

30 Years of Progress in Radar Altimetry Symposium

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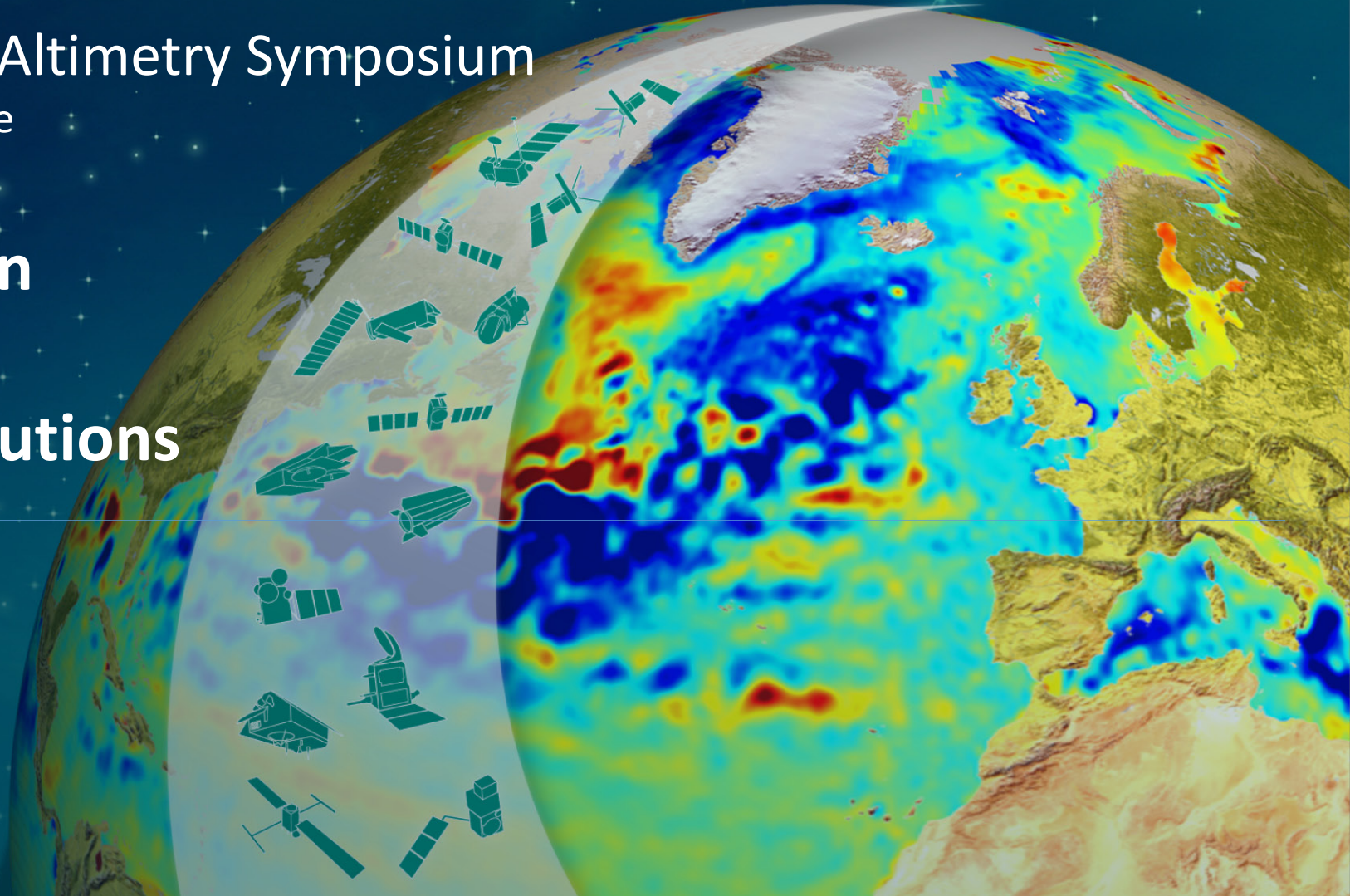
Exploring strategies for an optimal combination of mono-satellite DORIS solutions

