

# Preliminary Evaluation of the Jason-1 Data for Studies of Long-Term Sea Level Change

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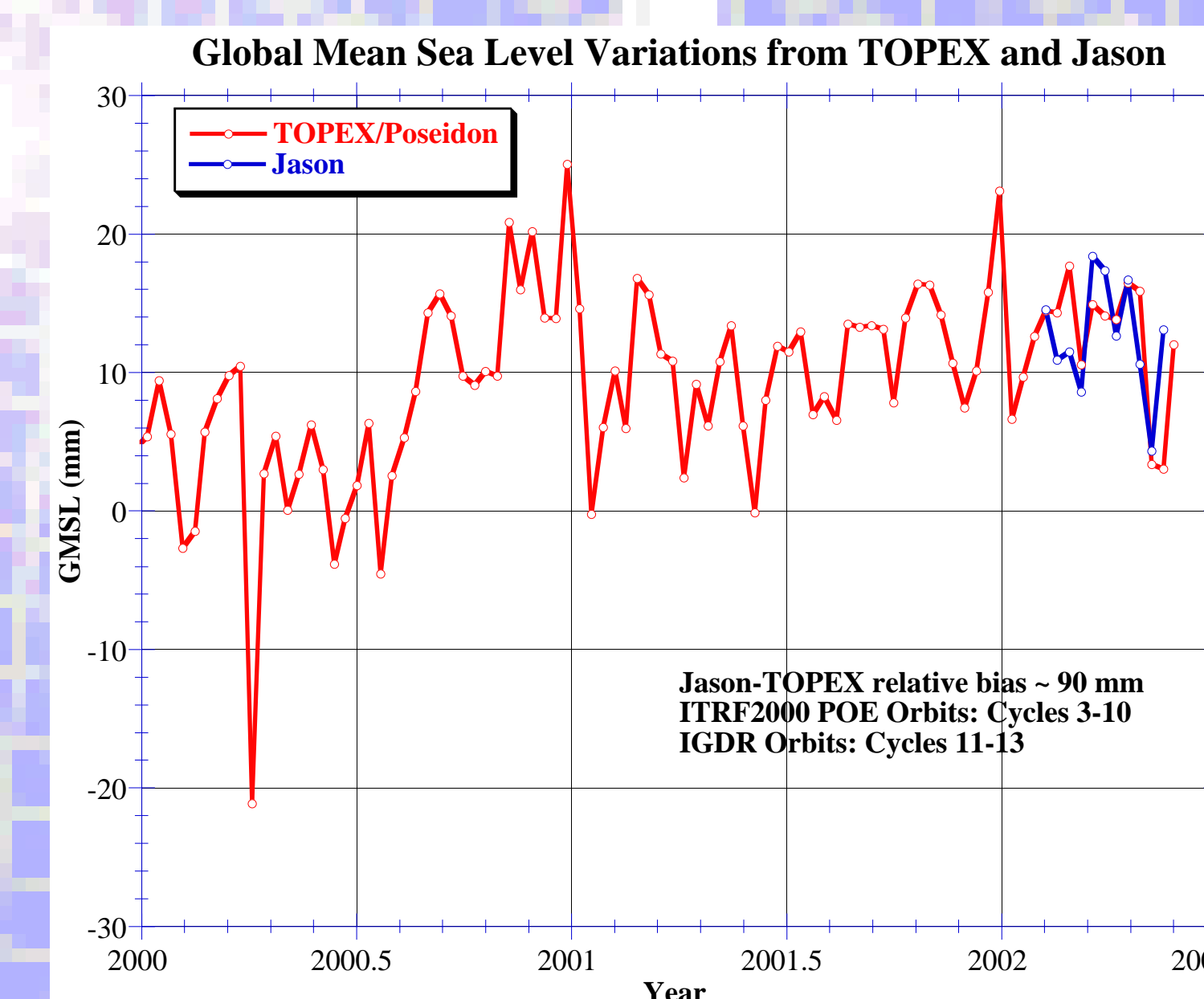
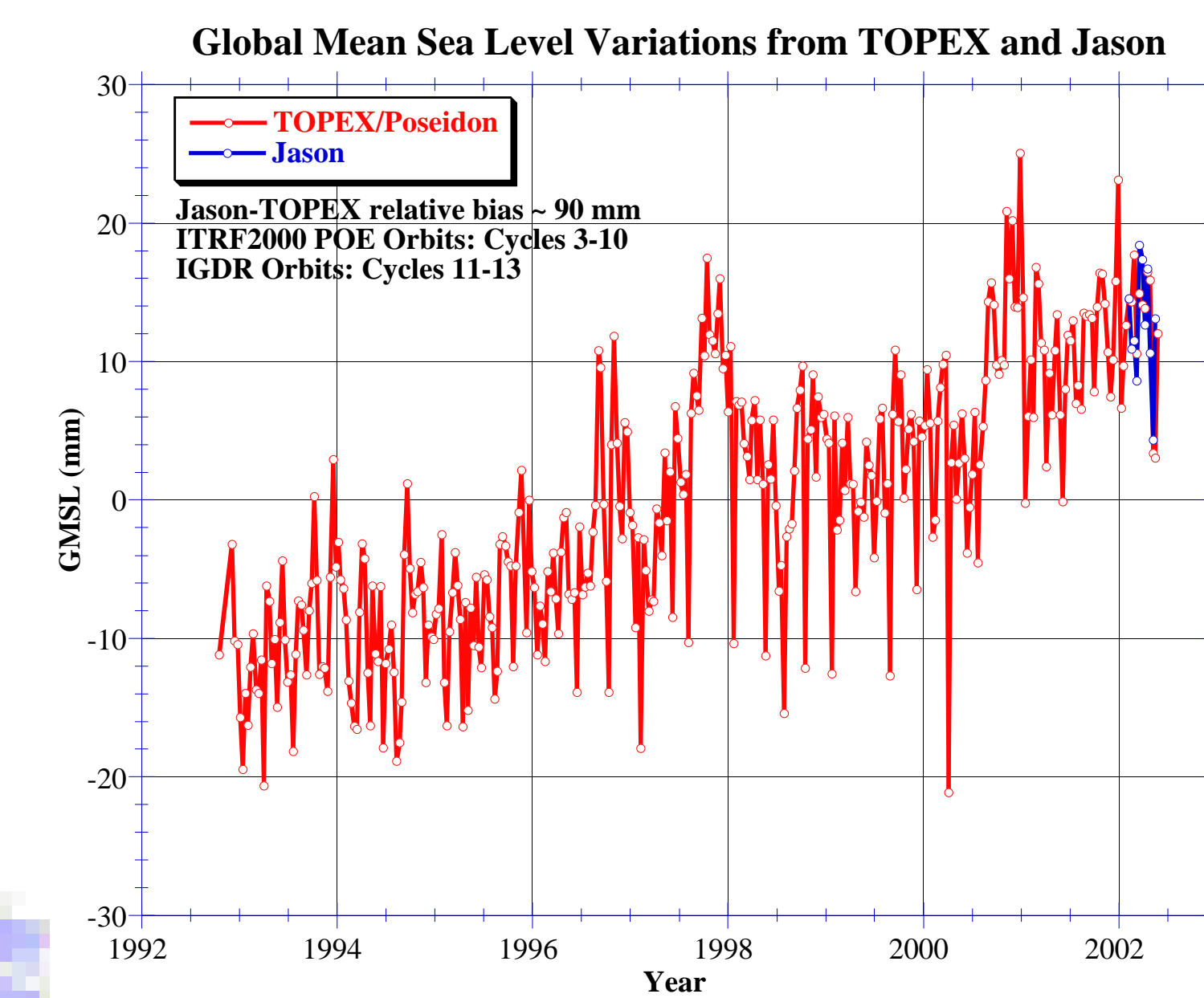


