GPS Time-Series Analysis

We use the GIPSY - OASIS II software package to process GPS data from Sept. 2002 to 20 Oct. 2005 from available SuGAr stations, station SAMP (BAKOSUTARNAL) and IGS station NTUS. In addition we include 10 regional IGS stations unaffected by postseismic deformation (BAKO, COCO, DGAR, MALD, IISC, HYDE, LHAS, KUNM, TNML, PIMO) to constrain the reference frame (with a different frame for the period before 12/26/04, between 12/27/04-03/28/05, and after 03/29/05, because of far-field coseismic offsets). Station coordinates were estimated every 24 hours using the precise point positioning method [*Zumberge et al.*, 1997] with ambiguity resolution applied successfully across the entire network by automatic selection of the ionospheric- or pseudorange-widelane method [*Blewitt*, 1989]. Satellite orbit and clock parameters, and daily coordinate transformation parameters into ITRF2000 were provided by the Jet Propulsion Laboratory (JPL). Ionosphere-free combinations of carrier phase and pseudorange were processed every 5 minutes. Estimated parameters included a tropospheric zenith bias and two gradient parameters estimated as random-walk processes, and station clocks estimated as a white-noise process. Formal errors for daily station positions were computed assuming 10-mm 1-standard deviation errors in the ionosphere-free carrier phase data.

Station velocities are estimated using all available data from 2002 to 26 December 2004. These velocities are then used to de-trend the data spanning the entire time-series, from which average pre-12/26/05 positions are estimated. For sites that became operational after the first event (BSIM, LEWK, LHWA, and UMLH) we leave the time-series in the ITRF2000 reference frame and solve for the secular velocity in this frame while solving for the co- and postseismic parameters. For stations LEWK, LHWA and NGNG the length of the available time-series is shortened to avoid the visible effects of large aftershocks (M_w =6.7 on 02/26/5, M_w =6.6 on 07/05/05, M_w =6.7 on 04/10/05, respectively).

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Auxiliary References

Blewitt, G. (1989), Carrier phase ambiguity resolution for the Global Positioning System applied to geodetic baselines up to 2000 km, *J. Geophys. Res.*, *94*, 10,187-110,283.

Zumberge, J.F., M.B. Heflin, D.C. Jefferson, and M.M. Watkins (1997), Precise point positioning for the efficient and robust analysis of GPS data from large networks, *J. Geophys. Res.*, *102*, 5005-5017.

Auxiliary Table . Co- and Postseismic Parameters for December 26, 2004, Andaman-Aceh Earthquake

Site	Lon., °E	Lat., °N	c^a_{east}, mm	c^a_{north}, mm	c^a_{up}, mm	a^b_{east}, mm	a^b_{north}, mm	a^b_{up}, mm	$\chi_\nu^{2\,c}$	$\chi_\nu^{2\,d}$
abgs	99.39	0.22	-4.4±0.6	0.5±0.5	-15.2±0.2	1.8±0.3	-0.7±0.2	9.4±0.9	1.3	2.8
bsat	100.28	-3.08	-6.3±1.2	2.0±0.9	-7.3±3.7	3.3±0.5	-1.5±0.3	1.4±1.6	1.2	3.1
bsim*	96.32	2.41	--	--	--	8.7±2.7	-11.1±1.6	6.7±7.7	2.7	2.8
lewk*	95.80	2.92	--	--	--	-71.6±5.0	-76.8±3.0	-31.2±14.8	2.8	2.8
lhwa*	97.13	1.38	--	--	--	-19.1±5.5	-11.2±3.1	54.5±15.4	2.7	19.0
lnng	101.16	-2.29	-1.8±0.6	3.0±0.5	-11.1±1.9	1.6±0.3	-0.5±0.2	3.6±0.9	1.1	2.3
mkmk	101.09	-2.54	-0.1±0.7	3.6±0.5	-6.3±2.0	0.8±0.3	-1.2±0.2	2.4±0.9	1.0	2.1
msai	99.09	-1.33	-2.3±1.1	-0.1±0.6	-26.4±3.1	2.1±0.5	-1.8±0.3	6.3±1.3	1.7	2.9
ngng	99.27	-1.80	1.8±0.7	0.5±0.5	-6.5±2.0	1.8±0.3	-0.5±0.2	2.3±0.9	43.0	3.2
ntus	103.68	1.35	-18.3±0.5	5.1±0.4	-12.7±1.4	-1.5±0.3	1.5±0.2	3.0±0.7	1.5	2.8
pbai	98.53	-0.03	-2.0±2.2	-5.6±1.5	-17.0±7.0	2.7±0.9	-1.3±0.6	4.9±2.8	0.7	2.2
prkb	100.40	-2.97	1.3±0.7	2.3±0.5	-6.3±2.1	2.1±0.4	-1.2±0.3	-0.2±1.0	1.2	2.9
pski	100.35	-1.12	-4.0±1.7	3.7±1.1	-23.8±5.1	1.6±0.7	-2.0±0.5	9.7±2.1	1.1	3.1
psmk	97.86	-0.09	0.6±2.1	-6.8±1.5	-30.3±6.8	2.9±0.8	-1.8±0.6	9.1±2.7	1.4	2.5
ptlo	98.28	-0.05	-3.0±1.4	-6.0±1.0	-15.5±4.3	3.0±0.6	-1.5±0.4	3.1±1.8	1.2	2.5
samp	98.71	3.62	-141.5±0.7	-10.3±0.4	-3.2±1.7	-8.5±0.4	-2.0±0.2	7.1±0.8	1.1	3.1
slbu	100.01	-2.77	1.2±0.9	1.9±0.7	-14.7±2.9	1.8±0.4	0.7±0.3	-0.4±1.3	2.0	5.4
umlh*	95.34	5.05	--	--	--	-114.5±25.7	-152.1±14.8	-207.4±75.9	5.9	5.4

$\tau_{\log} = 5.3 \pm 0.4$ days $\tau_{\exp} = 13.4 \pm 0.2$ days

[a] Coseismic offset from (1); [b] Decay amplitude from (1); [c] Reduced χ^2 of fit for logarithmic decay; [d] Reduced χ^2 of fit for exponential decay.

[*] For these sites no data before the December 26 earthquake was available and a constant secular velocity was also included in the inversion