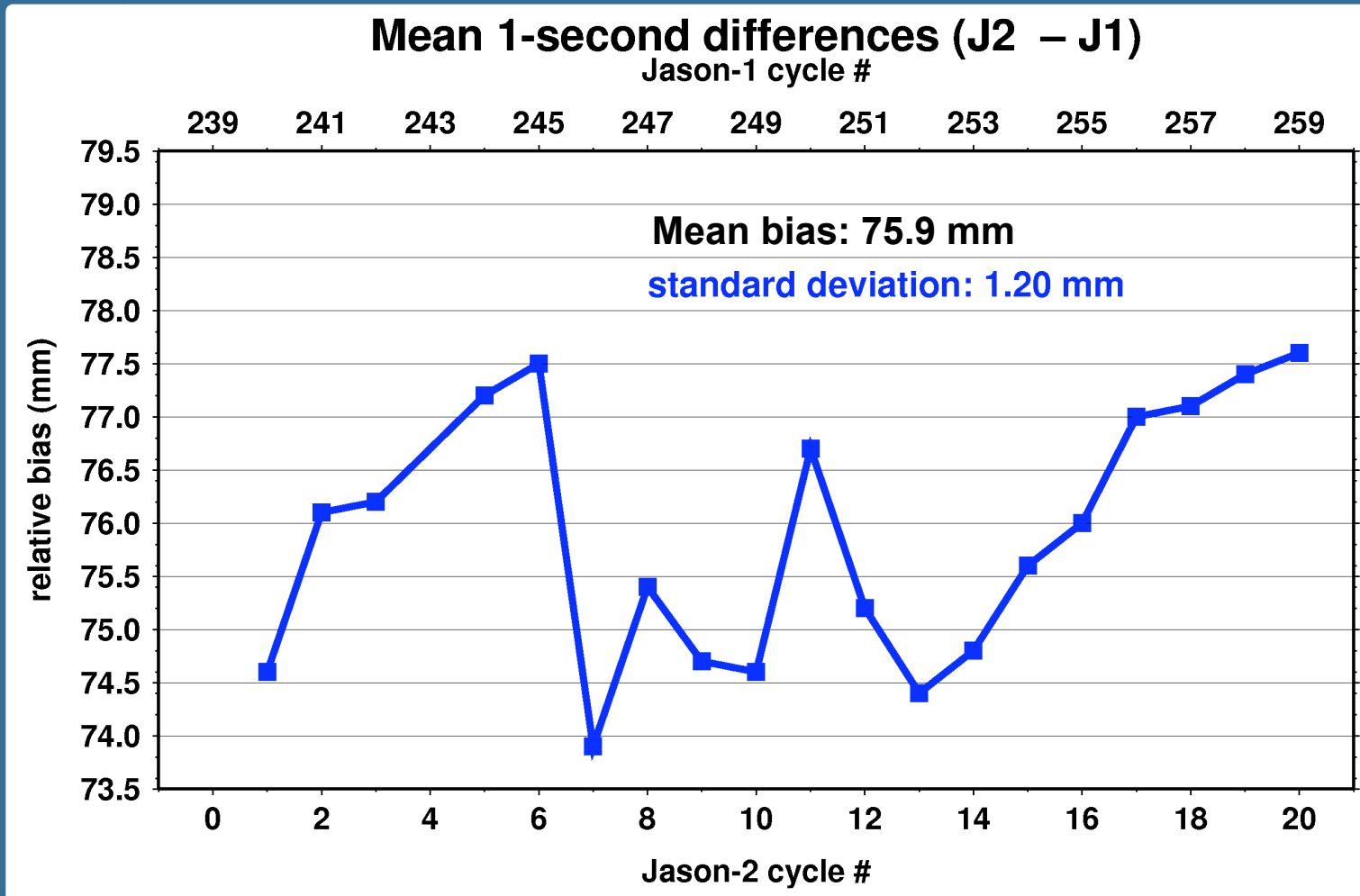
Biases from tide gauge calibration



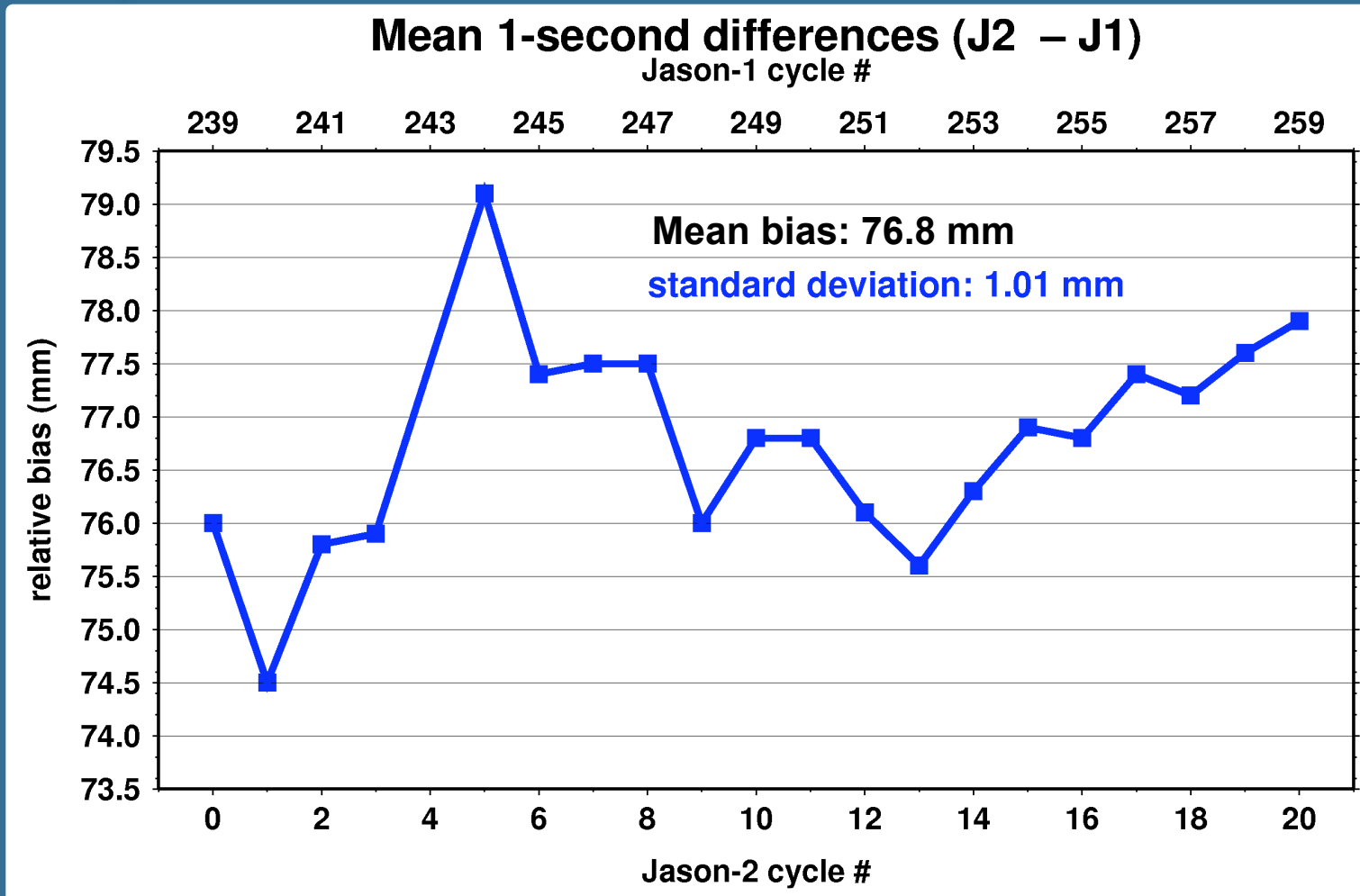
