


CryoSat Long-Term Ocean Data Analysis and Validation: Final Words on GOP Baseline-C

Marc Naeije ^{1,*} , Alessandro Di Bella ², Teresa Geminale ³ and Pieter Visser ¹

¹ Department of Space Engineering, FAC Aerospace Engineering, Delft University of Technology (TU Delft), Kluyverweg 1, 2629 HS Delft, The Netherlands

² ESA Centre for Earth Observation ESA/ESRIN, Largo Galileo Galilei 1, 00044 Frascati, RM, Italy

³ Exprivia S.p.A. Defence & Aerospace Digital Factory, Via della Bufalotta 378, 00139 Roma, RM, Italy

* Correspondence: m.c.naeije@tudelft.nl; Tel.: +31-1527-8-3831

Supplementary materials

In this supplement we present some material that we think could be of use for the reader and user of CryoSat-2 GOP Baseline-C data. It complements the material for the accompanying paper but would have made the paper too long when incorporated in the paper itself.

In our CryoSat-2 vs. concurrent altimetry we present in the paper the geographical maps for average bias for SLA, SWH and wind speed. Here, Figure S1 gives the result for mean crossover difference for backscatter (σ^0) between GOP Cryosat-2 and all the other concurrent altimeter satellite missions/phases, and Figure S2 for sea state bias (SSB). Due to CryoSat-2's orbit, the number of crossovers within $|\Delta t| < 2$ days is limited which results in a typical banded pattern for the case where GOP CryoSat-2 crosses RADS CryoSat-2. As with the SLA, SWH and wind speed plots in the paper, these plots give insight on how the biases are distributed geographically. They have been averaged over the period in which the two crossing satellites overlap. In the σ^0 (Figure S1) we notice outstanding biases for Jason-3/a and Sentinel 6A, and in the sea state bias (Figure S2) outstanding differences with the SARALs and to a lesser extend with Jason-2/a. Though sea state bias should not be compared directly because they are tailored to each satellite/mission/phase (except for CryoSat-2 GOP Baseline-C).

In our CryoSat-2 vs. tide gauges we present the statistics of the differences of CryoSat-2 GOP Baseline-C ('cg') and our reference missions Jason-2 and Jason-3 ('ref') with a selected set of 309 tide gauges from the PSMSL sea level service. Here, in Table S1, we give the results for each individual station. Obviously this table is too long to incorporate in the paper.

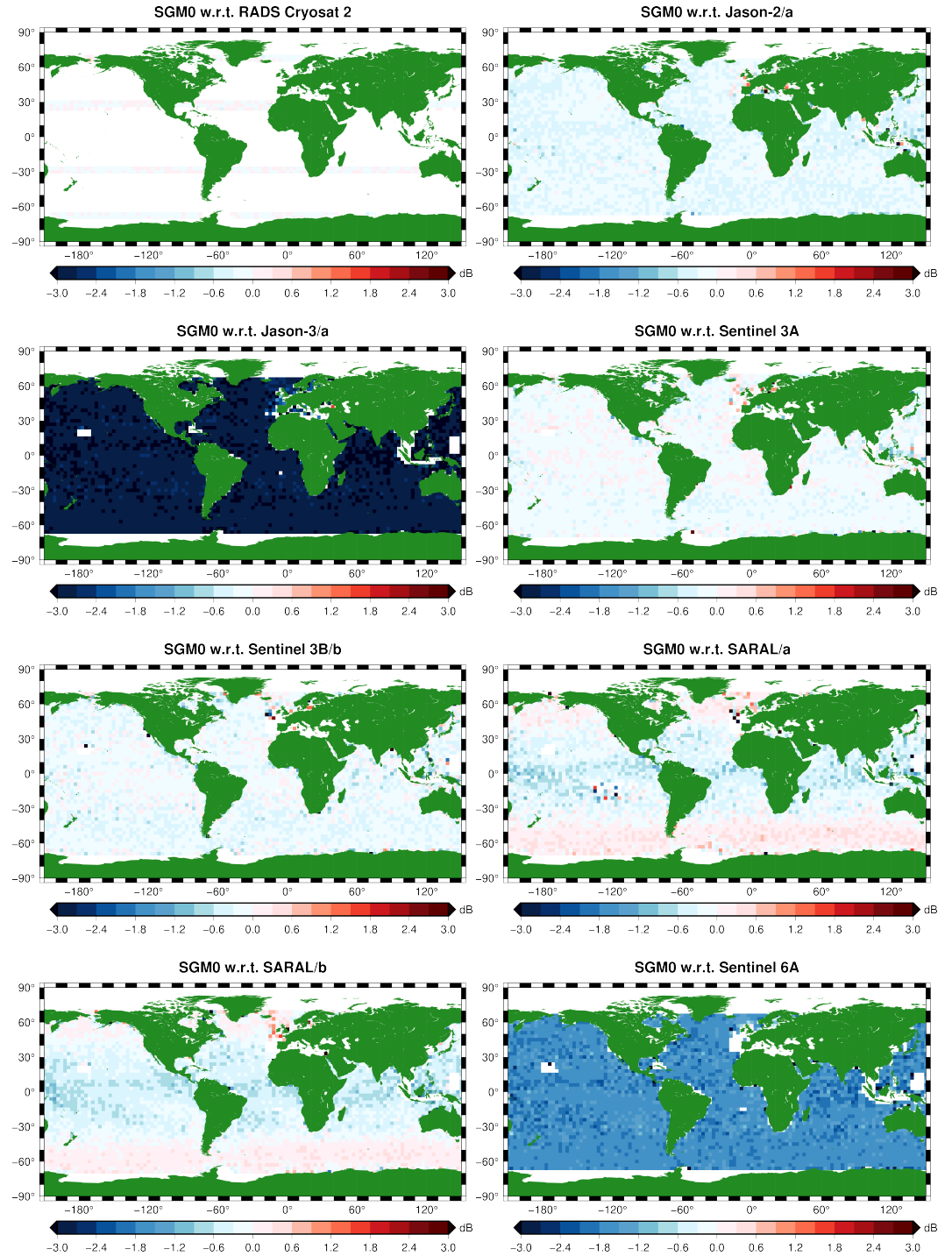


Figure S1. Mean backscatter (σ^0) crossover differences between GOP CryoSat-2 and the concurrent altimeter missions RADS CryoSat-2, Jason-2, Jason-3, Sentinel-3A, Sentinel-3B, SARAL, and Sentinel-6A.

