

Supporting Information for "GPS-observed elastic deformation due to surface mass balance variability in the Southern Antarctic Peninsula"

Achraf Koulali¹, Pippa L. Whitehouse², Peter J. Clarke¹, Michiel R. van den Broeke³, Grace A. Nield², Matt A. King⁴, Michael J. Bentley², Bert Wouters^{3,5}, Terry Wilson⁶

¹Geospatial Engineering, Newcastle University, Newcastle upon Tyne NE1 7RU, UK.

²Department of Geography, Durham University, South Road, Durham, DH1 3LE, UK.

³Institute for Marine and Atmospheric Research, Utrecht University, Utrecht, The Netherlands.

⁴School of Geography, Planning, and Spatial Sciences, University of Tasmania, Hobart, TAS, Australia.

⁵Department of Geoscience and Remote Sensing, Delft University of Technology, Delft, The Netherlands.

⁶School of Earth Sciences, Ohio State University, 125 South Oval Mall, Columbus, OH 43210-1522, USA.

Contents of this file

1. Figures S1 to S4
 2. Tables S1 to S2
-

February 1, 2022, 11:46am

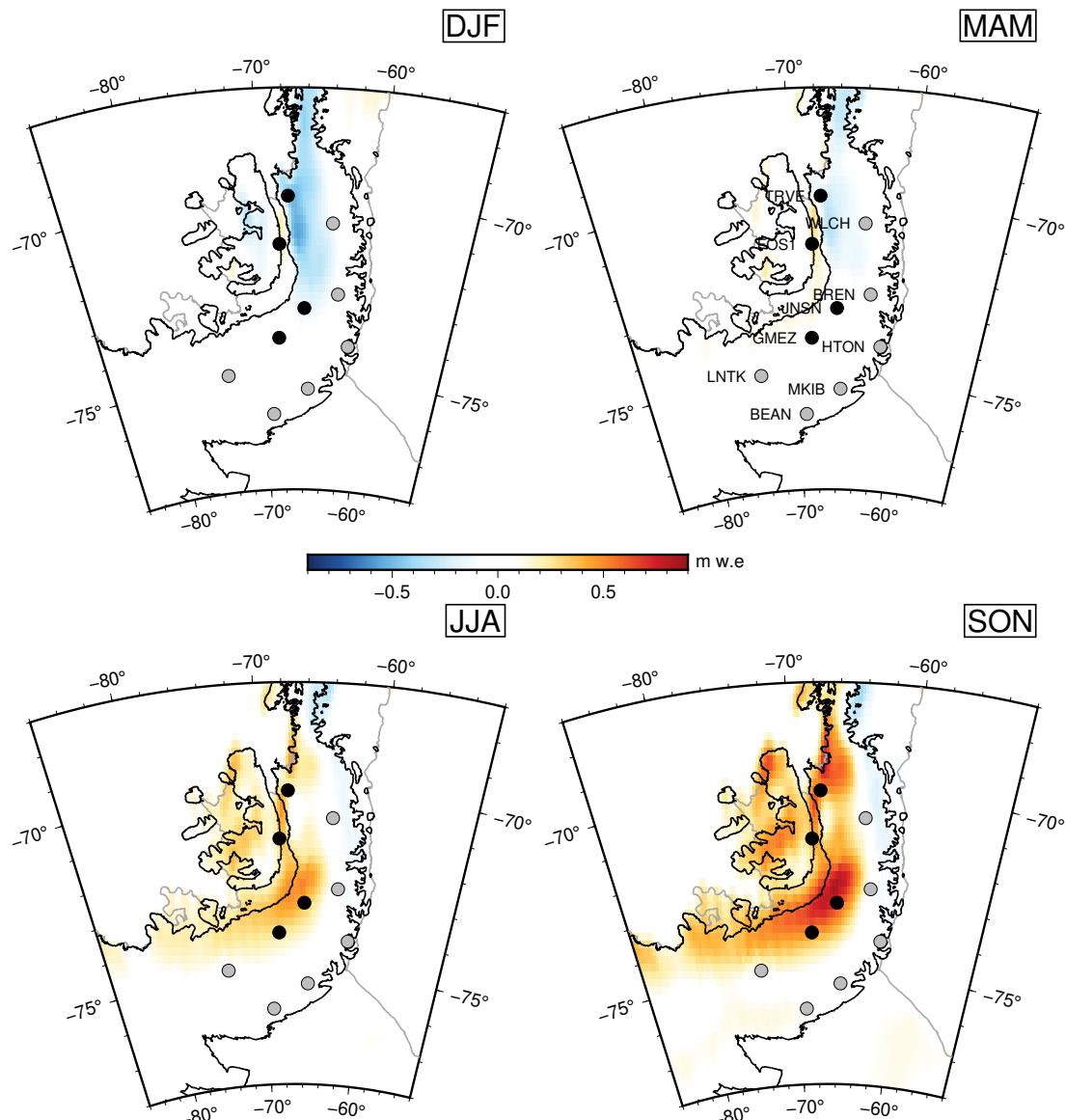


Figure S1. Three-monthly mean (December 2015 – November 2016) of the surface mass balance anomaly with respect to the linear trend (1979-2019) from the MAR3.11 model (similar to figure 1).