Global mean sea level during the Jason-1/Jason-2 cal phase



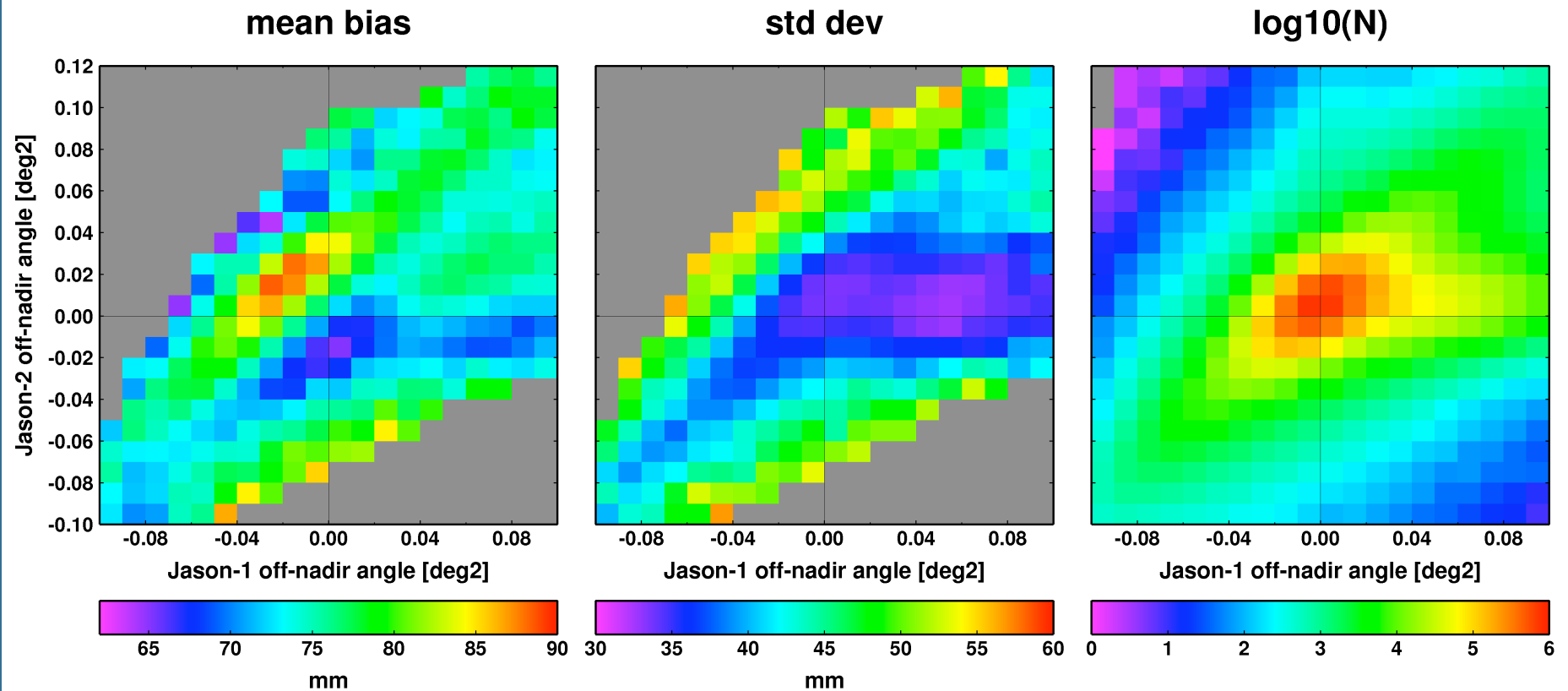
1-Hz differences during Jason-1/ Jason-2 cal phase