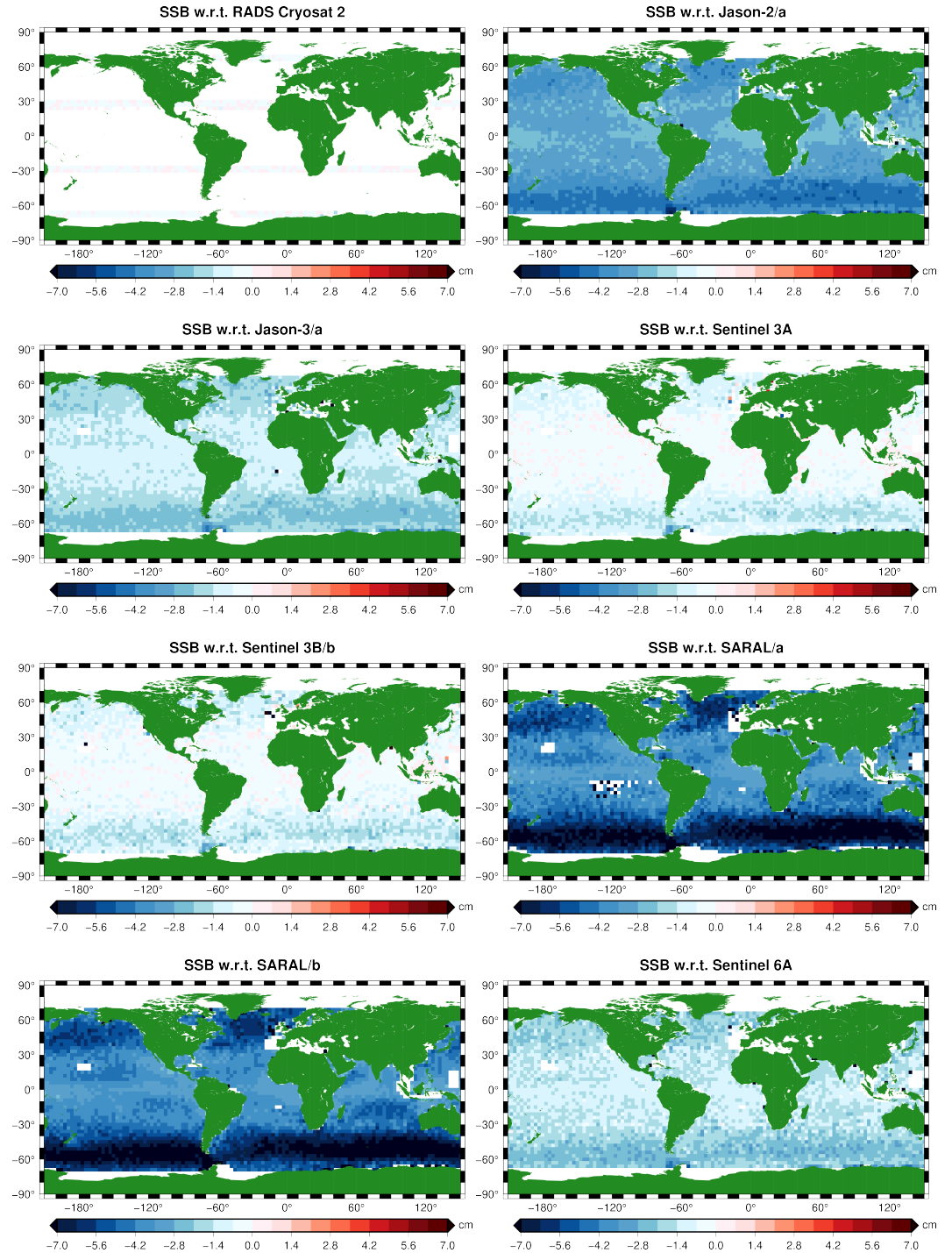


Figure S2. Mean sea state bias (SSB) crossover differences between GOP CryoSat-2 and the concurrent altimeter missions RADS CryoSat-2, Jason-2, Jason-3, Sentinel-3A, Sentinel-3B, SARAL, and Sentinel-6A.

Table S1. Statistics comparing PSMSL tide gauges with GOP CryoSat-2 (index 'cg') and Jason-2/Jason-3 (index 'ref'). Given are station name, location, correlation R, standard deviation σ , slope y' between tide gauge and altimeter data, and GIA correction.