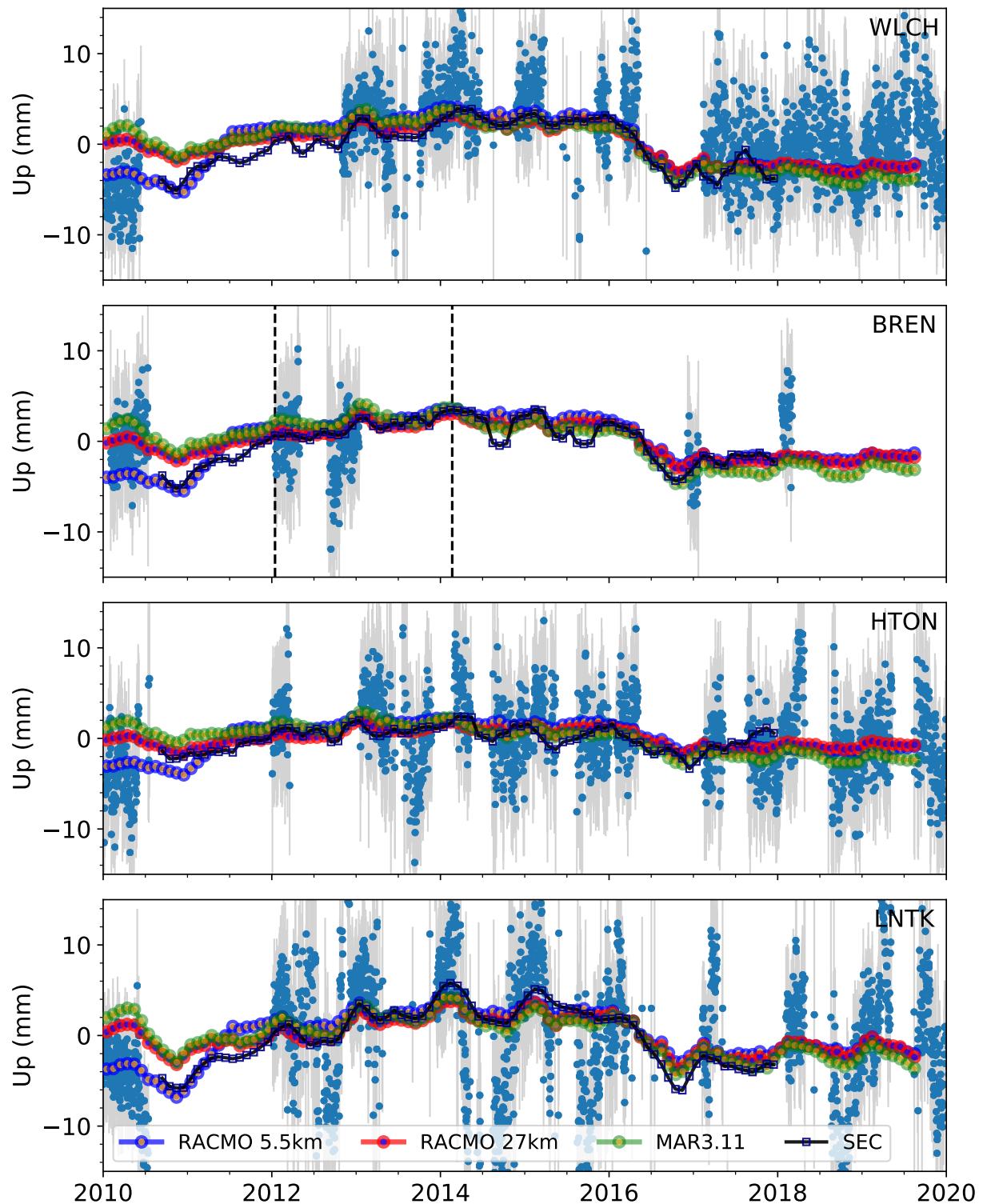


Figure S2. Similar to Figure 2 for sites: WLCH, BREN, HTON and LNTK. The vertical dashed lines are the epochs of instrumental changes.