*Karine Le Bail⁽¹⁾, Frank Lemoine⁽²⁾,
Guilhem Moreaux⁽³⁾*

*(1) Chalmers University of Technology /
Onsala Space Observatory*

(2) Goddard Space Flight Center / NASA

(3) CLS



Outline

- The question –

*Which **weights** to use to combine weekly mono-satellite solutions?*

- The data –

GSFC solutions from 3 January 2021 (21003) to 31 December 2023 (23365)

Combined (wd58) and 6 mono-satellite solutions

- The method –

CATREF used with 3 different weighting strategies

- The results –

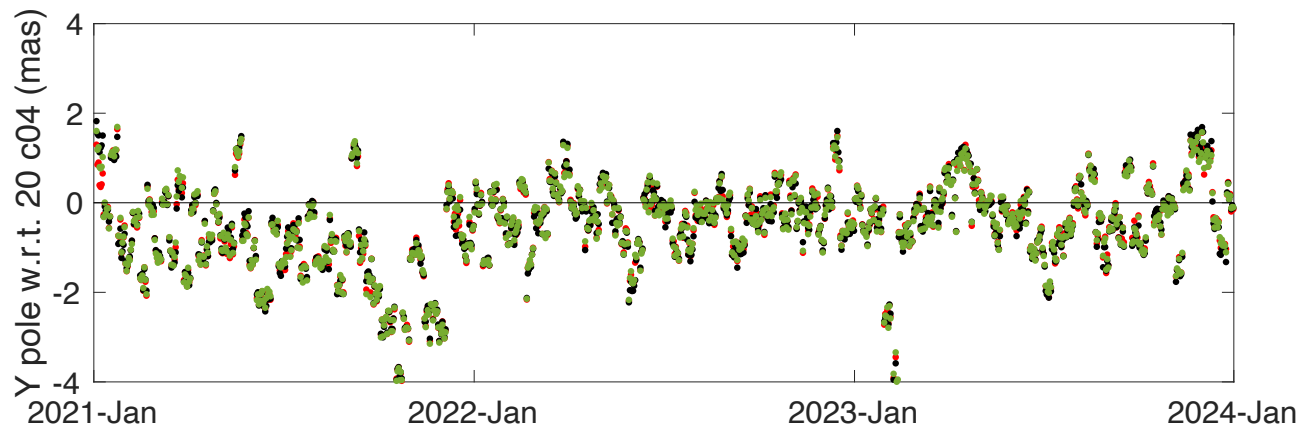
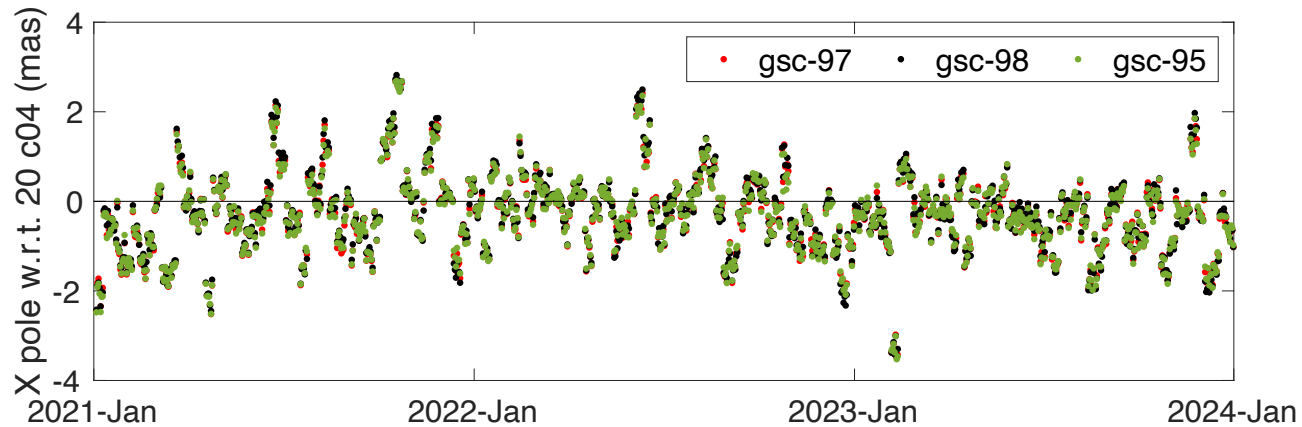
(X,Y) pole w.r.t. c04, 4 helmert parameters, WRMS ENU