Station	lon	lat	R _{cg}	R _{ref}	σ_{cg}	σ_{ref}	y'_{cg}	y'_{ref}	GIA
	[°E]	[°N]			[cm]		[mm/yr]		
BREST	-4.49	48.38	0.785	0.821	0.058	0.053	-2.18	1.47	0.22
SAN FRANCISCO	-122.47	37.81	0.800	0.661	0.039	0.048	2.03	-0.38	0.42
SAN JUAN	-66.11	18.46	0.923	0.893	0.021	0.025	2.45	3.41	0.09
OSHOBO II	140.86	43.21	0.906	0.873	0.036	0.048	2.28	0.44	-0.34
HIROSIMA	132.46	34.35	0.746	0.924	0.102	0.052	2.59	1.96	-0.43
STONY POINT	145.22	-38.37	0.713	0.863	0.071	0.039	0.77	-0.36	-0.33
TAI PO KAU, TOL	114.18	22.44	0.761	0.872	0.076	0.059	3.31	3.24	-0.34
MATSUYAMA II	132.71	33.86	0.659	0.892	0.119	0.059	5.16	4.77	-0.43
WHANGAREI HARBO	174.35	-35.76	0.703	0.722	0.044	0.043	-0.64	-1.15	-0.29
JEJU	126.54	33.53	0.898	0.949	0.061	0.042	2.52	0.51	-0.31
BRIDGEPORT	-73.18	41.17	0.823	0.794	0.049	0.050	0.11	-0.86	1.12
PORT HARDY	-127.48	50.72	0.836	0.903	0.058	0.046	4.25	2.98	-0.29
AWA SIMA	139.25	38.47	0.901	0.868	0.047	0.060	2.25	2.60	-0.42
HAKATA	130.41	33.62	0.919	0.943	0.054	0.045	-1.92	-0.57	-0.42
SAIGO	133.33	36.20	0.949	0.959	0.039	0.037	0.44	-1.83	-0.28
NISINOOMOTE	130.99	30.73	0.923	0.822	0.053	0.089	-0.74	4.17	-0.19
OSAKA	135.43	34.66	0.893	0.917	0.056	0.049	5.10	0.36	-0.45
NAGASAKI	129.87	32.73	0.907	0.963	0.061	0.038	0.39	-1.04	-0.35
FUKUE	128.85	32.70	0.920	0.967	0.057	0.035	-0.24	-0.12	-0.31
OURA	130.22	32.98	0.889	0.937	0.067	0.050	5.73	5.37	-0.38
WAKKANAI	141.69	45.41	0.834	0.803	0.040	0.043	-0.76	-0.49	-0.34
ABASHIRI	144.29	44.02	0.681	0.510	0.050	0.061	2.83	5.86	-0.40
NAKANO SIMA	129.85	29.84	0.939	0.908	0.045	0.058	-0.98	0.53	-0.13
FORT MYERS	-81.87	26.65	0.816	0.873	0.055	0.044	-2.58	-1.60	0.12
NAPLES	-81.81	26.13	0.860	0.914	0.047	0.036	-3.55	-3.61	0.12
MUKHO	129.12	37.55	0.784	0.756	0.057	0.061	3.55	5.56	-0.30
FREMANTLE	115.74	-32.06	0.776	0.837	0.068	0.052	-4.58	-4.83	-0.25
NANTUCKET ISLAN	-70.10	41.28	0.793	0.836	0.044	0.037	-1.76	-1.34	1.30
HELGEROA	9.86	59.00	0.758	0.724	0.071	0.072	-0.42	1.90	-3.04
ESPERANCE	121.90	-33.87	0.727	0.845	0.056	0.042	0.78	-0.06	-0.18
FERNANDINA BEAC	-81.47	30.67	0.724	0.906	0.093	0.049	-1.05	-1.87	0.35
SASEBO II	129.72	33.16	0.913	0.955	0.060	0.044	-0.40	-0.32	-0.38
TAJIRI	134.32	35.59	0.951	0.945	0.042	0.044	-3.93	-4.30	-0.39
NAHA	127.67	26.21	0.924	0.956	0.046	0.035	1.65	0.59	-0.15
PATRICIA BAY	-123.45	48.65	0.755	0.820	0.073	0.059	-0.99	0.90	0.26
CAPE MAY	-74.96	38.97	0.755	0.819	0.066	0.059	-1.67	-0.82	1.20
BUNDABERG, BURN	152.38	-24.77	0.516	0.635	0.091	0.063	-4.13	-3.84	-0.27
DAUPHIN ISLAND	-88.08	30.25	0.880	0.873	0.056	0.053	-2.36	-5.71	0.44
BROOME	122.22	-18.00	0.775	0.847	0.078	0.060	1.28	-4.84	-0.23
MILNER BAY (GRO	136.42	-13.86	0.973	0.984	0.051	0.039	-1.78	-1.88	-0.25
APALACHICOLA	-84.98	29.73	0.850	0.911	0.058	0.043	-4.27	-3.84	0.42
SOUTH BEACH	-124.04	44.62	0.744	0.643	0.078	0.088	1.99	1.18	1.09
NEW YORK (THE B	-74.01	40.70	0.792	0.748	0.062	0.063	2.35	-1.44	1.26
TOKUYAMA II	131.80	34.04	0.661	0.915	0.119	0.056	-1.42	-0.47	-0.44
SPIKARNA	17.53	62.36	0.894	0.967	0.080	0.044	0.59	-0.51	-8.01
UWAJIMA II	132.55	33.23	0.894	0.825	0.053	0.078	-1.98	-3.63	-0.41
SPRING BAY	147.93	-42.55	0.667	0.539	0.056	0.062	0.20	-0.68	-0.18
LEROS	26.85	37.13	0.717	0.863	0.051	0.038	1.46	-2.47	0.04
GOTEBORG - TORS	11.79	57.68	0.820	0.796	0.066	0.067	1.26	2.03	-1.85
KHALKIS NORTH	23.59	38.47	0.793	0.819	0.054	0.047	3.49	1.71	-0.04
RORVIK	11.23	64.86	0.772	0.934	0.088	0.056	0.45	2.70	-2.06
BAMFIELD	-125.13	48.85	0.857	0.866	0.058	0.056	5.10	1.22	0.60
PORT TUDY	-3.45	47.64	0.808	0.790	0.051	0.052	2.58	3.82	0.12

Table S1. (continued)