## Abstract

We have conducted a preliminary evaluation of the Jason-1 measurements to determine their “readiness” for continuing the 10-year time series of sea level change measurements compiled by the TOPEX/POSEIDON mission. We have completed detailed comparisons of the TOPEX/POSEIDON and Jason-1 sea level measurements, including each of the measurement corrections. Although these studies have raised a number of data analysis issues, once these issues are resolved, we are confident that the Jason-1 sea level change measurements will be of the same quality as TOPEX/POSEIDON.

## Processing

- TOPEX GDR Correction/Jason Compatibility Product applied
  - Total SSH correction, modified with
  - Gaspar EMB G4 correction
  - GOT99.2 tide model
- Equilibrium tides added to Jason IGDR tide
- Mean sea surface reference: GSFC001.MSS
- GSFC ITRF2000 orbits used for Jason-1 cycles 1–10 and TOPEX cycles 344–353. (I)GDR orbits used otherwise.



## Results: Global mean sea level

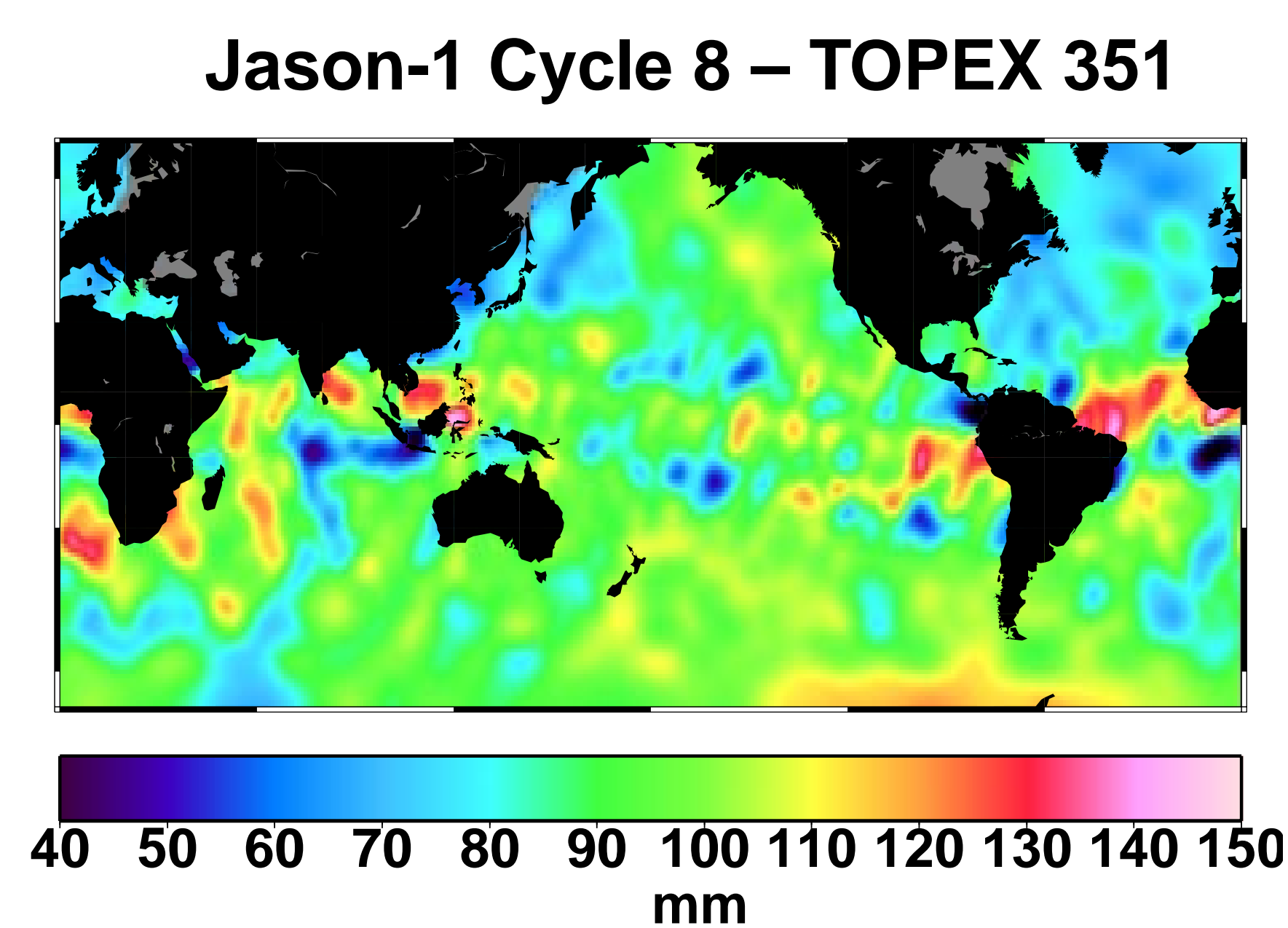
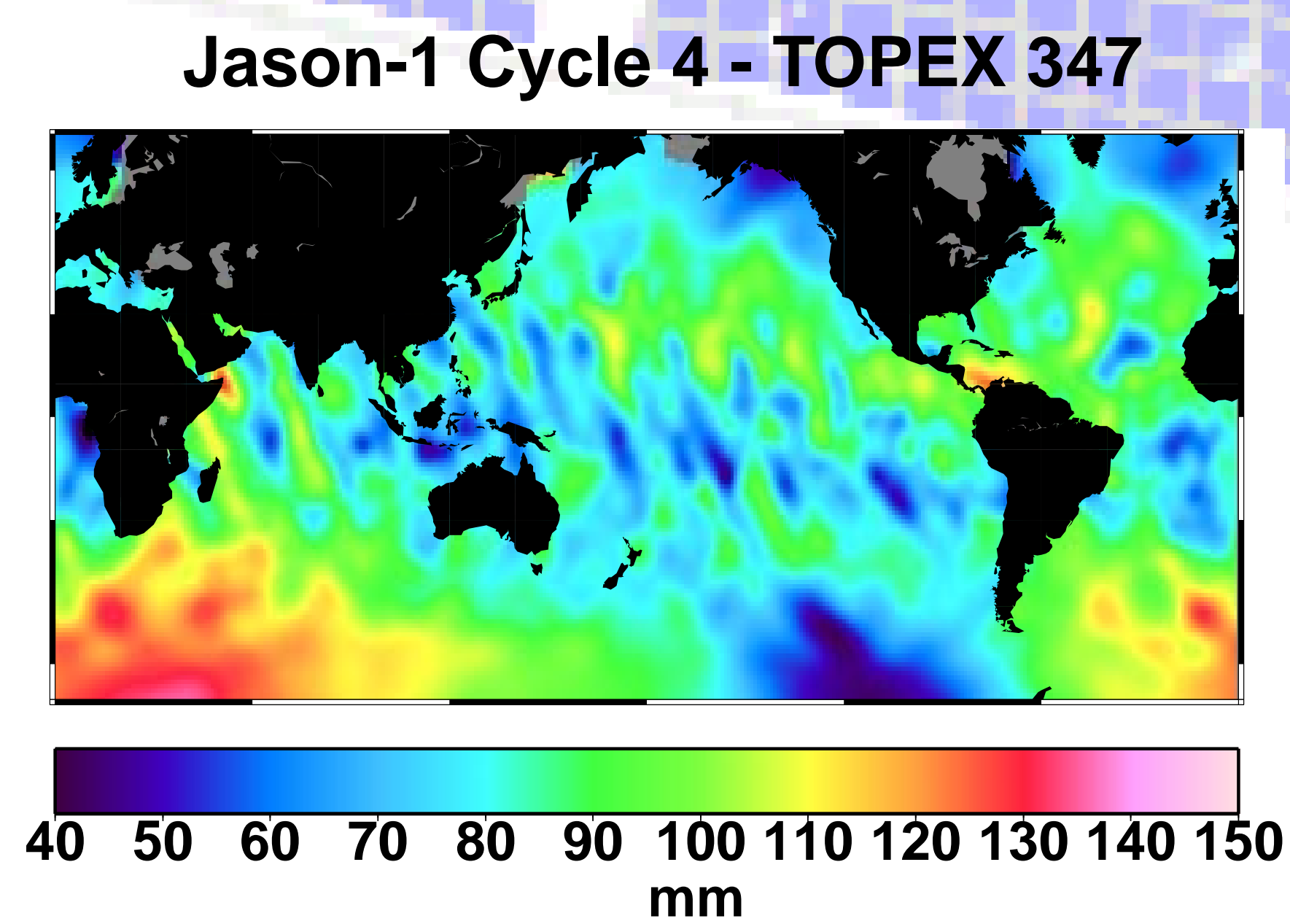
Table 1: GMSL difference (no IB)

