Table S1(a). Velocities of places in Category Rigid.

Place	Lat. °N	Lon. °E	Horizontal Speed mm/yr	Az. °	Vertical Up mm/yr	χ^2	Sites (Technique, Site abbreviation, Observation time)
Antarctic plate							
Vesleskarvet {Cliff}	−71.67	−2.84	0.3 ± 0.9	−157	3.8 ± 2.1	0.4	G vesl 9
Marion Island	−46.88	37.86	0.9 ± 3.1	−150	1.0 ± 4.8	0.6	D mara 13
Syowa {Base}	−69.01	39.58	0.1 ± 0.7	101	3.5 ± 1.6	0.1	G syog 11 V syowa 3 D syob 8
Mawson {Base}	−67.60	62.87	0.3 ± 0.6	−121	0.7 ± 1.3	1.6	G maw1 15
Kerguelen {Island}	−49.35	70.26	0.7 ± 0.9	35	0.9 ± 1.8	2.9	G kerg 10 D kera 13
Amsterdam Island	−37.80	77.57	10.7 ± 8.2	50	9.4 ± 13.1	6.9	D amsa 4
Davis {Base}	−68.58	77.97	0.4 ± 0.6	−19	0.7 ± 1.3	1.7	G dav1 15
Casey {Base}	−66.28	110.52	0.9 ± 0.6	−63	2.8 ± 1.3	10.2	G cas1 15
Dumont D'Urville {Base}	−66.67	140.00	0.5 ± 0.7	46	1.4 ± 1.6	2.4	G dum1 12 D adea 9
McMurdo {Base}	−77.85	166.67	0.4 ± 0.7	96	1.0 ± 1.6	1.6	G mcm4 7 sctb 5
Ross Island	−77.53	167.14	0.9 ± 0.8	54	−2.0 ± 1.8	6.1	G e1g2 8 hooz 6 macz 3 rayg 3

The residual horizontal velocity of each place is specified by a speed in mm/yr and an azimuth (Az.) in degrees clockise of North. One dimensional 95% confidence limits in horizontal speed and vertical rate follow the ±. Chi-square (χ^2) is the decrease in misfit when the place is taken off its plate and is significant at the 5% and 1% risk level if greater than, respectively, 6.0 and 9.2. The right hand column lists the sites at a place: the space technique (G GPS, V VLBI, and D DORIS), the site abbreviation, ane the effective time period of observation. For example, Syowa has 11 years of GPS observation at site syog, 3 years of VLBI observation at site syowa, and 8 years of observations at DORIS site syob. Velocities are residuals relative to the plate velocity model and do not account for uncertainty in the rotational and translational velocities of the reference frame. The uncertainties in the vertical rates in the plate velocity model are 0.2 mm/yr larger than those listed for the tightest constrained places and negligibly larger than those listed for the worst constrained places. The two horizontal components of the velocity are not strongly correlated; the lengths of the major axis and minor axis of the horizontal error ellipse are within 3% at all places. Two dimensional 95% confidence limits in horizontal velocity are 1.25 (= sqrt(2) x 1.73/1.96) times the 1 dimensional confidence limits in horizontal rate. Categories Rigid, GIA, and Boundary are as in Argus et al. [2010] and Argus and Peltier [2010].

Table S1(b). Velocities of places in Category Glacial Isostatic Adjustment.

Place	Lat. °N	Lon. °E	Horizontal Speed mm/yr	Az. °	Vertical Up mm/yr	χ^2	Sites (Technique, Site abbreviation, Observation time)
Antarctic plate							
Adelaide Island	−67.57	−68.12	3.3 ± 2.9	122	3.1 ± 4.7	5.1	D rota 13
O'Higgins {Base}	−63.32	−57.90	2.3 ± 0.6	150	5.7 ± 1.3	61.1	V ohiggins 11 G ohi2 8 ohi3 7 ohig 6
Mount Paterson	−78.03	−155.02	1.5 ± 2.2	116	4.9 ± 4.8	1.8	G w12a–patn 4
Mount Howe	−87.42	−149.43	0.4 ± 1.6	125	1.7 ± 3.5	0.2	G w01a 4 w01b 4
Whitmore Mountains	−82.68	−104.40	1.0 ± 3.0	180	3.9 ± 6.6	0.5	G w09a 3
Mount Johns	−79.63	−91.28	2.9 ± 2.9	−5	−3.6 ± 6.5	3.8	G w06a 3
Howard Nunatak	−77.53	−86.77	1.7 ± 4.2	89	4.1 ± 9.3	0.6	G w14a–hown 2
Patriot Hills	−80.32	−81.43	0.8 ± 2.1	−178	6.2 ± 4.6	0.5	G w07a 3 w07b 3
Wilson Nunataks	−80.04	−80.56	0.2 ± 2.1	21	4.9 ± 4.6	0.0	G w05a 3 w05b 3
Haag Nunatak	−77.04	−78.29	1.5 ± 4.2	94	7.5 ± 9.4	0.5	G w15a–haag 2
Mount Suggs	−75.28	−72.18	1.0 ± 2.4	−166	3.3 ± 5.4	0.6	G w08a 3 w08b–sugg 2
Palmer {Station}	−64.78	−64.05	1.8 ± 1.0	−164	6.0 ± 2.2	13.2	G palm 8
Cordiner Peaks	−82.86	−53.20	2.7 ± 1.5	138	2.5 ± 3.3	12.8	G w04b–crdi 5 w04a 3
Whichaway Nunataks	−81.58	−28.40	2.2 ± 1.6	168	−1.1 ± 3.5	7.5	G w03a 4 w03b 4

The horizontal velocity of each place is specified by a speed in mm/yr and an azimuth (Az.) in degrees clockise of North. One dimensional 95% confidence limits in horizontal speed and vertical rate follow the ±. Chi-square (χ^2) is the inrease in misfit when the place is placed on its plate and is significant at the 5% and 1% risk level if greater than, respectively, 6.0 and 9.2. The right hand column lists the sites at a place: the space technique (G GPS, V VLBI, and D DORIS), the site abbreviation, ane the effective time period of observation. For example, O'Higgins has 11 years of VLBI observation at site ohiggins, 11 years of GPS observation at site ohi2, 7 years of GPS observations at site ohi3, and 6 years of GPS observation at site ohig. Horizontal velocities and vertical rates are parameters in GEODVEL; their uncertainties account for uncertainties in the rotational and translational velocities of the space techniques. The two horizontal components of the velocity are not strongly correlated; the lengths of the major axis and minor axis of the horizontal error ellipse are within 18% at all places except Whichaway Nuntatuks, where the major axis is 39% longer than the minor axis.

Table S1(c). Velocities of places in Category Boundary

Place	Lat. °N	Lon. °E	Horizontal Speed mm/yr	Az. °	Vertical Up mm/yr	χ^2	Sites (Technique, Site abbreviation, Observation time)
Antarctic plate							
Frei {Base}	−62.19	−58.98	6.5 ± 1.3	−40	−3.4 ± 2.8	93.1	G frei 7

Same as Table S1b.