Data and method

- Considered time period: 3 January 2021 (21003) to 31 December 2023 (23365)
- GSFC weekly SINEX solutions (see Lemoine et al. presentation):
 - GSFC mono-satellite solutions: CRYOSAT2, JASON-3, SARAL, SENTINEL-3A, SENTINEL-3B, SENTINEL-6A
 - GSFC combined solution: wd58 (gscwd55 + dpod2020 + Jason-3 downweighted w.r.t. S6A + MSIS2 atmosphere density model + apply nutation corrections)
- CATREF used with 3 different weighting strategies

gscwd58	Combined solution from GSFC Analysis Center
gscwd97	CATREF combination using unit weights
gscwd98	CATREF combination using CATREF function for weighting
gscwd95	CATREF combination using GSFC weights as indicated in SINEX files (wd58)

Results – (X,Y) pole comparison w.r.t. 20 c04



gscwd97: CATREF / unit wgts;
gscwd98: CATREF / CATREF;
gscwd95: CATREF / SLR fits

Evaluation of each series w.r.t. ITRF2020 without SAA stations

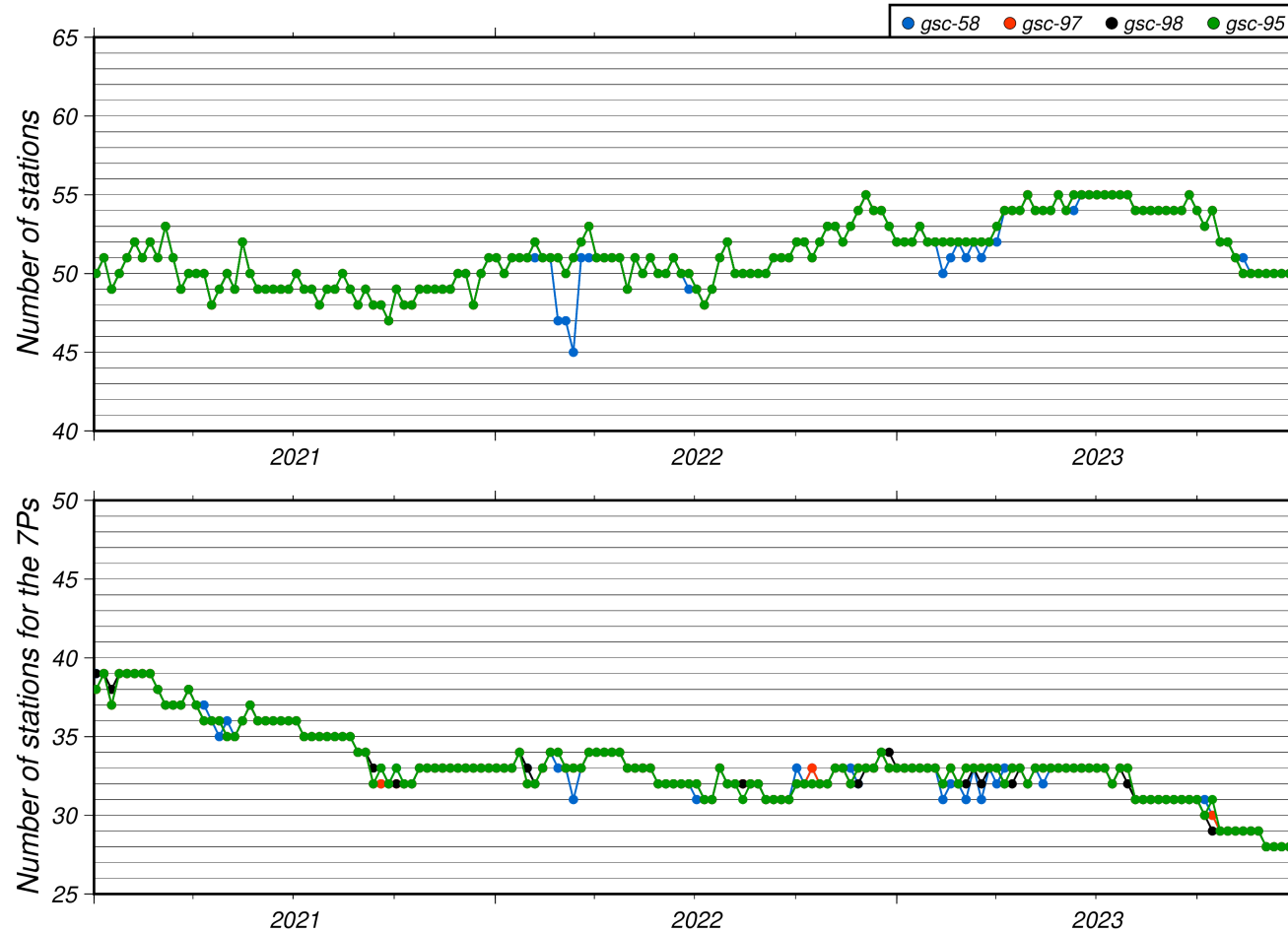
gscwd58: GSFC / SLR fits;

gscwd97: CATREF / unit wgts;

gscwd98: CATREF / CATREF;