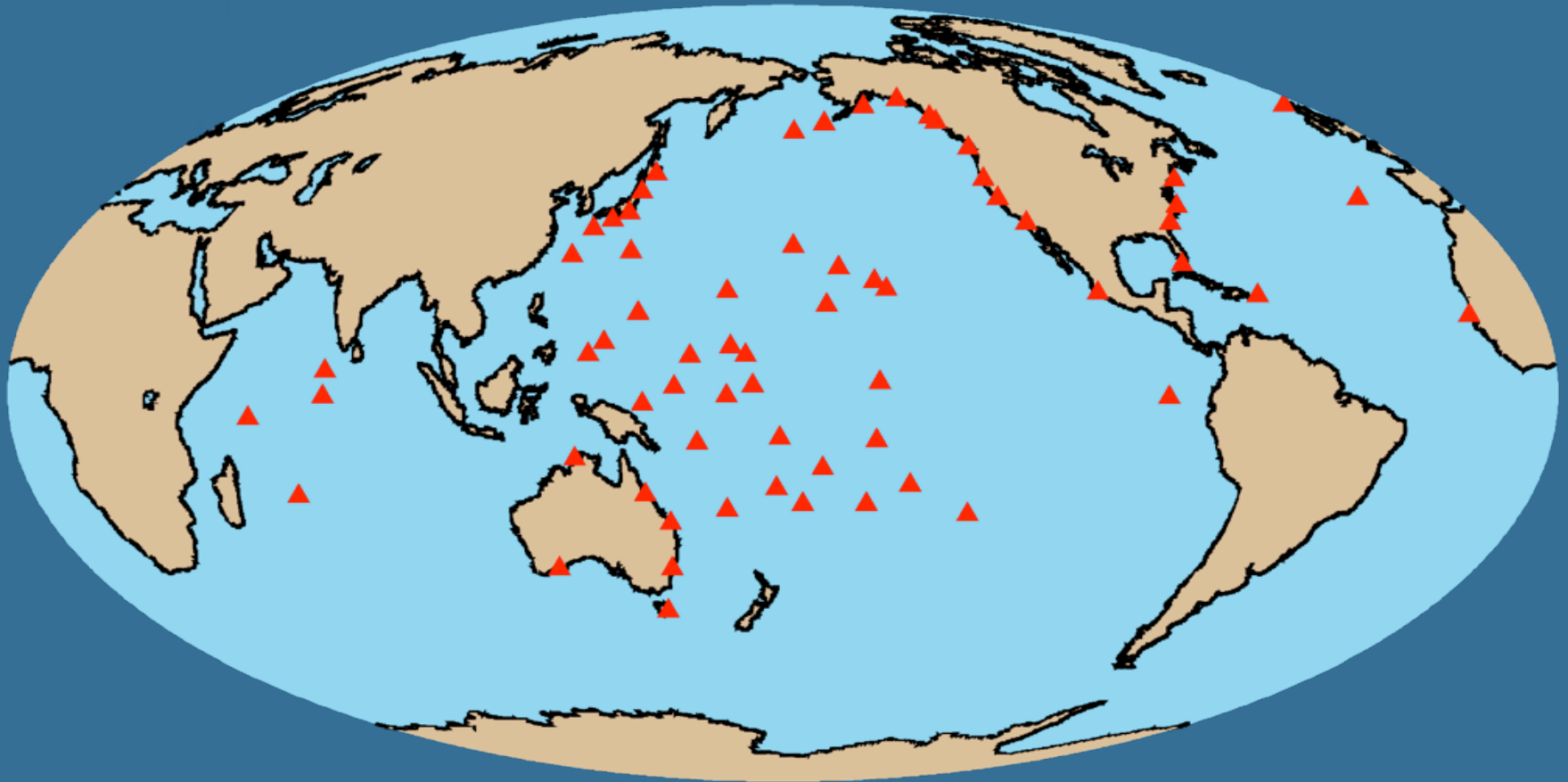
1-Hz differences during Jason-1/ Jason-2 cal phase: GSFC orbits



