APPENDIX (for Data Repository)

Space Geodetic Velocities

The space geodetic results in this study are part of a global model of the angular velocities of 11 major plates estimated from four velocity solutions: (1) a GPS solution determined from data from 1991 to 2007 (M. B. Heflin, Jet Propulsion Laboratory, electronic communication 2007; Zumberge et al. 1997), (2) a VLBI solution determined from data from 1979 to 2004 (C. Ma, Goddard Space Flight Center, electronic communication 2004; Ma et al. 1994), (3) SLR solution CSR00L01, which is determined from data from 1976 to 2000 (J. C. Ries, Center for Space Research, University of Texas at Austin, electronic communication 2000), and (4) a DORIS solution determined from data from 1993 to 2006 (P. Willis, Institut Geographique National, electronic communication, 2006). A total of 166 GPS, 31 VLBI, 19 SLR, and 38 DORIS sites were assumed to be on plates, but the velocities of 48 of these 254 sites were not used to determine the angular velocities of the 11 plates because the sites are affected by glacial isostatic adjustment. The four solutions are analyzed using methods described in Argus and Gordon (1996) and Argus et al. (1999).

APPENDIX REFERENCES CITED

Argus, D. F., and R. G. Gordon, 1996, Tests of the rigid-plate hypothesis and bounds on plate rigidity using geodetic data from very long baseline interferometry: Journal of Geophysical Research, v. 101, p. 13555-13572.

Argus, D. F., W. R. Peltier, and M. M. Watkins, 1999, Glacial isostatic adjustment observed using very long baseline interferometry and satellite laser ranging: Journal of Geophysical Research, v. 104, p. 29077-29083.

Ma, C., J. W. Ryan, and D. S. Caprette, 1994, NASA space geodesy program\-GSFC data analysis\-1993: VLBI geodetic results 1979–1992: NASA Technical Memo 104605, Greenbelt, Maryland, 231 pp.

Minster, J. B., T. H. Jordan, P. Molnar, and E. Haines, 1974, Numerical modeling of instantaneous plate tectonics, Geophysical Journal of the Royal Astronomical Society, v. 36, p. 541-576.

Zumberge, J. F., M. B. Heflin, D. C. Jefferson D. C, M. M. Watkins, and F. H. Webb, 1997, Precise point positioning for the efficient and robust analysis of GPS data from large networks: Journal of Geophysical Research, v. 102, p. 5005-5017.

Figure Captions

Figure DR1. Global positioning system (GPS) data from the Bangalore GPS site (IISC), located at 12.937°N, 77.570°E (geocentric coordinates) plotted in the Australian plate reference frame. A position, a velocity, an offset, and a sinusoid with a period of 1 yr were fit to each of the (A) east (14.7 mm yr^{-1}) and (B) north (–3.1 mm yr^{-1}) components of the position of the GPS site for the time interval from January 1995 to March 2004. The observed velocity is a rate of 15.02 mm yr^{-1} ± 0.64 mm yr^{-1} (±1σ) toward 102.02° ± 2.63° (±1σ) with a two-dimensional 1σ error ellipse having a major semi-axis of 1.00 mm yr^{-1} striking 41° and a minor semi-axis of 0.87 mm yr^{-1}. The amplitude of the best-fitting sinusoid is 0.6 mm in the east component and 2.0 mm in the north component. The offset on 26 December 2004, the day of the great M 9.2 Sumatran earthquake, is estimated; offsets of the east and north components are given in mm. Twelve months of observations after the earthquake (gray) are omitted because they may be influenced by a postseismic transient. Observations misfit by more than 3 sigma in any component (red) are also omitted.

G21987

Table DR1

Table of spreading rates and transform fault azimuths used to estimate Capricorn-Antarctica motion averaged over the past 3.16 m.y.