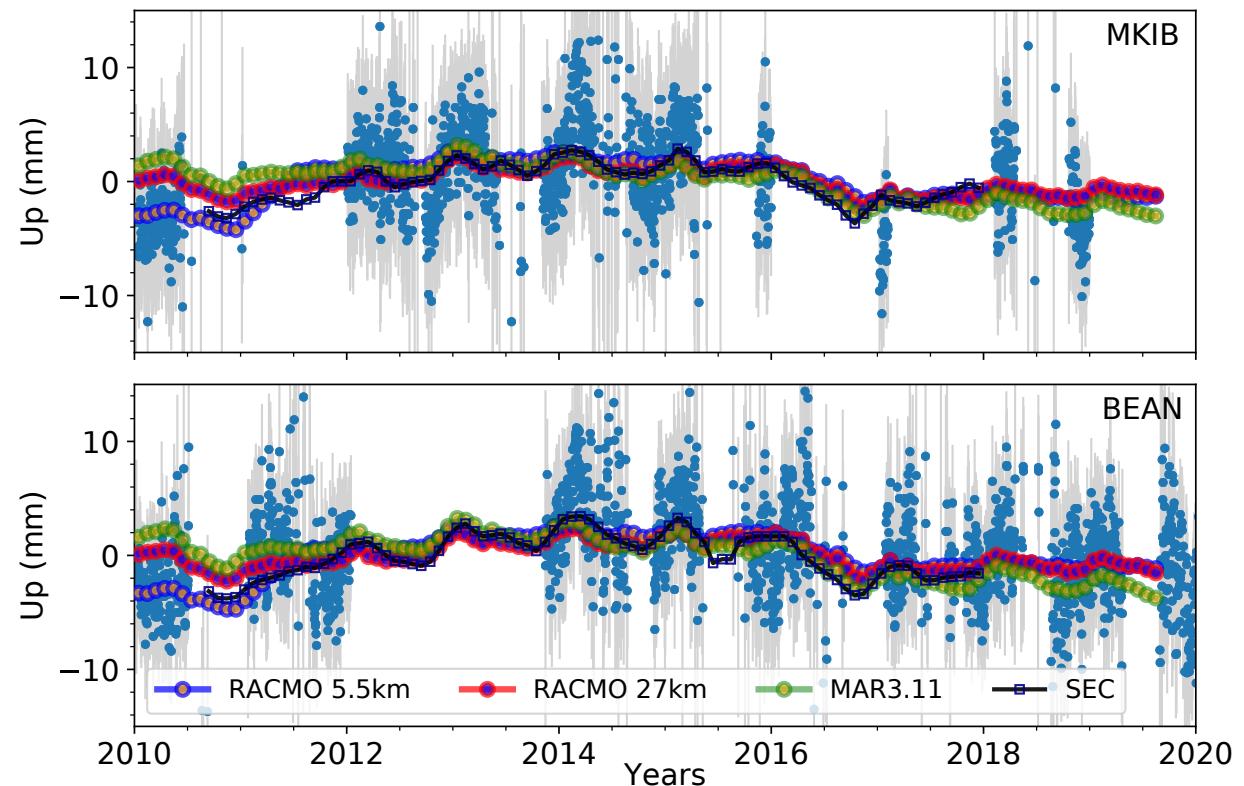


Figure S3. Similar to Figure S2 for sites: MKIB and BEAN

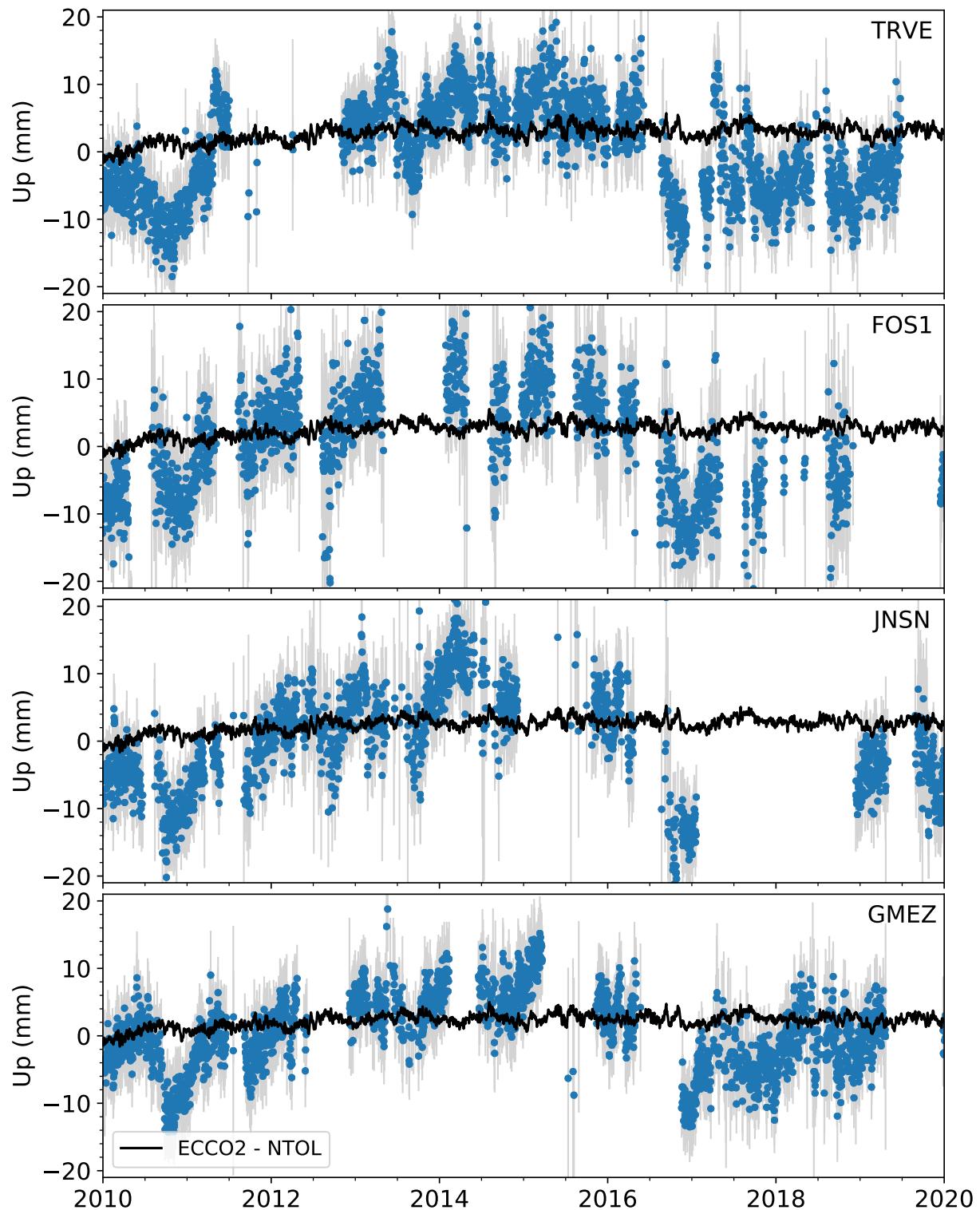


Figure S4. Daily GPS vertical position time series, with modeled Non-tidal ocean loading displacements (black) calculated from the ECCO2 (Menemenlis et al., 2008) ocean bottom pressure (daily, 0.25 degree)

February 1, 2022, 11:46am

Table S1. GPS vertical raw (up) velocities and their 2-sigma uncertainties estimated from time series and velocities derived after removing SMB elastic deformation from the position time series using the RACMO 2.3 (5.5 km resolution) model.

Sites	Raw time series		corrected time series		Period of observation (years)
	up (mm/yr)	sig (mm/yr)	up (mm/yr)	Sig(mm/yr)	
TRVE	0.17	0.86	0.82	0.11	2009.97 2019.48
WLCH	-1.45	0.40	-0.76	0.13	2009.96 2020.20
FOS1	-0.91	0.80	-0.95	0.25	2009.99 2020.20
BREN	3.17	0.42	0.92	0.52	2010.02 2020.20
JNSN	1.36	0.74	1.30	0.37	2010.02 2020.20
GMEZ	2.75	0.46	2.72	0.18	2006.99 2018.17
HTON	3.58	0.21	3.69	0.08	2010.01 2020.20
LNTK	2.86	0.29	2.89	0.14	2010.00 2020.20
MKIB	4.83	0.35	4.82	0.14	2010.01 2019.00
BEAN	5.44	0.23	5.45	0.07	2010.02 2020.20

Table S2. Spearman's correlation between vertical GPS time series and SMB elastic deformation correction time series using the RACMO 2.3 (5.5 km) model.

Sites	Correlation coefficient
TRVE	0.77
WLCH	0.28
FOS1	0.84
BREN	0.46
JNSN	0.76
GMEZ	0.82
HTON	0.49
LNTK	0.29
MKIB	0.19
BEAN	0.62