Station	lon	lat	R _{cg}	R _{ref}	σ_{cg}	σ_{ref}	y'_{cg}	y'_{ref}	GIA
	[°E]	[°N]			[cm]		[mm/yr]		
OGA	139.71	39.94	0.848	0.798	0.057	0.066	4.43	3.22	-0.34
AKUNE	130.19	32.02	0.924	0.941	0.053	0.046	-1.20	-1.39	-0.29
CHARLESTON II	-124.32	43.34	0.788	0.549	0.065	0.085	3.43	1.54	0.91
SEATTLE	-122.34	47.60	0.790	0.778	0.066	0.060	-5.00	-3.20	0.70
OITA II	131.69	33.27	0.754	0.826	0.089	0.080	-0.71	-4.33	-0.42
CAMBRIDGE II	-76.07	38.57	0.728	0.799	0.083	0.065	2.89	0.37	0.92
CABO DE SAN ANT	-84.90	21.90	0.730	0.729	0.053	0.052	-3.55	-3.32	0.26
NORTH SYDNEY	-60.25	46.22	0.724	0.704	0.049	0.048	-1.28	1.22	1.45
CONCARNEAU	-3.91	47.87	0.843	0.850	0.047	0.045	-1.36	1.79	0.17
WAJIMA	136.90	37.41	0.935	0.941	0.044	0.042	-0.16	-2.15	-0.37
KURE I	133.24	33.33	0.887	0.774	0.057	0.087	-2.78	-0.09	-0.41
ARGENTIA	-53.98	47.30	0.863	0.718	0.040	0.053	0.25	-0.96	0.27
PORT TOWNSEND	-122.76	48.11	0.771	0.800	0.072	0.060	-0.47	1.42	0.50
ROSCOFF	-3.97	48.72	0.753	0.784	0.069	0.069	-3.34	0.72	0.15
PHILADELPHIA (P	-75.14	39.93	0.627	0.602	0.097	0.101	-1.18	-2.85	1.25
MONTEREY	-121.89	36.60	0.850	0.824	0.034	0.035	2.27	-0.13	0.40
TOKE POINT, WIL	-123.97	46.71	0.750	0.567	0.098	0.118	1.21	-0.85	1.29
SOKCHO	128.59	38.21	0.760	0.772	0.063	0.061	3.36	3.77	-0.32
TSIM BEI TSUI	114.01	22.49	0.789	0.865	0.065	0.054	-3.77	-2.13	-0.35
KUCHINOTSU	130.20	32.61	0.907	0.951	0.059	0.042	1.28	-0.20	-0.35
MAIZURU II	135.39	35.48	0.953	0.945	0.039	0.043	-0.53	-2.45	-0.45
OKINAWA	127.82	26.18	0.909	0.938	0.051	0.043	0.31	-0.42	-0.15
TOYAMA	137.22	36.76	0.946	0.945	0.040	0.040	0.91	-3.07	-0.46
CHICHIJIMA	142.18	27.08	0.911	0.960	0.040	0.027	-5.51	-2.76	-0.18
POINT REYES	-122.98	37.99	0.762	0.552	0.043	0.058	1.96	-0.66	0.50
MANGALORE (PANA	74.80	12.92	0.823	0.821	0.057	0.056	-2.10	-2.01	-0.31
GADEOKDO	128.81	35.02	0.895	0.928	0.055	0.045	-3.01	-1.37	-0.44
TONGYEONG	128.43	34.83	0.882	0.933	0.061	0.043	0.47	0.52	-0.44
LIME TREE BAY,	-64.75	17.69	0.941	0.943	0.020	0.018	1.58	1.79	0.07
SINES	-8.88	37.95	0.794	0.869	0.038	0.029	-0.33	1.07	-0.08
NICE	7.29	43.70	0.871	0.852	0.037	0.036	0.38	0.13	0.01
PORT VENDRES	3.11	42.52	0.780	0.828	0.049	0.041	-0.97	1.71	-0.01
HEUKSANDO	125.44	34.68	0.909	0.929	0.059	0.049	3.24	0.80	-0.33
ULLEUNG	130.91	37.49	0.839	0.821	0.063	0.066	3.50	1.68	-0.13
TOBERMORY	-6.06	56.62	0.830	0.885	0.064	0.049	2.18	-0.40	-1.08
POINTE DES GALE	55.29	-20.93	0.940	0.944	0.029	0.028	-0.65	0.35	-0.04
NASE III	129.50	28.50	0.953	0.975	0.041	0.030	0.53	-1.77	-0.12
TRIESTE	13.76	45.65	0.823	0.873	0.056	0.047	1.93	2.07	-0.14
GEOMUNDO	127.31	34.03	0.859	0.913	0.069	0.054	-4.94	-5.85	-0.37
PORTLAND	141.61	-38.34	0.775	0.817	0.047	0.043	0.27	0.42	-0.15
HONOLULU	-157.87	21.31	0.923	0.888	0.025	0.030	-1.38	-2.70	-0.19
ROOMPOT BUITEN	3.68	51.62	0.553	0.724	0.110	0.070	-4.15	1.91	-0.03
WANDO	126.76	34.32	0.880	0.911	0.064	0.055	-0.10	-0.54	-0.37
SAN DIEGO (QUAR	-117.17	32.71	0.913	0.867	0.029	0.035	-2.17	1.63	0.24
HAMADA II	132.07	34.90	0.957	0.962	0.040	0.038	-0.62	-3.01	-0.40
IZUHARA II	129.29	34.20	0.934	0.953	0.049	0.040	-3.34	-2.02	-0.43
CHUJADO	126.30	33.96	0.876	0.907	0.066	0.057	1.51	1.11	-0.33
TAURANGA (SALIS	176.18	-37.64	0.587	0.680	0.056	0.039	4.36	0.87	-0.43
GISBORNE	178.02	-38.68	0.711	0.712	0.043	0.040	-1.52	-2.26	-0.34
SEOGWIPO	126.56	33.24	0.888	0.914	0.062	0.054	-3.73	-3.51	-0.29
SAND POINT, POP	-160.50	55.34	0.923	0.946	0.057	0.049	-3.70	-4.47	-0.15
DUCK PIER OUTSI	-75.75	36.18	0.823	0.714	0.060	0.072	5.05	2.31	0.73
BERGEN POINT, S	-74.14	40.64	0.761	0.743	0.068	0.064	4.23	0.34	1.27
CLEARWATER BEAC	-82.83	27.98	0.841	0.860	0.057	0.054	-1.59	-4.46	0.23
N. SPIT, HUMBOL	-124.22	40.77	0.793	0.829	0.049	0.045	-0.92	-2.02	0.64
PANAMA CITY, ST	-85.67	30.15	0.893	0.924	0.049	0.040	-1.63	-2.50	0.43

Table S1. (continued)