Jason cycle	GMSL (mm)	TOPEX cycle	GMSL (mm)	bias (mm)
3	88.96	346	-0.06	89.02
4	84.28	347	-0.58	84.86
5	84.54	348	2.37	82.17
6	84.09	349	-2.28	86.37
7	90.77	350	-0.30	91.08
8	91.62	351	-0.80	92.43
9	89.06	352	-0.04	89.09
10	82.35	353	-0.34	82.69
11	82.40	354	+0.65	81.76
12	64.21	355	-18.83	83.04
13	77.83	356	-16.57	94.41

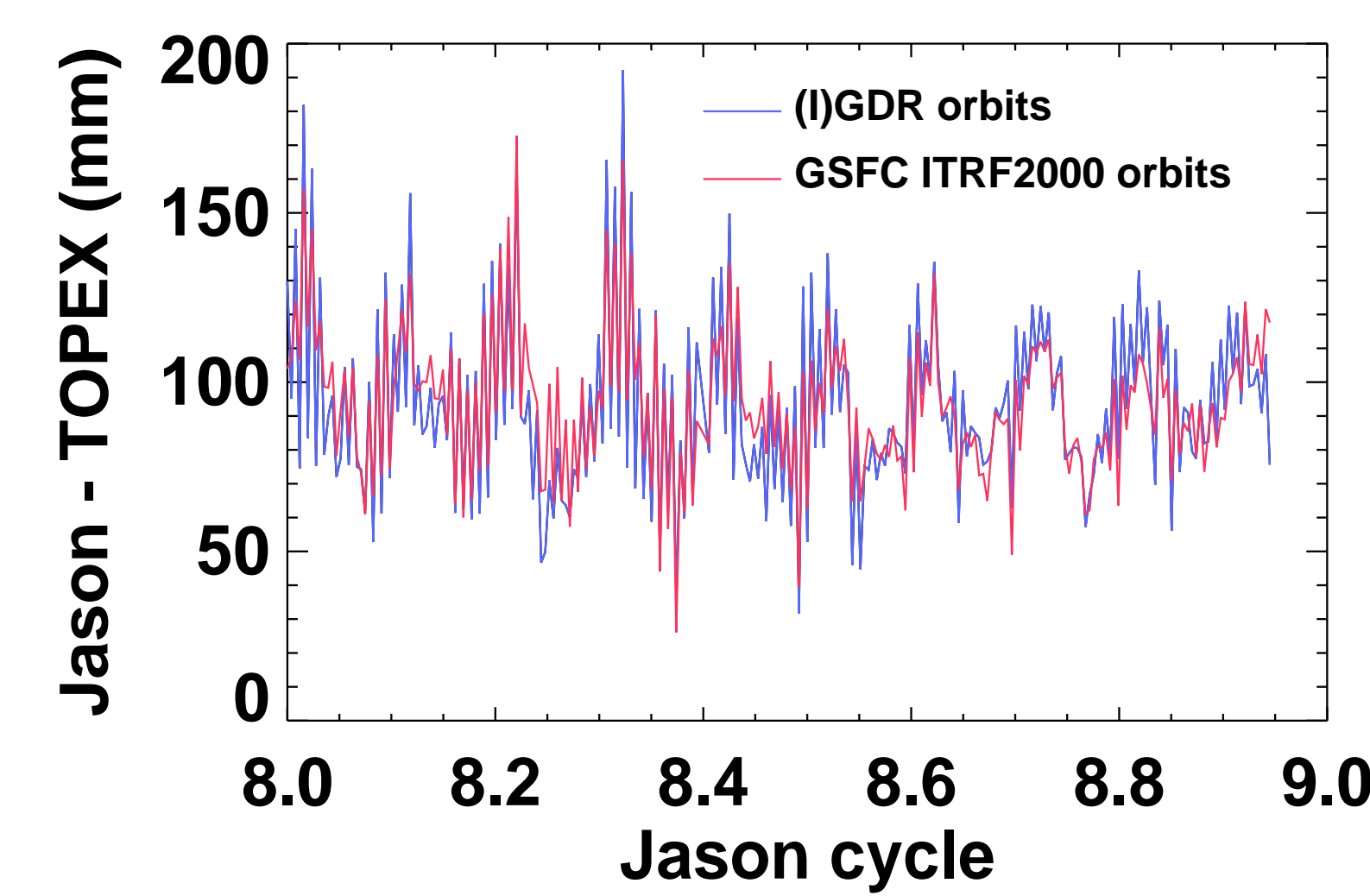
TOPEX cycles: MGDR 346–352, IGDR 353–356