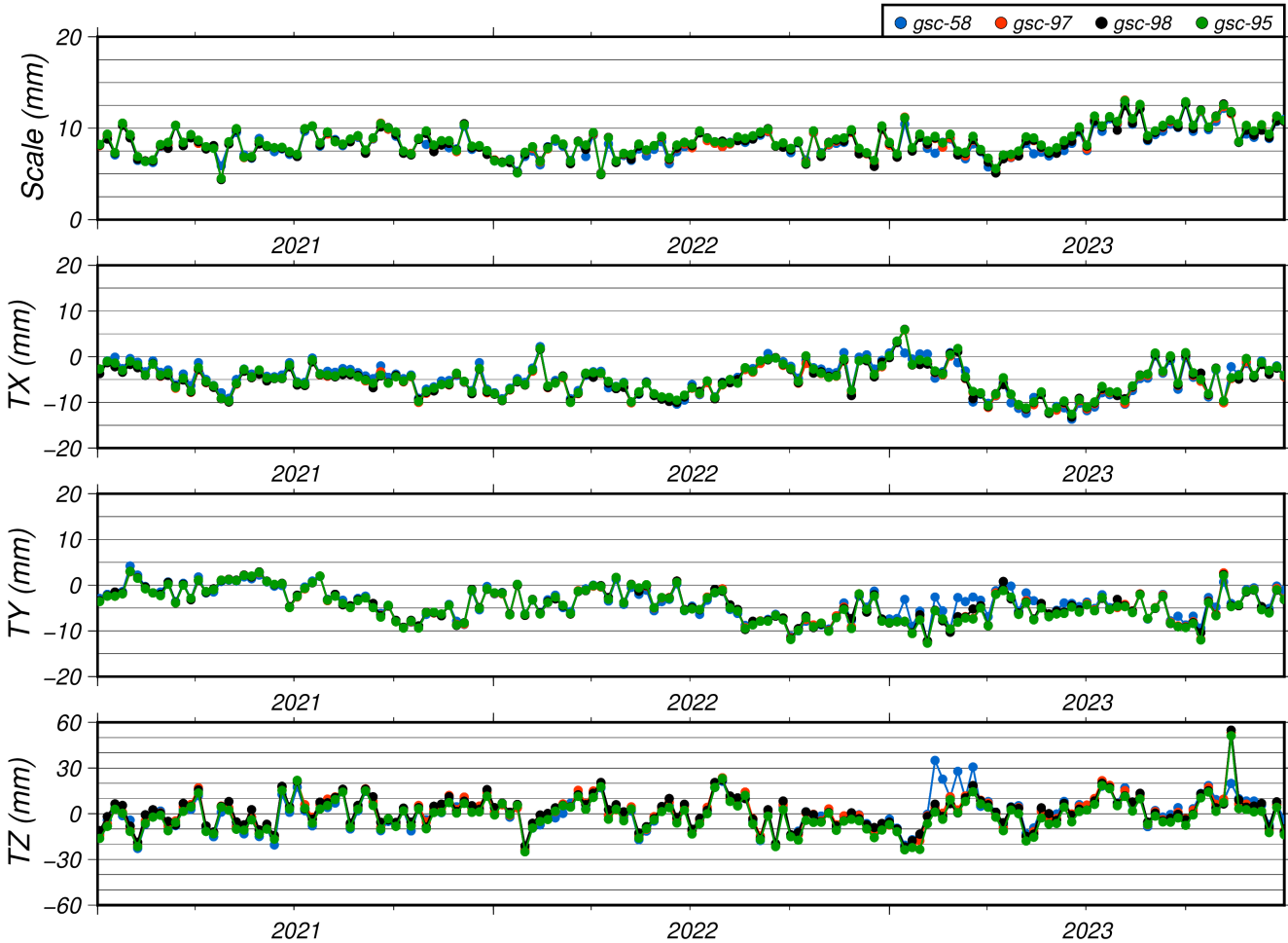
gscwd95: CATREF / SLR fits

Results – Number of stations



gscwd58: GSFC / SLR fits;
gscwd97: CATREF / unit wgts;
gscwd98: CATREF / CATREF;
gscwd95: CATREF / SLR fits

Results – Helmert parameters



	(mm)	Mean	Std	RMS	trend	Std d.
TX	gscwd58	-4.800	3.460	5.910	-0.607	3.420
	gscwd97	-5.170	3.300	6.130	-0.259	3.290
	gscwd98	-5.140	3.290	6.100	-0.169	3.290
	gscwd95	-4.920	3.300	5.910	-0.195	3.290
TZ	gscwd58	0.990	10.440	10.450	2.936	10.090
	gscwd97	1.150	10.580	10.610	1.277	10.490
	gscwd98	1.660	10.120	10.220	0.688	10.090
	gscwd95	-1.170	10.480	10.510	0.863	10.440