Station	lon	lat	R _{cg}	R _{ref}	σ_{cg}	σ_{ref}	y'_{cg}	y'_{ref}	GIA
	[°E]	[°N]			[cm]		[mm/yr]		
PORT CHALMERS	170.62	-45.81	0.648	0.795	0.052	0.033	-0.55	-2.18	-0.34
TOFINO	-125.92	49.15	0.804	0.759	0.072	0.077	5.90	0.67	0.60
VICTORIA	-123.37	48.42	0.796	0.849	0.064	0.052	-0.43	-0.77	0.42
PRINCE RUPERT	-130.33	54.32	0.819	0.836	0.066	0.059	0.17	1.59	-0.57
ISHIGAKI II	124.16	24.33	0.944	0.966	0.044	0.034	2.58	1.88	-0.07
RODRIGUES IS	63.42	-19.67	0.914	0.910	0.035	0.035	-3.63	-3.87	-0.07
PORT LOUIS II	57.50	-20.15	0.944	0.954	0.028	0.026	-1.52	-1.19	-0.09
QUARRY BAY	114.21	22.29	0.745	0.895	0.077	0.053	3.74	3.68	-0.33
LAKE WORTH PIER	-80.03	26.61	0.702	0.658	0.072	0.074	1.65	-0.65	0.17
ANHEUNG	126.13	36.67	0.787	0.932	0.109	0.052	2.62	-3.19	-0.44
VACA KEY	-81.11	24.71	0.820	0.854	0.055	0.046	2.79	-0.59	0.08
KO LAK	99.82	11.80	0.916	0.964	0.066	0.044	-2.34	-3.91	-0.36
LES SABLES D OL	-1.79	46.50	0.749	0.745	0.064	0.062	2.48	0.14	-0.04
TRONDHEIM 2	10.39	63.44	0.802	0.924	0.081	0.046	2.62	2.16	-3.07
NAPIER	176.92	-39.48	0.735	0.777	0.048	0.034	-0.60	-2.67	-0.40
SAN FELIX	-80.11	-26.29	0.554	0.564	0.039	0.039	4.17	5.10	-0.19
VIKER	10.95	59.04	0.724	0.702	0.084	0.082	0.41	3.29	-3.51
ROSSLYN BAY	150.79	-23.16	0.704	0.654	0.077	0.070	-0.02	-3.79	-0.36
HILLARYS	115.74	-31.83	0.800	0.856	0.064	0.048	-3.22	-4.05	-0.25
POINTE-A-PITRE	-61.53	16.22	0.922	0.914	0.025	0.026	1.39	2.24	0.02
TAKAMATSU II	134.06	34.35	0.814	0.891	0.084	0.063	3.04	2.70	-0.44
SMOGEN	11.22	58.35	0.771	0.759	0.072	0.070	1.70	3.08	-2.68
KOBE II	135.19	34.68	0.894	0.924	0.059	0.048	1.83	-2.99	-0.45
PORT ERIN	-4.77	54.09	0.775	0.753	0.068	0.082	-1.06	1.96	-0.59
WORKINGTON	-3.57	54.65	0.711	0.674	0.091	0.107	-3.07	-2.08	-0.67
WINTER HARBOUR	-128.03	50.52	0.785	0.808	0.084	0.082	5.21	4.97	0.22
ATLANTIC CITY	-74.42	39.35	0.812	0.832	0.056	0.053	-0.48	-0.90	1.33
LAS PALMAS D	-15.41	28.14	0.870	0.902	0.028	0.023	0.12	-0.41	0.05
TENERIFE	-16.24	28.48	0.888	0.933	0.029	0.022	0.03	-0.08	0.09
BETIO	172.93	1.37	0.943	0.957	0.021	0.018	0.83	0.58	-0.14
LAUTOKA	177.44	-17.60	0.898	0.894	0.024	0.024	1.31	1.59	-0.24
BILBAO	-3.05	43.35	0.774	0.767	0.047	0.045	0.56	-0.73	-0.16
SANTANDER III	-3.79	43.46	0.753	0.771	0.050	0.045	1.55	-0.05	-0.11
LA CORUNA III	-8.39	43.36	0.764	0.755	0.049	0.046	0.52	2.75	0.00
BONANZA	-6.34	36.80	0.783	0.783	0.046	0.043	2.12	0.34	-0.20
BARCELONA	2.17	41.34	0.835	0.814	0.046	0.053	-0.91	-0.25	0.03
VALENCIA	-0.31	39.44	0.808	0.860	0.050	0.041	-1.00	-3.37	-0.11
PORTLAND (MAIN	-70.25	43.66	0.610	0.635	0.059	0.055	0.03	2.52	-0.26
LORNE	143.99	-38.55	0.757	0.859	0.055	0.041	0.02	-0.15	-0.28
MAJURO-C	171.37	7.11	0.977	0.966	0.016	0.020	-0.31	-1.25	-0.14
FUNAFUTI B	179.20	-8.50	0.956	0.974	0.020	0.015	-0.35	-0.39	-0.11
PORT VILA B	168.31	-17.76	0.887	0.869	0.030	0.032	3.34	4.47	-0.08
NUKU'ALOFA B	-175.18	-21.14	0.879	0.882	0.028	0.028	-5.04	-4.59	-0.13
RAROTONGA B	-159.78	-21.20	0.880	0.909	0.025	0.022	-0.99	-0.79	-0.16
NAURU-B	166.91	-0.53	0.837	0.831	0.043	0.044	-3.15	-2.88	-0.11
VIRGINIA KEY, F	-80.16	25.73	0.736	0.798	0.067	0.058	-0.20	-2.22	0.11
LOMBRUM	147.37	-2.04	0.965	0.966	0.018	0.018	-1.63	-2.73	0.02
HONIARA-B	159.96	-9.43	0.975	0.968	0.020	0.026	-1.96	0.30	-0.17
GIJON II	-5.70	43.56	0.804	0.795	0.045	0.044	2.53	1.70	-0.05
KEY WEST	-81.81	24.55	0.816	0.857	0.054	0.046	0.46	-1.75	0.12
HUELVA	-6.83	37.13	0.848	0.845	0.038	0.037	0.02	-1.28	-0.20
TAI MIU WAN	114.29	22.27	0.700	0.805	0.085	0.071	1.59	-0.20	-0.32
SHEK PIK	113.89	22.22	0.797	0.875	0.066	0.053	2.56	3.06	-0.33
PORT BLOC	-1.06	45.57	0.695	0.647	0.071	0.072	1.96	-0.74	-0.11
LE CROUESTY	-2.90	47.54	0.752	0.742	0.063	0.062	0.14	1.24	0.06
HUPO	129.45	36.68	0.844	0.861	0.056	0.056	0.67	1.36	-0.33