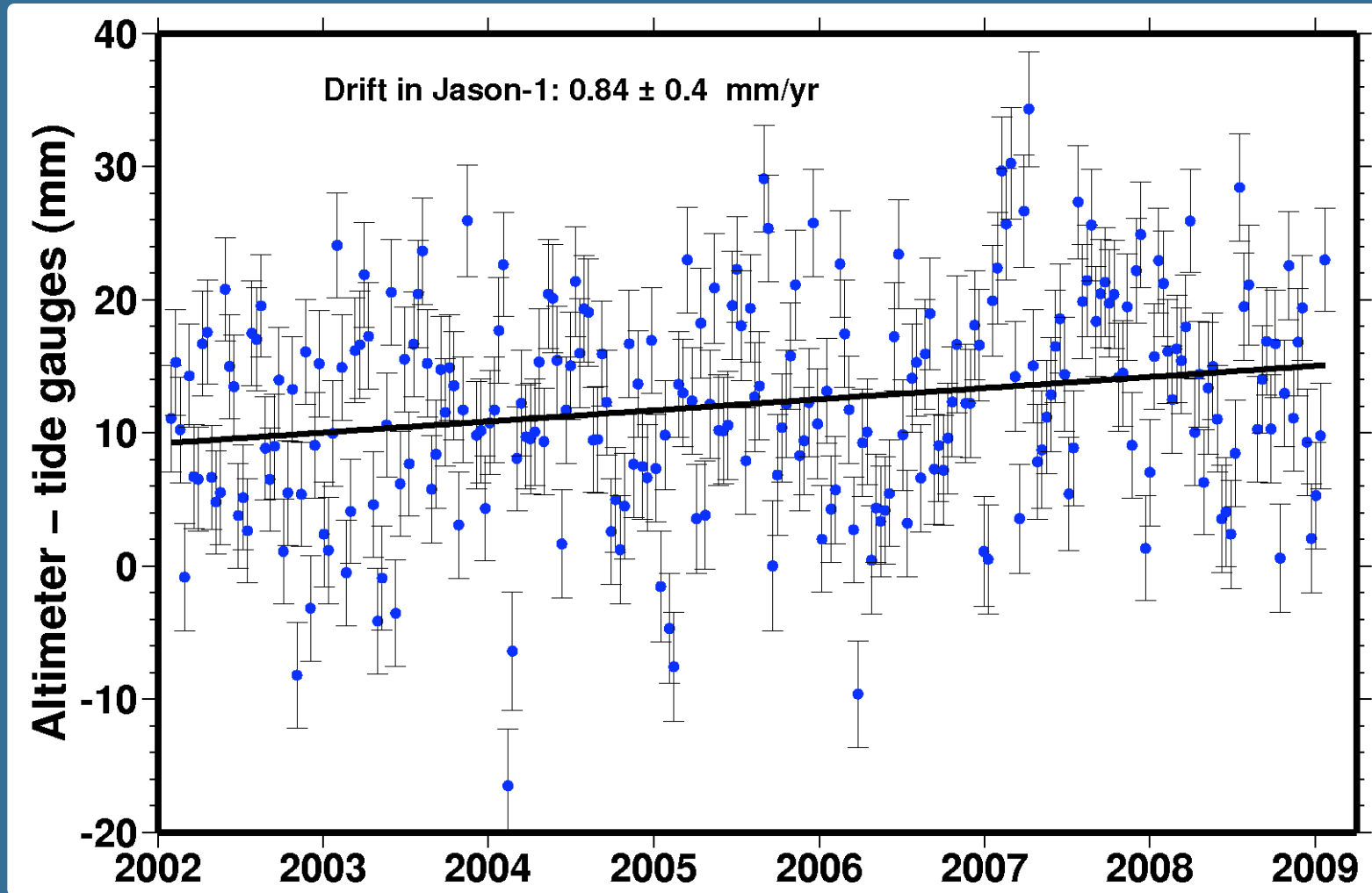
Jason-1/Jason-2 bias tracker bias dependence on nadir angle