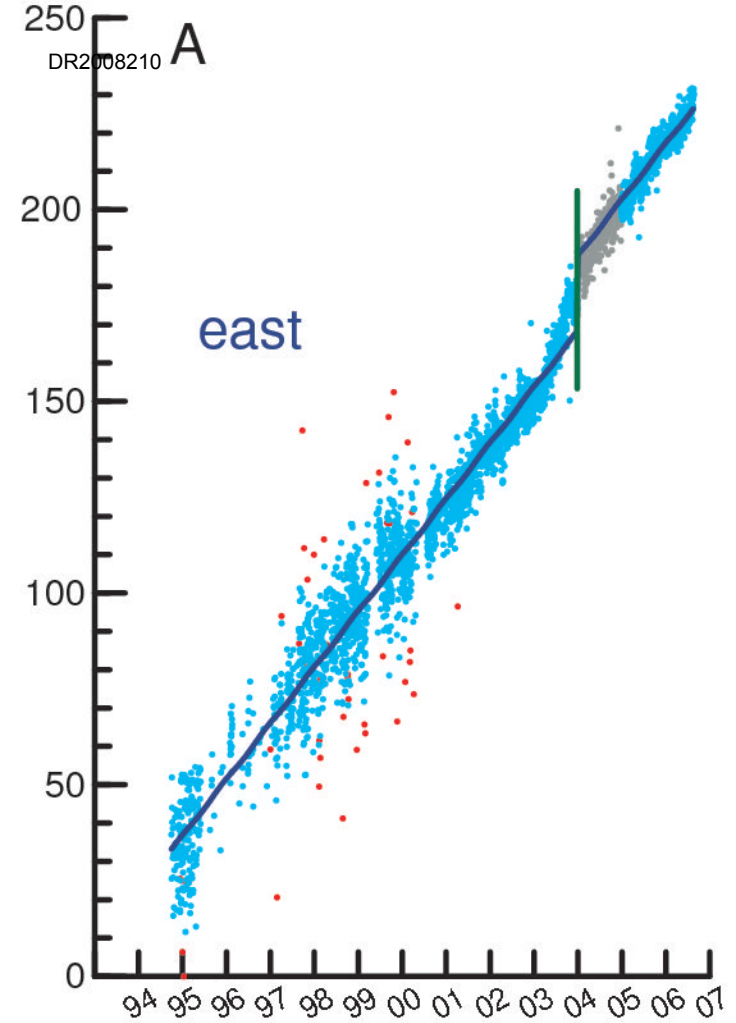
type	id	lat	lon	datum	s.d.	calc	wt. res.	imp.	Pred. az
sm	an	-47.20	32.89	1.50	.07	1.46	.60	.051	74.69
sm	an	-47.20	32.92	1.50	.07	1.46	.60	.051	74.72
sm	an	-47.23	33.00	1.50	.07	1.46	.60	.050	74.77
sm	an	-46.02	34.00	1.50	.07	1.46	.59	.049	75.60
sm	an	-44.18	38.43	1.55	.07	1.45	1.38	.044	78.85
sm	an	-44.20	38.77	1.50	.07	1.45	.66	.043	79.09
sm	an	-43.38	39.73	1.51	.07	1.45	.85	.041	79.76
sm	an	-43.86	40.56	1.53	.07	1.46	1.01	.038	80.33
sm	an	-42.88	42.02	1.43	.07	1.46	-.43	.035	81.32
sm	an	-41.04	43.90	1.49	.07	1.45	.64	.033	82.52
sm	an	-40.10	45.61	1.50	.07	1.45	.75	.030	83.58
sm	an	-40.09	45.77	1.40	.07	1.45	-.68	.029	83.69
sm	an	-40.06	45.78	1.50	.07	1.45	.75	.029	83.69
sm	an	-38.84	46.51	1.61	.07	1.44	2.36	.028	84.07
sm	an	-38.79	46.69	1.50	.07	1.44	.79	.028	84.18
sm	an	-38.75	47.59	1.41	.07	1.45	-.50	.027	84.73
sm	an	-37.72	49.77	1.39	.07	1.44	-.64	.024	85.97
sm	an	-37.64	50.94	1.42	.07	1.43	-.10	.022	86.67
sm	an	-37.48	51.02	1.39	.07	1.43	-.52	.022	86.70
sm	an	-36.07	53.09	1.35	.07	1.44	-1.35	.021	87.72
sm	an	-34.71	54.61	1.43	.07	1.44	-.11	.021	88.37
sm	an	-34.37	55.30	1.30	.07	1.44	-1.94	.020	88.69
sm	an	-34.39	55.34	1.41	.07	1.44	-.36	.020	88.72
sm	an	-33.76	55.91	1.30	.07	1.43	-1.89	.020	88.91
sm	an	-33.77	56.10	1.40	.07	1.43	-.45	.020	89.02
sm	an	-33.78	56.26	1.30	.07	1.43	-1.87	.020	89.11
sm	an	-31.88	57.40	1.52	.07	1.42	1.42	.020	89.33
sm	an	-31.80	57.63	1.43	.07	1.42	.11	.021	89.43
sm	an	-29.23	60.89	1.41	.07	1.37	.57	.023	90.44
sm	an	-29.07	61.17	1.35	.07	1.37	-.27	.024	90.54
sm	an	-28.98	61.39	1.40	.07	1.37	.45	.024	90.62
sm	an	-27.84	63.89	1.35	.07	1.38	-.40	.027	91.47
sm	an	-27.86	64.21	1.45	.07	1.38	1.05	.027	91.63
sm	an	-27.98	64.74	1.41	.07	1.38	.42	.028	91.92
sm	an	-27.95	64.82	1.40	.07	1.38	.29	.028	91.95
sm	an	-27.60	65.80	1.32	.07	1.37	-.66	.030	92.30
sm	an	-27.60	65.83	1.42	.07	1.37	.77	.030	92.31
sm	an	-27.59	65.86	1.37	.07	1.37	.06	.030	92.32
sm	an	-27.58	65.90	1.42	.07	1.36	.82	.031	92.34
sm	an	-27.58	65.92	1.31	.07	1.36	-.75	.031	92.35
sm	an	-27.57	65.95	1.32	.07	1.36	-.61	.031	92.36
sm	an	-27.56	65.98	1.26	.07	1.36	-1.46	.031	92.37
sm	an	-27.54	66.00	1.28	.07	1.36	-1.17	.031	92.37
sm	an	-27.56	66.00	1.31	.07	1.36	-.75	.031	92.38
sm	an	-27.54	66.04	1.32	.07	1.36	-.60	.031	92.39
sm	an	-27.53	66.06	1.37	.07	1.36	.12	.031	92.40