Table S1. (continued)

Station	lon	lat	R _{cg}	R _{ref}	σ_{cg}	σ_{ref}	y'_{cg}	y'_{ref}	GIA
	[°E]	[°N]			[cm]		[mm/yr]		
YEONGGWANG	126.42	35.43	0.723	0.883	0.118	0.066	-2.65	-4.24	-0.42
AJACCIO	8.76	41.92	0.912	0.940	0.033	0.028	0.86	0.83	0.21
IBIZA	1.45	38.91	0.921	0.944	0.034	0.028	-0.55	-2.82	0.15
SEONGSANPO	126.93	33.47	0.895	0.957	0.060	0.038	-0.29	-2.36	-0.31
MOTRIL 2	-3.52	36.72	0.805	0.837	0.046	0.042	-2.62	-3.76	-0.21
VLISSINGEN	3.60	51.44	0.559	0.761	0.114	0.064	-4.86	1.97	-0.06
ILE ROYALE	-52.59	5.28	0.828	0.768	0.028	0.027	-0.11	-0.00	-0.24
FURUOGRUND	21.23	64.92	0.846	0.950	0.115	0.060	-1.78	-1.02	-9.63
CAP AUX MEULES	-61.86	47.38	0.620	0.660	0.048	0.045	1.75	1.81	2.13
GEOJEDO	128.70	34.80	0.890	0.927	0.060	0.048	-1.50	-1.16	-0.44
JINDO	126.31	34.38	0.877	0.898	0.066	0.060	1.81	1.94	-0.36
FUERTEVENTURA	-13.86	28.49	0.847	0.935	0.029	0.019	-1.38	-1.24	-0.01
FERROL 2	-8.25	43.48	0.744	0.710	0.052	0.052	0.68	3.34	0.01
TARIFA 2	-5.60	36.01	0.837	0.848	0.040	0.035	1.75	-0.39	-0.18
ALGECIRAS 2	-5.40	36.18	0.795	0.833	0.045	0.038	0.59	-2.31	-0.19
ALMERIA 2	-2.48	36.83	0.837	0.780	0.047	0.064	1.38	-2.07	-0.16
MELILLA	-2.93	35.29	0.824	0.851	0.048	0.053	-1.23	-3.72	-0.18
GANDIA	-0.15	39.00	0.805	0.844	0.050	0.047	0.96	1.02	-0.05
SAGUNTO	-0.21	39.63	0.813	0.855	0.049	0.041	-0.47	-3.93	-0.11
FORMENTERA	1.42	38.73	0.916	0.938	0.036	0.031	-3.13	-4.83	0.15
PALMA DE MALLOR	2.64	39.56	0.907	0.926	0.038	0.033	1.17	-0.52	0.25
MAHON	4.27	39.89	0.933	0.945	0.036	0.031	-1.44	-1.48	0.36
ALCUDIA	3.14	39.83	0.921	0.935	0.035	0.031	0.60	0.51	0.29
LA PALMA	-17.77	28.68	0.861	0.907	0.031	0.026	2.20	2.12	0.08
LA GOMERA	-17.11	28.09	0.851	0.821	0.033	0.036	-1.94	-2.29	0.09
ARRECIFE 2	-13.53	28.97	0.879	0.944	0.027	0.018	-0.69	-0.11	0.01
IMPERIA	8.02	43.88	0.849	0.844	0.040	0.037	0.66	-0.20	-0.02
LIVORNO II	10.30	43.55	0.800	0.699	0.048	0.059	0.03	-0.97	-0.03
OTRANTO II	18.50	40.15	0.836	0.896	0.044	0.036	-1.81	0.20	0.03
ANCONA II	13.51	43.62	0.825	0.845	0.051	0.051	1.51	2.24	-0.07
FORSMARK	18.21	60.41	0.903	0.959	0.072	0.048	2.68	0.97	-5.97
VISBY	18.28	57.64	0.932	0.971	0.052	0.034	2.70	-0.57	-1.50
OSKARSHAMN	16.48	57.27	0.893	0.972	0.066	0.032	2.77	1.52	-1.39
SIMRISHAMN	14.36	55.56	0.926	0.918	0.044	0.049	-0.66	-0.48	-0.39
SKANOR	12.83	55.42	0.877	0.871	0.049	0.055	1.62	4.41	-0.22
BARSEBACK	12.90	55.76	0.891	0.854	0.046	0.059	-0.93	1.51	-0.32
VIKEN	12.58	56.14	0.882	0.774	0.048	0.075	0.70	2.44	-0.46
RINGHALS	12.11	57.25	0.840	0.809	0.061	0.063	1.14	2.19	-1.35
STENUNGSUND	11.83	58.09	0.796	0.779	0.073	0.073	0.46	1.22	-2.42
KUNGSVIK	11.13	59.00	0.727	0.711	0.085	0.083	0.72	3.35	-3.52
CHRISTIANSTED H	-64.70	17.75	0.946	0.938	0.019	0.019	0.49	0.67	0.07
LAMESHUR BAY	-64.72	18.32	0.948	0.959	0.017	0.015	-0.93	-0.35	0.07
MONA ISLAND	-67.94	18.09	0.877	0.839	0.028	0.030	0.02	0.67	0.03
TRIDENT PIER, P	-80.59	28.41	0.771	0.925	0.075	0.043	-0.17	-2.55	0.29
ARENA COVE, CAL	-123.71	38.91	0.614	0.538	0.059	0.064	0.53	-0.63	0.58
SANTA BARBARA,	-119.69	34.41	0.885	0.774	0.032	0.042	2.59	5.32	0.27
PORT ANGELES, W	-123.44	48.12	0.848	0.872	0.056	0.051	0.87	1.22	0.64
KAWAIHAE, HAWA	-155.83	20.04	0.914	0.893	0.030	0.033	-2.41	-0.99	-0.22
BLUFF (SOUTHLAN	168.35	-46.60	0.787	0.824	0.041	0.034	-3.78	-5.84	-0.29
LANDSORT NORRA	17.86	58.77	0.921	0.940	0.060	0.052	1.24	-0.96	-3.16
NOUMEA-NUMBO	166.42	-22.24	0.863	0.931	0.029	0.020	1.02	-2.13	-0.17
BONAVISTA	-53.12	48.65	0.803	0.692	0.054	0.066	1.89	-2.08	0.31
REGGIO CALABRIA	15.65	38.12	0.811	0.808	0.043	0.044	2.04	5.64	0.17
PORTO GARIBALDI	12.25	44.68	0.789	0.863	0.062	0.050	-1.94	-2.11	-0.13
HOEK VAN HOLLAN	4.12	51.98	0.704	0.763	0.094	0.066	-1.19	2.11	0.04
WELLINGTON HARB	174.78	-41.28	0.611	0.536	0.053	0.049	5.64	3.09	-0.37