## Relative bias, Jason-TOPEX

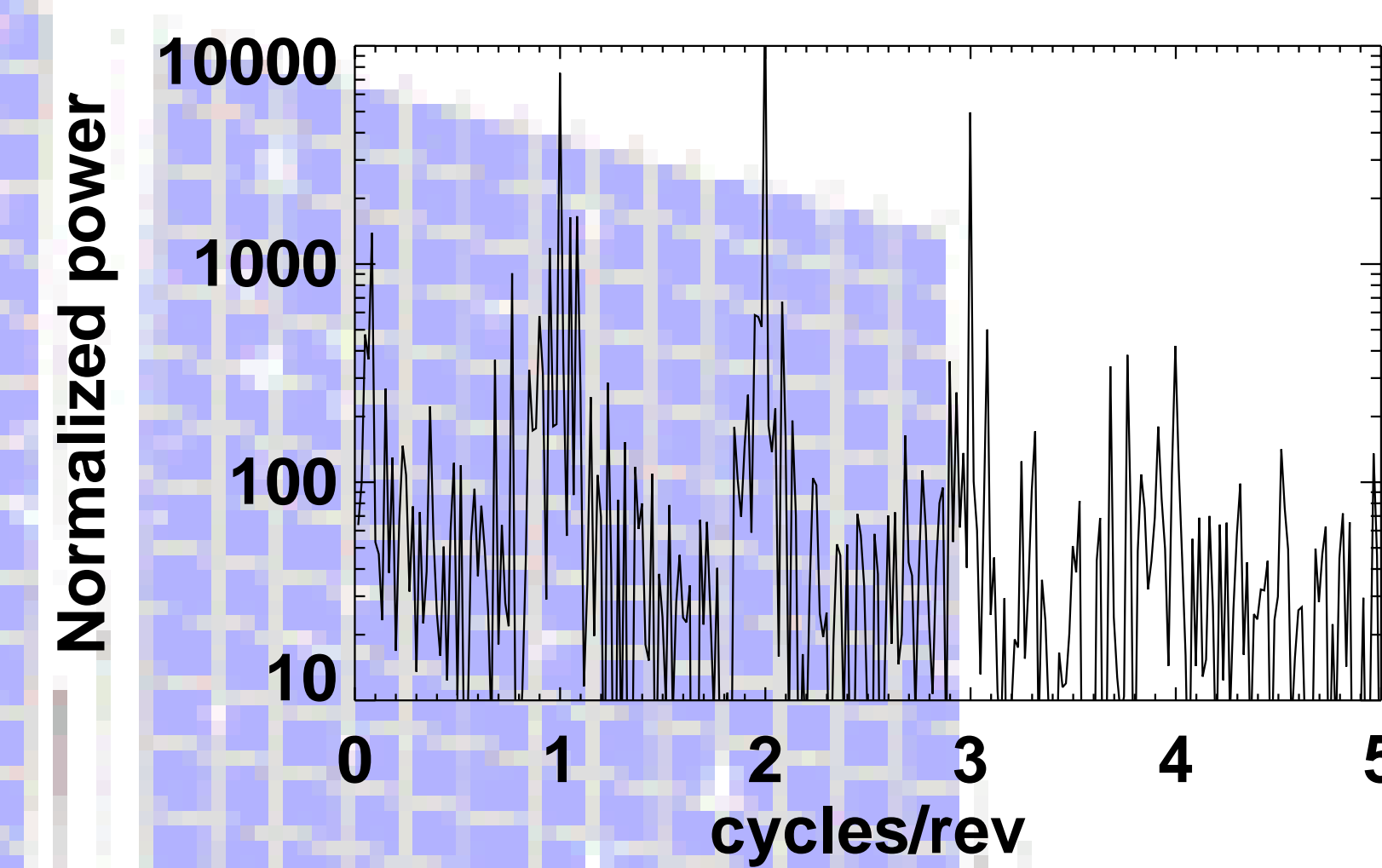
No inverted barometer corrections applied. TOPEX 15 mm MGDR bias included. Cycles with ITRF2000 orbits:  $87.3 \pm 3.6$  mm. All available cycles:  $86.5 \pm 4.5$  mm