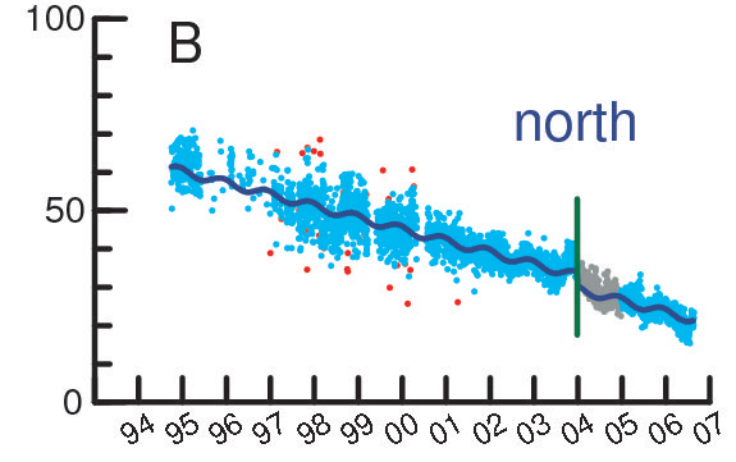
G21987

117		sm an	-27.52	66.10	1.42	.07	1.36	.84	.031	92.41
118		sm an	-27.52	66.15	1.27	.07	1.36	-1.30	.031	92.43
119		sm an	-27.50	66.18	1.46	.07	1.36	1.41	.031	92.44
120		sm an	-26.28	68.33	1.24	.07	1.35	-1.57	.035	92.98
121	az	sm an	-52.00	28.25	70.00	2.95	70.67	-.23	.045	70.67
122	az	sm an	-47.48	32.24	74.00	1.50	74.19	-.12	.109	74.19
123	az	sm an	-46.45	33.72	73.00	.95	75.36	-2.49	.239	75.36
124	az	sm an	-45.40	35.10	76.00	1.40	76.43	-.31	.097	76.43
125	az	sm an	-43.80	39.30	77.00	3.65	79.46	-.67	.011	79.46
126	az	sm an	-43.30	41.70	80.00	2.45	81.11	-.45	.023	81.11
127	az	sm an	-41.90	42.60	83.00	1.30	81.69	1.00	.070	81.69
128	az	sm an	-39.50	46.20	85.00	2.45	83.92	.44	.015	83.92
129	az	sm an	-36.70	52.30	87.00	2.10	87.35	-.17	.018	87.35
130	az	sm an	-35.80	53.40	87.00	3.25	87.86	-.26	.008	87.86
131	az	sm an	-35.00	54.10	84.00	5.95	88.13	-.69	.002	88.13
132	az	sm an	-32.78	57.07	89.50	.35	89.35	.44	.777	89.35
133	az	sm an	-31.45	58.40	91.00	4.50	89.75	.28	.005	89.75
134	az	sm an	-29.85	60.80	94.00	1.65	90.57	2.08	.047	90.57
135		cp sm	-10.50	66.40	3.43	.05	3.44	-.26	.123	33.61
136		cp sm	-10.51	66.39	3.43	.05	3.44	-.26	.123	33.59
137		cp sm	-10.57	66.42	3.53	.05	3.45	1.61	.122	33.58
138		cp sm	-10.64	66.45	3.43	.05	3.46	-.54	.121	33.56
139		cp sm	-12.00	66.00	3.53	.10	3.54	-.11	.026	31.69
140		cp sm	-12.35	65.71	3.67	.05	3.55	2.39	.102	30.95
141		cp sm	-12.50	65.84	3.58	.05	3.57	.20	.099	31.03
142	az	cp sm	-13.75	66.25	30.00	1.70	30.67	-.39	.388	30.67
143		cp sm	-14.11	65.93	3.72	.05	3.72	-.03	.077	29.92
144		cp sm	-14.28	66.07	3.63	.10	3.74	-1.13	.019	30.00
145		cp sm	-15.03	66.81	3.82	.05	3.84	-.44	.064	30.54
146		cp sm	-15.40	67.20	3.82	.10	3.89	-.72	.015	30.83
147		cp sm	-15.18	67.00	3.82	.10	3.86	-.44	.016	30.70
148	az	cp sm	-16.25	67.00	28.00	2.40	29.96	-.82	.170	29.96
149		cp sm	-16.80	66.67	3.91	.05	3.99	-1.64	.071	29.12
150	az	cp sm	-17.50	66.00	30.00	3.00	27.73	.76	.104	27.73
151		cp sm	-18.47	65.35	4.10	.05	4.07	.66	.065	26.23
152		cp sm	-18.93	65.87	4.01	.10	4.13	-1.17	.016	26.70
153		cp sm	-19.60	65.90	4.20	.10	4.18	.19	.017	26.36
154		cp sm	-20.20	66.90	4.20	.05	4.27	-1.44	.072	27.40