Table S1. (continued)

Station	lon	lat	R _{cg}	R _{ref}	σ_{cg}	σ_{ref}	y'_{cg}	y'_{ref}	GIA
	[°E]	[°N]			[cm]		[mm/yr]		
LEWES (BREAKWAT	-75.12	38.78	0.735	0.820	0.070	0.059	-2.08	-1.60	1.14
KETCHIKAN	-131.62	55.33	0.810	0.845	0.068	0.059	-2.33	-2.50	-0.21
DEN HELDER	4.75	52.96	0.768	0.839	0.084	0.061	0.76	0.94	0.30
CHARLESTON I	-79.92	32.78	0.781	0.935	0.072	0.039	-5.25	-3.78	0.51
BOSTON	-71.05	42.35	0.633	0.674	0.071	0.057	-2.38	-0.80	0.49
WEST-TERSCHELLI	5.22	53.36	0.775	0.872	0.082	0.059	0.80	0.82	0.43
DELFIJL	6.93	53.33	0.760	0.890	0.088	0.059	-2.96	-2.90	0.37
LOS ANGELES	-118.27	33.72	0.926	0.848	0.026	0.036	-1.55	2.74	0.22
PORT LYTTTELTON	172.72	-43.61	0.714	0.625	0.052	0.051	-3.02	-4.59	-0.37
HARLINGEN	5.41	53.18	0.722	0.834	0.098	0.073	1.17	0.96	0.36
SEWELLS POINT,	-76.33	36.95	0.776	0.749	0.072	0.069	3.71	0.93	0.62
HILO, HAWAII I	-155.06	19.73	0.897	0.900	0.032	0.031	-3.75	-2.70	-0.21
TREGDE	7.55	58.01	0.834	0.887	0.048	0.040	-0.66	-0.49	-0.99
ANNAPOLIS (NAVA	-76.48	38.98	0.627	0.703	0.117	0.088	-0.12	-1.84	0.96
HEIMSJOEN	9.10	63.43	0.832	0.935	0.073	0.052	1.62	2.49	-2.11
IJMUIDEN	4.55	52.46	0.738	0.817	0.091	0.061	3.07	3.68	0.16
OSCARSBORG	10.60	59.68	0.713	0.688	0.095	0.093	-0.54	3.40	-4.07
KLAGSHAMN	12.89	55.52	0.898	0.894	0.045	0.050	-0.57	2.02	-0.25
NEWPORT	-71.33	41.51	0.798	0.841	0.047	0.040	0.22	-0.07	1.03
SANDY HOOK	-74.01	40.47	0.794	0.749	0.061	0.061	2.85	-1.67	1.32
WOODS HOLE (OCE	-70.67	41.52	0.797	0.839	0.046	0.038	-1.12	-1.75	1.09
PIRAIEVS	23.63	37.94	0.829	0.888	0.053	0.038	0.98	-0.36	0.01
SANTA MONICA (M	-118.50	34.01	0.928	0.852	0.025	0.035	-0.49	3.25	0.20
CRESCENT CITY	-124.18	41.74	0.736	0.792	0.055	0.050	4.90	3.58	0.69
FRIDAY HARBOR (-123.01	48.55	0.714	0.764	0.085	0.073	-2.13	-0.48	0.25
ST. JOHN'S, NFL	-52.72	47.57	0.800	0.787	0.053	0.051	-0.71	-1.09	0.48
FORT PULASKI	-80.90	32.03	0.646	0.899	0.111	0.049	-2.77	-2.70	0.44
SOLOMON'S ISLAN	-76.45	38.32	0.735	0.763	0.086	0.068	4.09	-1.28	0.81
SITKA	-135.34	57.05	0.783	0.743	0.072	0.076	3.41	2.77	-0.02
CEDAR KEY II	-83.03	29.14	0.816	0.882	0.068	0.051	-3.02	-3.10	0.24
NEW LONDON	-72.09	41.36	0.805	0.803	0.047	0.045	0.22	0.35	1.06
PROVIDENCE (STA	-71.40	41.81	0.763	0.786	0.053	0.048	-0.84	-0.96	0.83
ALAMEDA (NAVAL	-122.30	37.77	0.752	0.664	0.044	0.048	2.23	0.18	0.40
ST. NAZAIRE	-2.20	47.27	0.700	0.714	0.074	0.068	3.86	4.30	-0.02
LA ROCHELLE-LA	-1.22	46.16	0.693	0.673	0.074	0.071	3.64	1.05	-0.10
CHERBOURG	-1.64	49.65	0.692	0.826	0.085	0.053	-0.44	0.46	-0.08
STAVANGER	5.73	58.97	0.768	0.891	0.064	0.045	4.09	3.18	-1.14
MALOY	5.11	61.93	0.800	0.921	0.075	0.056	4.46	3.56	-0.61
ADAK SWEEPER C	-176.63	51.86	0.867	0.825	0.043	0.048	1.82	2.74	-0.10
VALPARAISO	-71.63	-33.03	0.631	0.680	0.046	0.043	-5.71	-3.89	-0.36
PORT SAN LUIS	-120.76	35.18	0.783	0.849	0.042	0.035	3.04	1.99	0.33
ALESUND	6.15	62.47	0.804	0.913	0.078	0.060	4.15	2.80	-0.85
KWAJALEIN	167.74	8.73	0.968	0.978	0.018	0.015	-1.15	-0.63	-0.15
MONTAUK	-71.96	41.05	0.831	0.850	0.043	0.039	1.27	1.07	1.24
ST. PETERSBURG	-82.63	27.76	0.835	0.865	0.055	0.051	-0.91	-3.46	0.20
KAHULUI HARBOR,	-156.48	20.89	0.934	0.857	0.022	0.034	-0.24	2.20	-0.21
MIDWAY ISLAND	-177.36	28.21	0.823	0.828	0.039	0.039	0.18	0.02	-0.19
GRAND ISLE	-89.96	29.26	0.869	0.904	0.055	0.047	-2.66	-4.10	0.47
APRA HARBOR	144.65	13.44	0.969	0.986	0.026	0.016	-0.31	-0.23	-0.15
BODO	14.39	67.29	0.814	0.941	0.088	0.052	-1.46	1.02	-1.56
GIBARA	-76.12	21.11	0.801	0.812	0.050	0.048	4.38	2.46	-0.12
CORDOVA	-145.75	60.56	0.868	0.928	0.068	0.048	5.38	1.37	-0.04
BERGEN	5.32	60.40	0.722	0.904	0.075	0.045	5.12	1.53	-1.37
GENOVA	8.90	44.40	0.811	0.724	0.047	0.056	1.61	-0.47	-0.09
WAKE ISLAND	166.62	19.29	0.900	0.945	0.034	0.026	-0.91	0.25	-0.17
OSLO	10.73	59.91	0.696	0.687	0.103	0.096	-0.94	3.71	-4.33