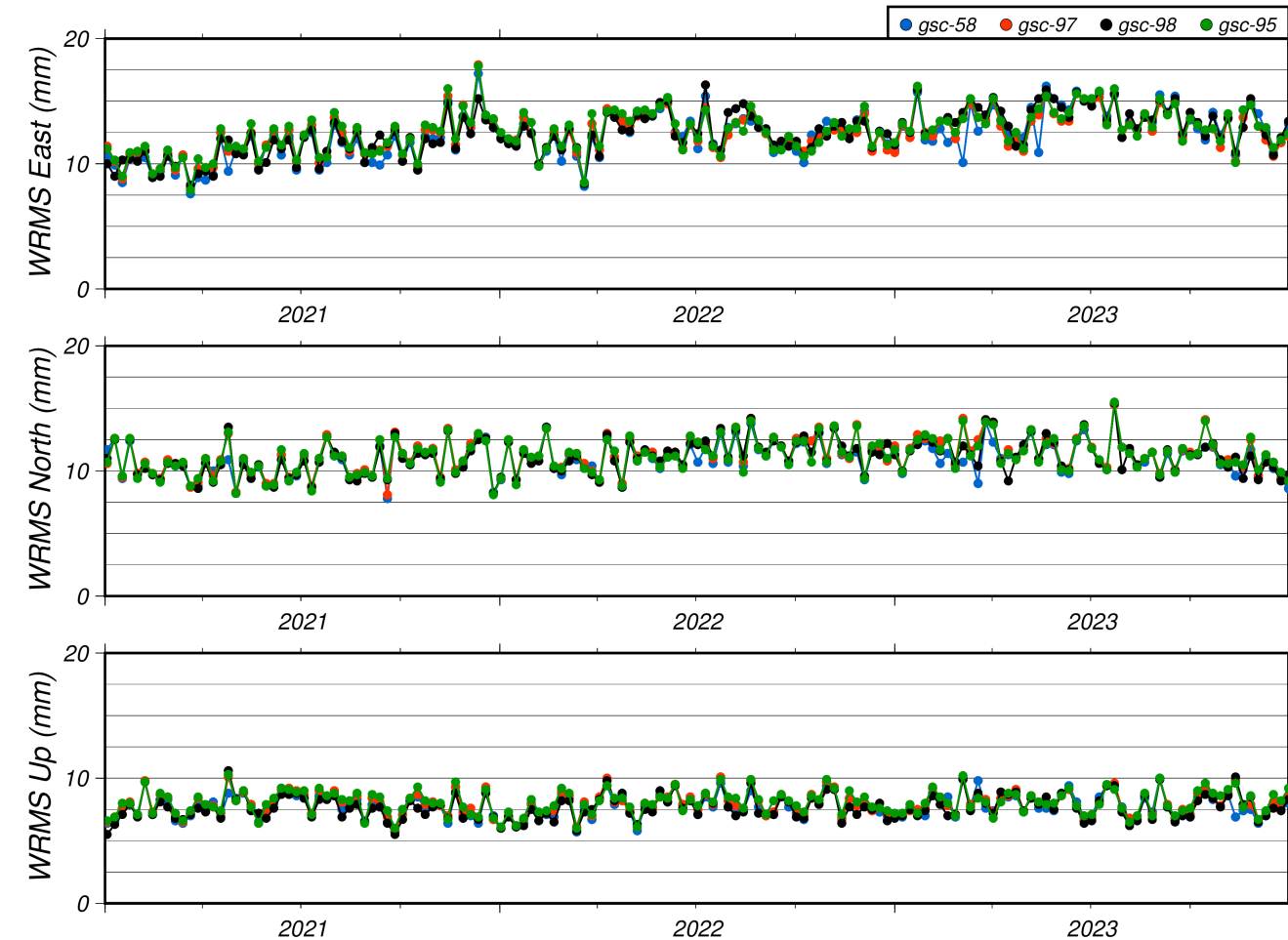
gscwd58: GSFC / SLR fits;