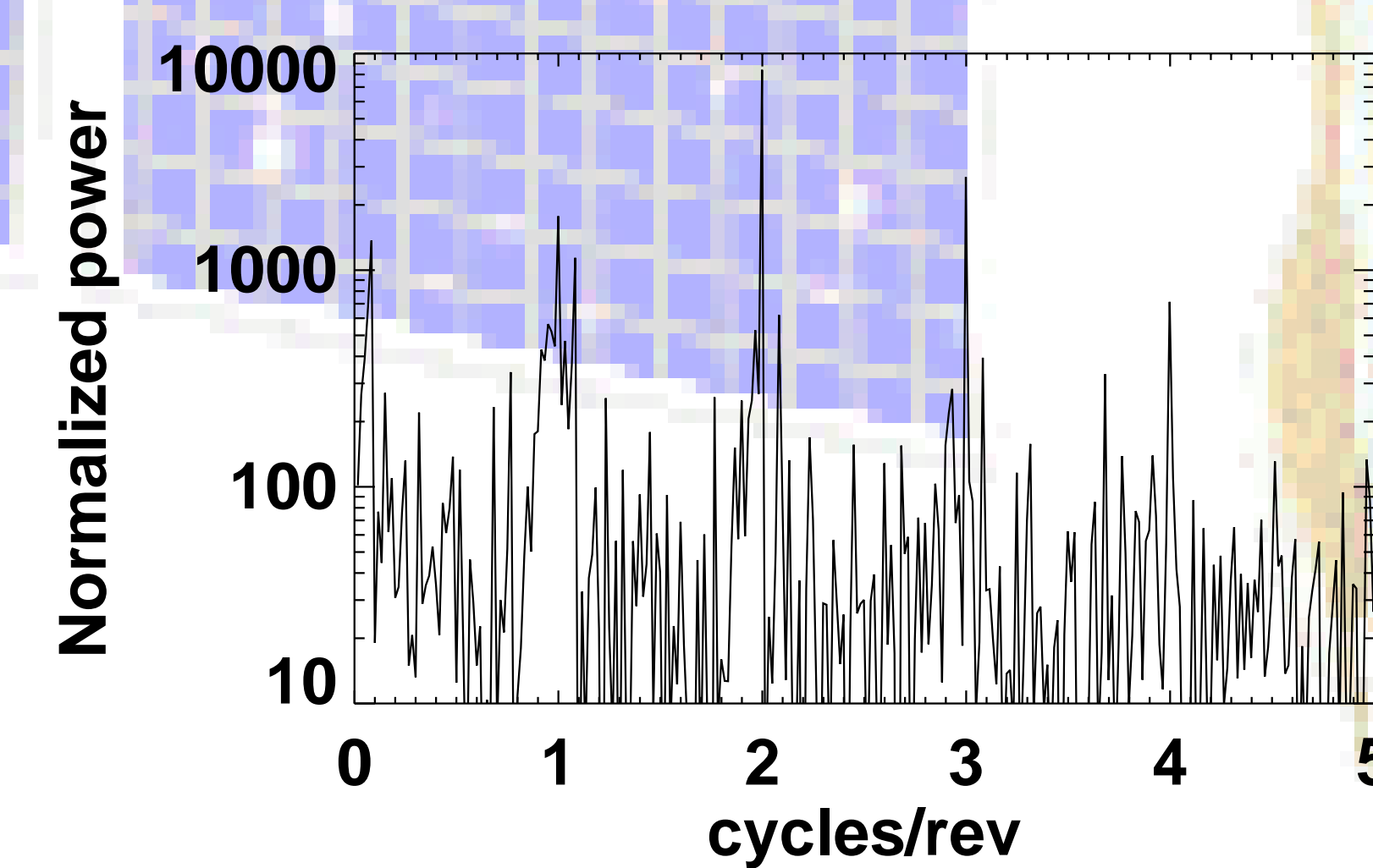
## Along-track SSH differences



## Lomb periodogram of along-track Jason-TOPEX SSH differences (I)GDR orbits



## Lomb periodogram of along-track Jason-TOPEX SSH differences GSFC ITRF2000 orbits



## Table 2: SSH rms differences.

Jason cycle	TOPEX cycle	(I)GDR orbits rms (mm)	GSFC ITRF2000 rms (mm)
3	346	82.0	32.5
4	347	33.3	33.5
6	349	52.4	37.2
7	350	65.2	57.2
8	351	41.4	36.4
9	352	34.2	33.1
10	353	64.7	37.7
11	354	65.8	
12	355	57.0	
13	356	41.3	

60-second along-track smoothing applied

Table 3: SWH\_K

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	-91.6	201.2
4	347	-91.0	192.8
5	348	-79.9	196.6
6	349	-80.8	204.8
7	350	-68.7	204.1
8	351	-58.6	189.2
9	352	-53.3	206.0
10	353	-64.9	213.3
11	354	-82.2	202.0
12	355	-90.1	202.8
13	356	-92.3	202.1

## Results: Global mean range correction differences

Table 4: Wet troposphere (JMR/TMR)

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	11.83	5.42
4	347	11.98	5.29
5	348	11.54	5.44
6	349	6.19	6.06
7	350	5.08	6.39
8	351	10.47	5.79
9	352	11.55	5.09
10	353	11.69	5.51
11	354	11.27	5.29
12	355	9.42	5.53
13	356	4.58	7.01

Table 5: Dry troposphere

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	0.032	1.37
4	347	-0.026	1.28
5	348	0.030	1.28
6	349	-0.007	1.26
7	350	0.007	1.25
8	351	-0.065	1.28
9	352	0.020	1.33
10	353	-0.466	1.30
11	354	-0.483	1.32
12	355	-0.501	1.38
13	356	-0.560	1.34

Table 6: Ionosphere (dual-frequency)

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	3.02	12.50
4	347	3.48	12.15