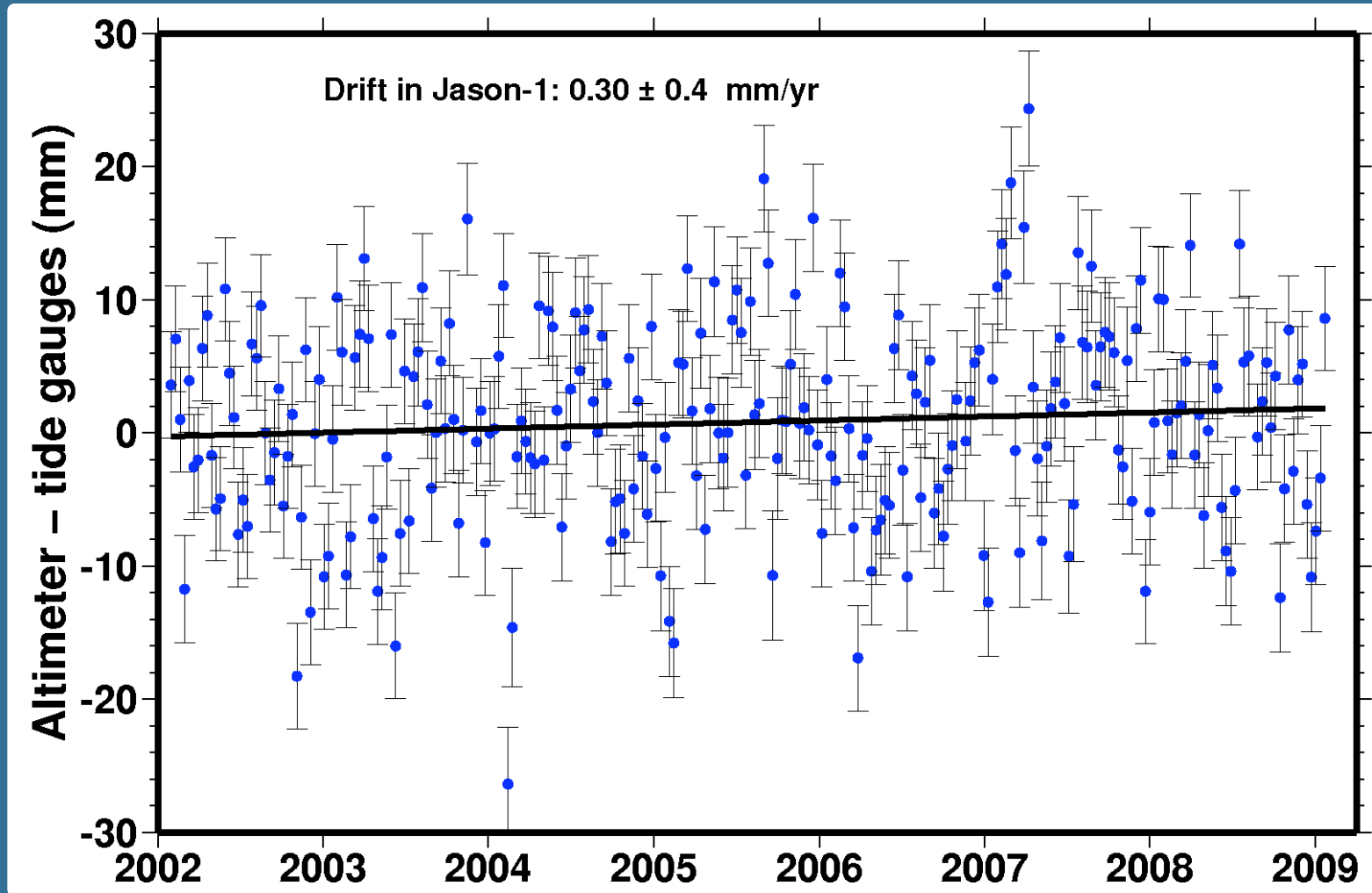
Tide gauge calibration network (Mitschum)



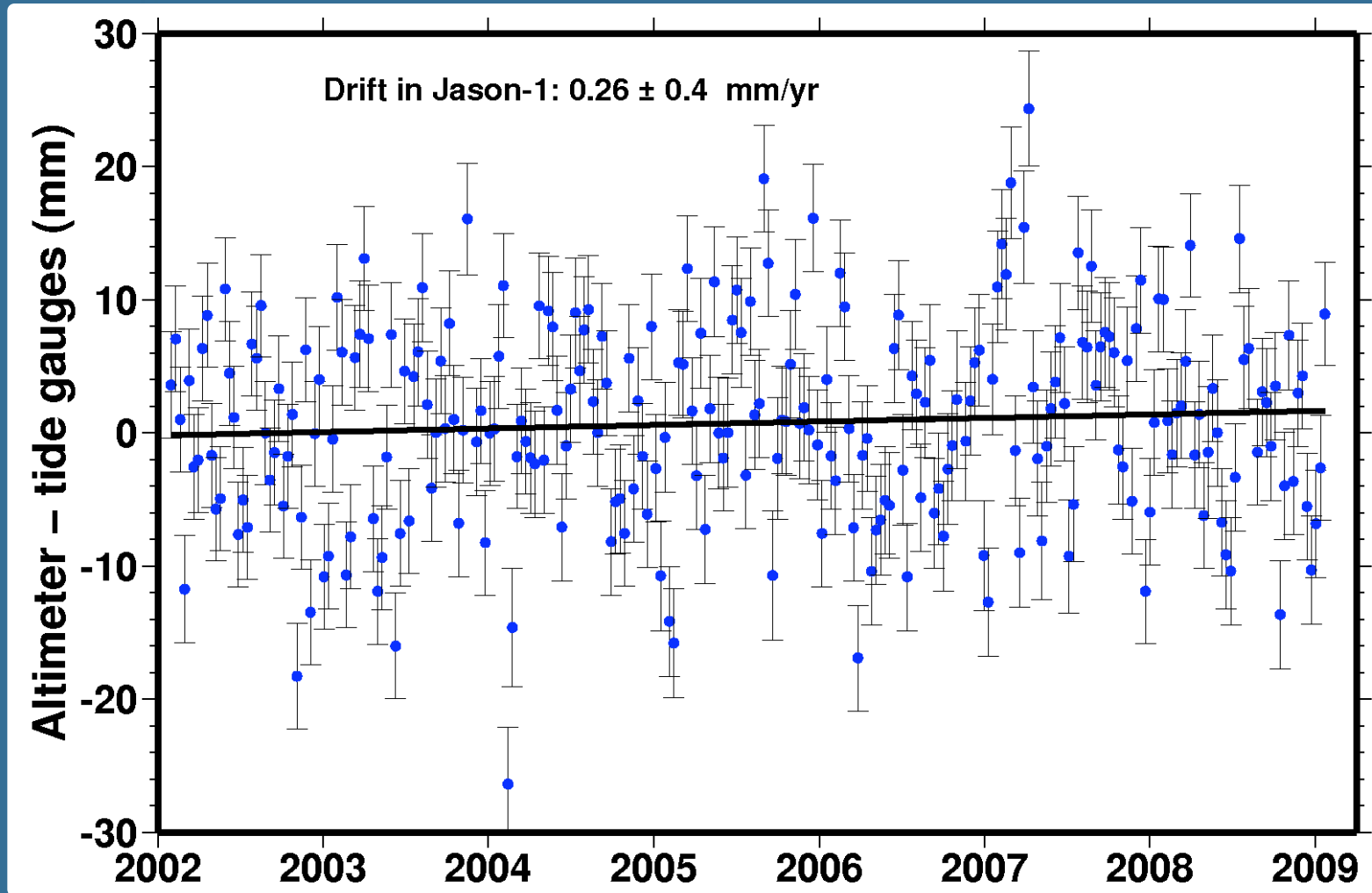
Jason-1 tide gauge calibration wet troposphere from ERA-interim



