



# Precision Orbit Determination For The Current Jason Missions Using GPS

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- 2015-01-20 Max Sats 8 -> 10
- 2015-03-04 Max Sats 10 -> 12
- 2015-06-03 90-sec c









Data starts: Jan. 20, Cycle 1 begins: Feb. 17





- 6 month(Mar-Aug) sample L1CA-L1P1: Jason-2 A-side 2010, B-side and Jason-3 2016
- IS-GPS-200F L1CA 0.25 +- 0.0.016 cycles, L1CA,L1P1 different shifts in rec. bandpass filter



Fractional Cycles: L1 Phase(CA) - L1 Phase(P1)





- EIGEN-GRGS.RL03-v2.MEAN-FIELD (Time Variable Gravity,TVG)
- Atmospheric and oceanic dealising (AOD) produced by Pascal Gegout (GET/CNRS) personnal communication 2016, through June 2016, GRACE after that
- Empirical antenna calibrations, code and phase
- Box wing surface forces from specifications (Jason2/3)
- Reduced dynamics, bias fixed



Jason-2 Differences Due to TVG Fitting Bias, Drift, Annual in 6°x6° Bins Max Annual Amplitude 1.3 mm











• Uses data from 2016-02-13 to 2016-08-27

- Longer data span makes insignificant differences
- Close to the pre-launch measurements (only phase was measured)



### Data Fits Jason2 vs Jason3









RMS Radial Overlaps, Jason2 B-Side vs Jason3 Jason2 Av: 1.3 Median: 1.1 (mm) March 1 - Sept. 2, 2016





### Jason-2 JPLrlse16a – POE-E Cycles 1-299







RMS	4.5 mm
Mean	-0.9 mm
Median	-0.7 mm
Number Points	4,028,675 @ 1 min

Drift	-0.007 mm/yr
Annual Amplitude	0.15 mm



#### Jason-2 – Rlse16a, POE-E Geographical Differences Fit Linear, Annual 6°x6° Bins, Cycles 1-299









### Jason-3 JPLrlse16a – POE-T Cycles 1-19







RMS	5.4 mm (JA-2 4.5)
Mean	-1.3 mm
Median	-1.2 mm
Number Points	262,127 @ 1 min

Drift	1.3 mm/yr
Annual Amplitude	Not Enough Data



#### Jason-3 – POE-T Geographical Differences Fit Linear, 6°x6° Bins, Cycles 1-19, Feb. – Aug. 2016





0.0 0.8 1.6 2.4 3.2 4.0 4.8 5.6 6.4 Jason-2 Radial Amplitude JPLrIse16a - GDRE,Aug. 2014-Aug 2016, Scale (mm) Mean,Max: 2.0, 6.0(mm)













$$\sqrt{10.2}/2 = 1.6 \, mm$$





- Jason-3 GPS reciever probably better than Jason-2(A or B side)
  - More data, fewer ½ cycle slips
    - Better overlap performance
    - Jason-3 slightly higher residuals (more low elevation data)
- Phase map is close to chamber measurements
- Jason-2 GPS B-side performs slightly worse than the A-side
  - Still much better than requirements
- Jason-2(RMS 4.5 mm) and Jason-3(RMS 5.4 mm) GPS orbits are close to final operational orbits (CNES)
- Jason-2 geographically correlated errors/differences with CNES remain small, geocenter?











 $\sqrt{41.2}/2 = 3.2 \, mm$ 



## Jason-3 JPLrlse16a – GSFC Laser/Doris Cycles 1-20







RMS	8.6 mm
Mean	-1.3 mm
Median	mm
Number Points	303,723 @ 1 min