155	az	cp sm	-20.25	67.25	25.00	3.80	27.84	-.75	.057	27.84
156		cp sm	-20.30	67.70	4.39	.05	4.31	1.52	.076	28.41
157		cp sm	-21.39	68.65	4.29	.10	4.44	-1.47	.023	29.04
158		cp sm	-21.57	69.00	4.29	.10	4.47	-1.75	.024	29.39
159		cp sm	-21.95	68.96	4.48	.10	4.49	-.12	.025	29.13
160		cp sm	-22.51	69.26	4.58	.05	4.55	.69	.109	29.21
161		cp sm	-23.82	69.66	4.87	.10	4.66	2.13	.033	29.04
162		cp sm	-24.50	69.84	4.72	.05	4.71	.13	.149	28.92
163		cp sm	-24.77	69.80	4.68	.10	4.73	-.51	.038	28.74
164		cp sm	-24.94	69.88	4.68	.10	4.75	-.66	.039	28.76
165		cp an	-25.81	70.23	5.37	.08	5.51	-1.79	.080	41.43
166	az	cp an	-26.20	71.00	43.00	5.00	41.96	.21	.020	41.96
167		cp an	-26.17	71.57	5.46	.08	5.59	-1.67	.090	42.49
168		cp an	-26.37	71.96	5.56	.08	5.62	-.76	.093	42.75
169		cp an	-26.67	72.07	5.65	.08	5.64	.13	.097	42.71
170		cp an	-27.70	72.70	6.04	.08	5.72	4.05	.110	42.80
171		cp an	-28.00	74.00	5.75	.16	5.78	-.21	.031	43.82
172		cp an	-28.00	74.20	5.85	.08	5.79	.72	.125	43.99
173										

174

175 *Notes.* Column captions: “type” indicates type of data: blank for spreading rate, “az” for
176 transform-fault azimuth; “id” indicates the identity of the plate boundary for the datum: “sm an”
177 for Southwest Indian Ridge (Somalia-Antarctic boundary), “cp sm” for Central Indian Ridge
178 (Capricorn-Somalia boundary), “cp an” for Southeast Indian Ridge (Capricorn-Antarctic
179 boundary); “lat” and “lon” respectively indicate north latitude and east longitude of the datum;
180 “datum” is either a spreading rate (in cm yr^{-1}) or a transform-fault azimuth (in degrees counter-
181 clockwise from east); “s.d.” is the 1σ error assigned to each datum; “calc” is the corresponding
182 value calculating from the best-fitting plate motion parameters, “wt. res.” is the residual divided
183 by the assigned 1σ error; “imp.” is the importance (a measure of the information content) of that
184 datum (Minster et al. 1974); “Pred. az.” is the azimuth predicted from the best-fitting parameters
185 for a transform fault at that location.


A
east
250
200
150
100
50
0
94 95 96 97 98 99 00 01 02 03 04 05 06 07


B
north
100
50
0
94 95 96 97 98 99 00 01 02 03 04 05 06 07