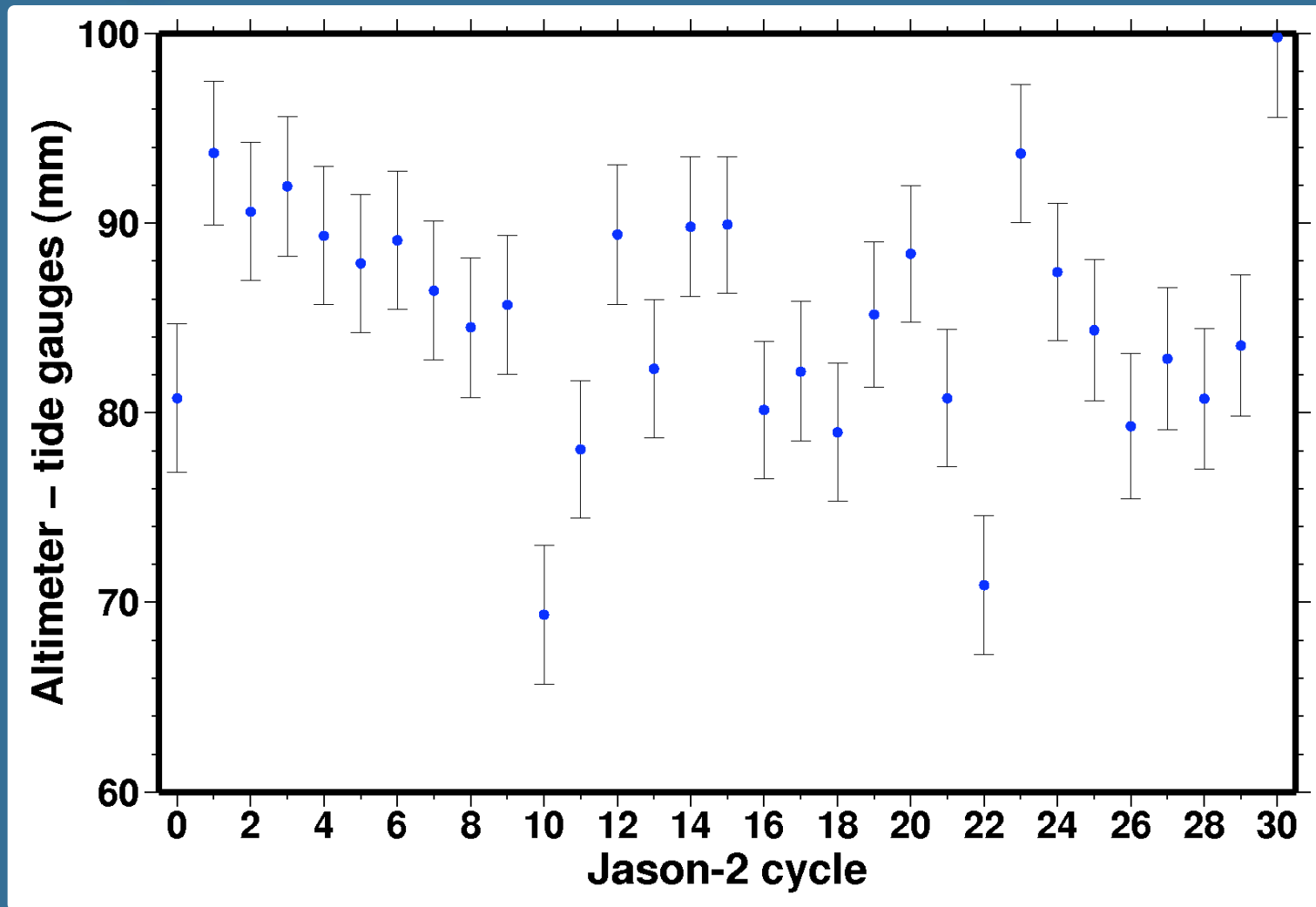
Jason-1 tide gauge calibration JMR replacement product (1-228)



Jason-1 tide gauge calibration JMR replacement product (all cycles)