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gscwd95: CATREF / SLR fits

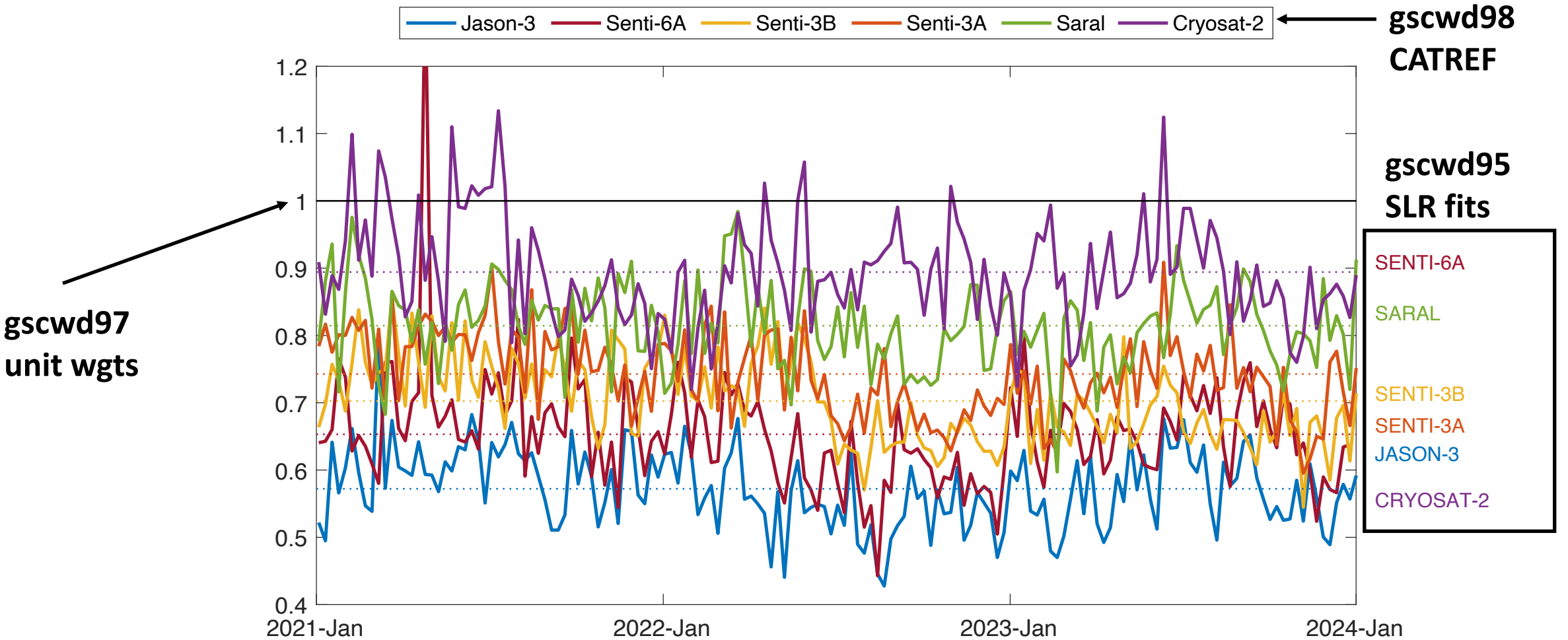
Results – WRMS station positions



(mm)	Mean E	Std E	Mean N	Std N	Mean U	Std U
gscwd58	12.276	1.839	10.987	1.300	7.775	0.920
gscwd97	12.411	1.646	11.287	1.392	7.957	0.937
gscwd98	12.450	1.748	11.080	1.362	7.701	0.988
gscwd95	12.582	1.680	11.199	1.389	8.067	0.976

gscwd58: GSFC / SLR fits;
gscwd97: CATREF / unit wghts;
gscwd98: CATREF / CATREF;
gscwd95: CATREF / SLR fits

Weekly weights per satellite as estimated by CATREF



Conclusion

- The four combined solutions are almost undistinguishable.
- The weights calculated by CATREF show a time variability and are significantly different from the weights determined from SLR fits.
- Preliminary work:
 - Should re-do the study using RINEX version (cf. Lemoine et al. presentation).
 - More unanswered questions: differences in GSFC combined and CATREF combined with GSFC weights, no significant differences,...

Recommendations

- IDS CC campaign to investigate combination of IDS AC mono-satellite solutions using various combination strategies (week-by-week, constant, station selections,...)
- Focus on weighting at the observation level (cf. Nahmani et al. presentation)