Table S1. (continued)

Station	lon	lat	R _{cg}	R _{ref}	σ_{cg}	σ_{ref}	y'_{cg}	y'_{ref}	GIA
	[°E]	[°N]			[cm]		[mm/yr]		
KIPTOPEKE BEACH	-75.99	37.16	0.825	0.836	0.062	0.053	2.90	-1.73	0.72
TOWNSVILLE I	146.83	-19.25	0.795	0.767	0.051	0.052	-2.22	-0.33	-0.29
REYKJAVIK	-21.94	64.15	0.792	0.930	0.064	0.032	-1.34	-3.11	-1.46
KRISTIANSUND	7.73	63.11	0.798	0.923	0.079	0.058	2.21	2.91	-1.40
BURNIE	145.91	-41.05	0.747	0.797	0.052	0.039	-2.07	-1.59	-0.27
OLANDS NORRA UD	17.10	57.37	0.905	0.974	0.063	0.032	0.52	-1.49	-1.42
KUNGSHOLMSFORT	15.59	56.11	0.928	0.933	0.047	0.048	2.44	0.52	-0.61
NEZUGASEKI	139.55	38.56	0.882	0.856	0.054	0.062	-2.60	-2.91	-0.43
NAWILIWILI BAY,	-159.35	21.95	0.915	0.897	0.024	0.027	-0.07	0.12	-0.18
UNALASKA	-166.54	53.88	0.947	0.925	0.034	0.038	2.51	3.08	0.03
MAGUEYES ISLAND	-67.05	17.97	0.929	0.888	0.021	0.028	-0.08	0.57	0.07
STOCKHOLM	18.08	59.32	0.908	0.955	0.067	0.046	3.35	0.71	-4.03
REEDY POINT	-75.57	39.56	0.587	0.687	0.109	0.092	-2.00	-0.56	1.17
MONACO (FONTVIE	7.42	43.73	0.859	0.856	0.038	0.034	0.94	0.68	0.01
LEIXOES	-8.70	41.18	0.703	0.822	0.052	0.040	-0.85	0.33	-0.20
SAKAI	133.24	35.55	0.958	0.960	0.040	0.039	-0.49	-1.83	-0.36
UNO	133.95	34.49	0.797	0.898	0.090	0.060	1.79	1.04	-0.44
LORD HOWE ISLAN	159.07	-31.52	0.901	0.851	0.063	0.080	0.76	2.44	0.00
MAR DEL PLATA (-57.52	-38.03	0.622	0.597	0.084	0.081	-1.22	3.99	-0.42
MOKUOLOE ISLAND	-157.79	21.43	0.920	0.923	0.025	0.025	-1.35	-2.46	-0.19
QUEEN CHARLOTTE	-132.07	53.25	0.887	0.819	0.040	0.050	-0.74	-3.82	1.03
RATAN	20.89	63.99	0.867	0.953	0.099	0.058	-1.43	-0.77	-9.35
MAASSLUIS	4.25	51.92	0.679	0.712	0.100	0.073	-1.34	2.14	0.03
DARWIN	130.85	-12.47	0.698	0.926	0.106	0.045	-0.58	-1.62	-0.29
MOKPO	126.38	34.78	0.823	0.870	0.083	0.069	3.52	3.56	-0.39
BUSAN	129.04	35.10	0.883	0.897	0.062	0.056	-1.34	-0.02	-0.43
SETE	3.70	43.40	0.785	0.860	0.047	0.036	-2.84	-0.88	-0.09
DEVONPORT	-4.19	50.37	0.774	0.806	0.058	0.063	-4.29	-0.01	0.12
COCOS ISLAND (H	96.89	-12.12	0.951	0.974	0.034	0.024	-3.11	-2.07	-0.06
BELLA BELLA	-128.13	52.17	0.808	0.880	0.068	0.053	-0.12	0.59	-1.14
PORT TARANAKI	174.03	-39.06	0.588	0.784	0.057	0.038	-4.30	-2.66	-0.40
ULSAN	129.39	35.50	0.883	0.911	0.059	0.047	-1.62	-0.07	-0.41
mean	-	-	0.818	0.841	0.057	0.049	0.17	-0.11	-0.27