Jason-2 tide gauge calibration

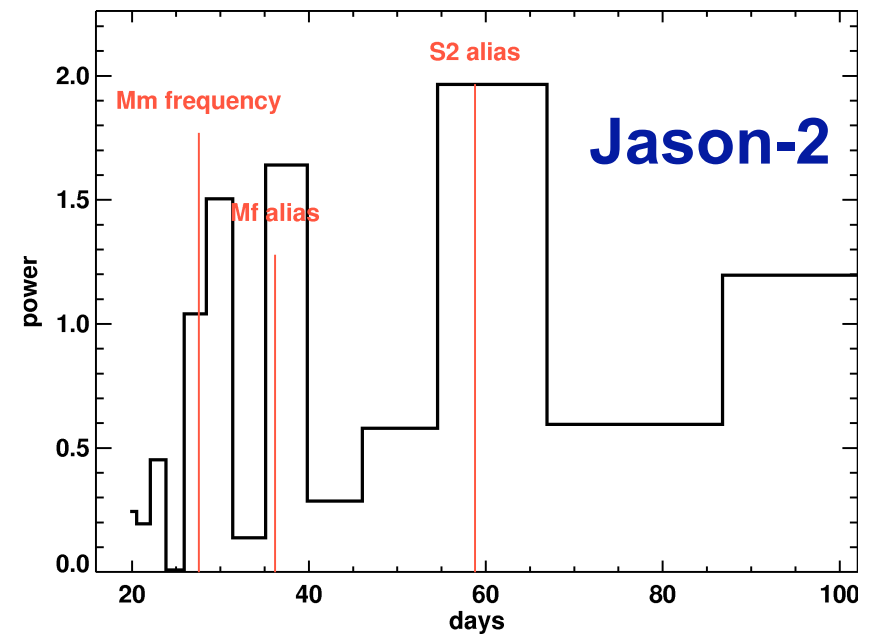
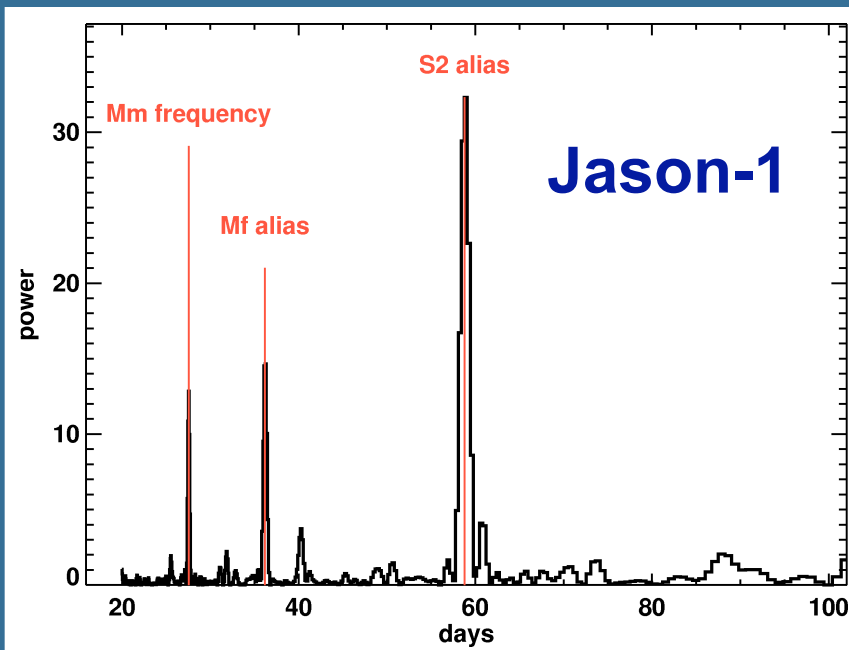
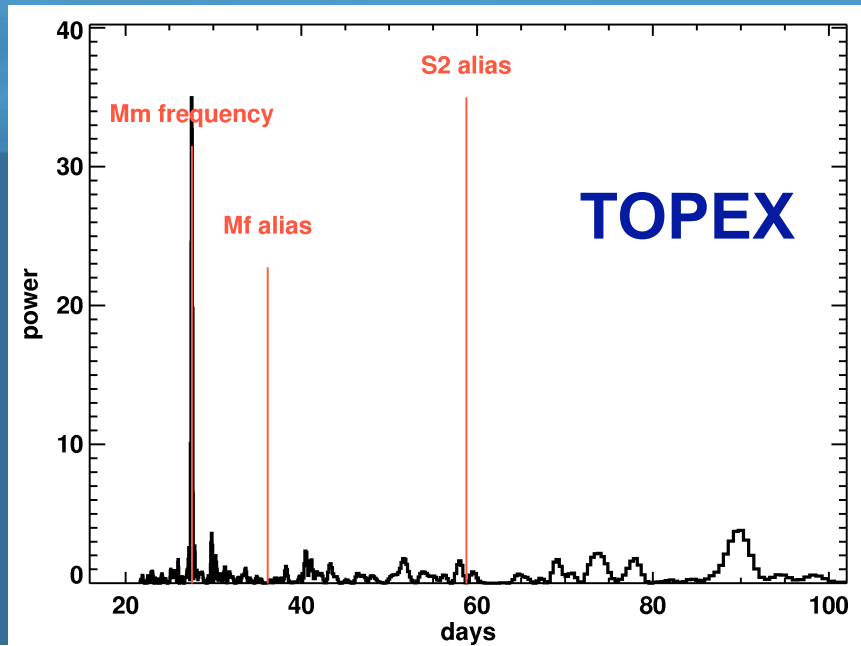


What is the “noisiest” mission?