5	348	4.26	11.96
6	349	4.19	12.23
7	350	0.09	13.23
8	351	-0.60	13.36
9	352	-0.26	13.30
10	353	0.54	13.23
11	354	4.09	12.32
12	355	3.47	12.40
13	356	3.81	12.27

Table 7: Ionosphere (DORIS)

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	-4.4	13.3
4	347	-0.3	15.1
5	348	0.6	16.5
6	349	0.5	19.8
7	350	-3.0	17.2
8	351	-5.4	17.4
9	352	-8.3	16.0
10	353	-84.5	61.6
11	354	-79.5	63.3
12	355	-88.5	60.2
13	356	-68.8	45.4

Table 8: SSB\_K

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	-15.5	7.8
4	347	-15.3	7.5
5	348	-15.2	7.6
6	349	-15.7	8.0
7	350	-16.0	8.4
8	351	-16.1	7.8
9	352	-15.9	8.3
10	353	-15.5	8.3
11	354	-15.9	8.0
12	355	-15.7	7.8
13	356	-15.0	7.7

## Results: Global mean geophysical correction differences

Table 9: Inverted barometer

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	-0.82	6.21
4	347	-1.48	5.76
5	348	-1.40	5.71
6	349	-1.43	5.71
7	350	-2.18	5.64
8	351	-0.59	6.67
9	352	0.51	6.78
10	353	-0.47	6.97
11	354	-2.77	6.76
12	355	-7.74	6.79
13	356	-5.43	6.22

Table 10: Ocean tides

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	0.26	3.87
4	347	0.01	3.64
5	348	-0.51	5.00
6	349	-0.20	3.85
7	350	-0.33	3.45
8	351	0.60	4.82
9	352	0.42	3.36
10	353	0.16	3.52
11	354	0.11	4.22
12	355	-0.28	2.87
13	356	-0.01	3.38

Table 11: Pole tide

Jason cycle	TOPEX cycle	mean (mm)	rms (mm)
3	346	0.012	0.301
4	347	0.008	0.295
5	348	0.006	0.295
6	349	-0.006	0.296
7	350	-0.015	0.296
8	351	-0.017	0.301
9	352	-0.003	0.306

## Acknowledgements

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