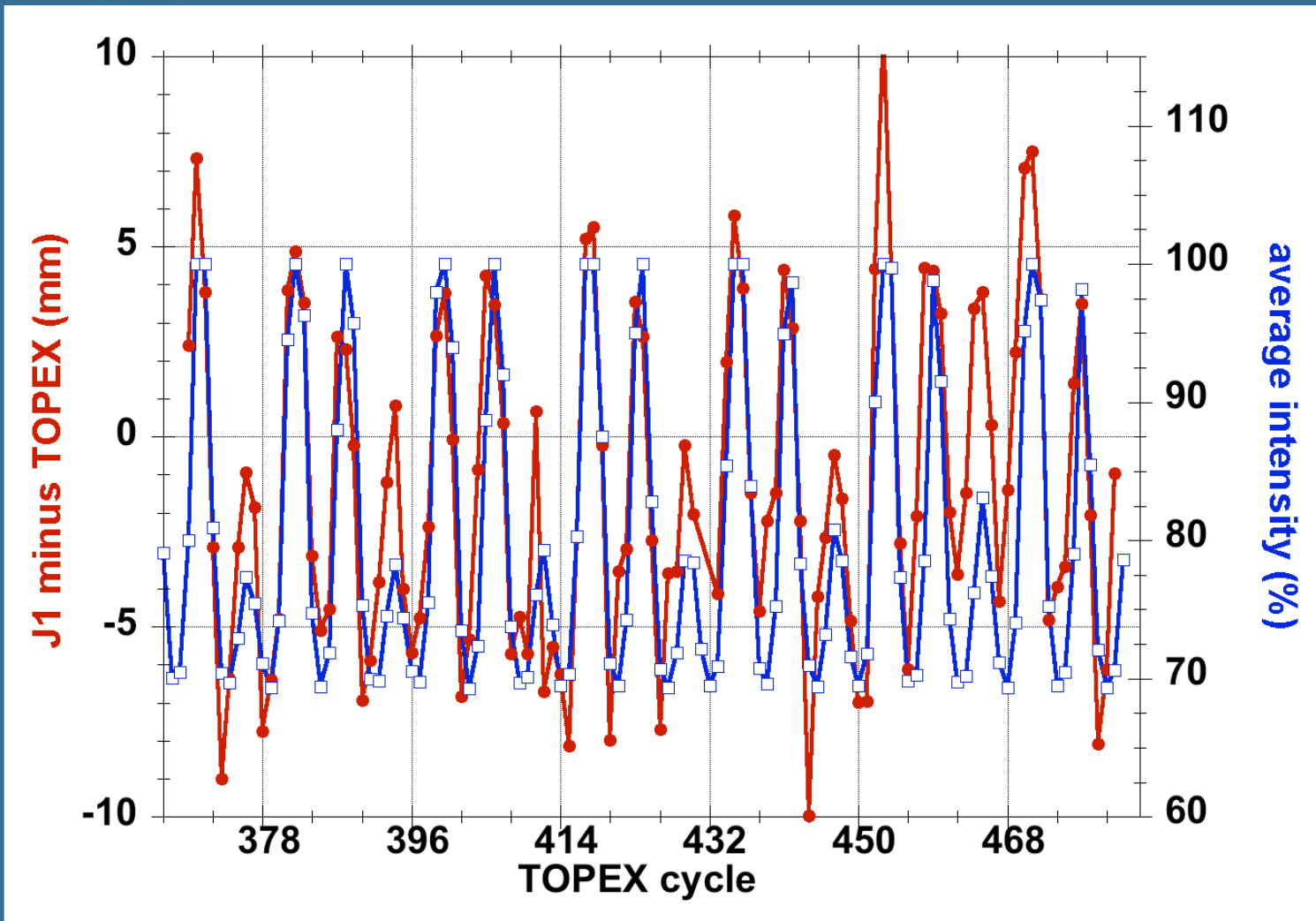
| Mission | rms of GMSL residuals from fit of trend, Sa, Ssa | rms of detrended altimeter – tide gauges |
|-------------------|--|--|
| TOPEX original | 3.1 mm | 5.2 mm |
| TOPEX interleaved | 2.2 mm | 4.0 mm |
| Jason-1 original | 3.6 mm | 7.5 mm |
| Jason-2 | 4.2 mm | 6.4 mm |

**Note: 1) TOPEX data were not retracked
2) Jason-2 GMSL and tide gauge calibration only detrended**

Power spectrum of altimeter – tide gauge time series



Jason-1 orbit and solar intensity



Tandem cal/val phases comparison

| Tandem phases | rms of per-cycle 1-second differences |
|--|---------------------------------------|
| TOPEX/Jason-1 GDR orbits | 4.7 mm |
| Jason-1/Jason-2 GDR orbits | 1.2 mm |
| Jason-1/Jason-2 GSFC orbits | 1.0 mm |

Summary and conclusions

Intersatellite calibration

- J2–J1 1-sec. residuals have a 1.0 mm per-cycle rms.
- The J2-J1 bias depends on off-nadir angles.

Tide gauge calibration

- JMR correction product reduces drift rate of Jason-1 to less than the error of calibration.
- Jason-1 mean sea level has a significant 58-day signal. Comparison with the TOPEX interleaved mission shows that the sea level residuals are correlated solar intensity.
 - Aerodynamic lift?