Supplemental text, figures, and tables

"High-resolution reconstructions and GPS estimates of India-Eurasia and India-Somalia plate motions: 20 Ma to the present"

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Overview

The supplementary materials include four figures and two tables that are referenced in the main document.

List of supplementary contents

1. *Supplemental Figures 1 to 6*: Six supplemental figures are referenced in the main document, as follows: Supplemental Figure 1 locates the GPS stations used to estimate the India plate angular velocity in ITRF2014. Supplemental Figures 2-4 show the velocities of the India, Eurasia, and Somalia plate GPS sites and the fits of their best-fitting angular velocities (listed in Table 1 of the main document). Figure 5 compares the digitized India-Somalia fracture zone to flow lines predicted by the rotations from Merkouriev & DeMets (2006) and rotations listed in Table 2 of the main document. Figure 6 shows the dependence of the modeled shape of the Anomaly 3 sequence on seafloor spreading rates.

2. *Supplemental Table 1*: Summarizes the data that were inverted to estimate India-Somalia rotations for this study and their WRMS misfits.

3. *Supplemental Table 2*: India, Somalia, and Eurasia GPS site velocities used to derive the angular velocities listed in Table 1 of the main document. All velocities are given relative to ITRF14.

4. *GPS coordinate time series plots*: Plots of the coordinate time series for all 29 India plate GPS sites in alphabetical order are found after Table 2. We include these plots since the raw data for 22 of the 29 sites are not generally available. In each plot, the daily station positions are reduced by the predicted motion of the India plate relative to ITRF14 at the site location. Reducing the coordinate time series by the predicted plate motion emphasizes transient aspects of the station time series, including random and correlated noise and the perturbing effects of the M_w=9.3 2004 Sumatra and M_w=8.6 2012 Indian Ocean earthquakes on the motions at some stations (see for example the time series for sites IISC and KODI).

5. *Daily displacement text files for India plate GPS sites*: Daily displacements in the east, north, and vertical directions are provided in text format for each of the 29 India plate GPS sites relative to the initial measurement epoch for each site. The time series are not corrected for offsets and thus differ from the supplemental station coordinate time series plots, which are corrected for offsets. The daily displacements are given relative to ITRF2014.

1 GPS data analysis methods

The GPS code-phase data that were processed with the GIPSY software suite from the Jet Propulsion Laboratory were processed with releases 6.3 and 6.4 of the software as follows. No-fiducial

daily GPS station coordinates were estimated using the precise point-positioning strategy described by Zumberge *et al*. (1997). Our processing methodology includes constraints on a priori tropospheric hydrostatic and wet delays from Vienna Mapping Function parameters (http//:ggosatm.hg.tuwien.ac.at), elevation-dependent and azimuthally dependent GPS and satellite antenna phase center corrections from IGS08 ANTEX files (available via ftp from sideshow.jpl.nasa.gov), and FES2004 corrections for ocean tidal loading (http://holt.oso.chalmers.se). Phase ambiguities were resolved using GIPSY's single- station ambiguity resolution feature (Bertiger *et al*. 2010). Daily no-net-rotation station location estimates were transformed to IGS14, which conforms to ITRF2014 (Altamimi *et al*. 2016), using daily seven-parameter Helmert transformations from the Jet Propulsion Lab.

The methods used to process the GPS code-phase data with GAMIT/GLOBK are described by Jade *et al*. (2017). The raw data from the India plate sites are the same as those described and used by Jade *et al*. (2017), but were reprocessed for the present analysis with GAMIT and satellite and other files appropriate for ITRF2014.

Station velocities were estimated with linear regressions and in some cases include offsets estimated for earthquakes and changes in hardware. Seasonal terms were not estimated and removed from any of the station time series.

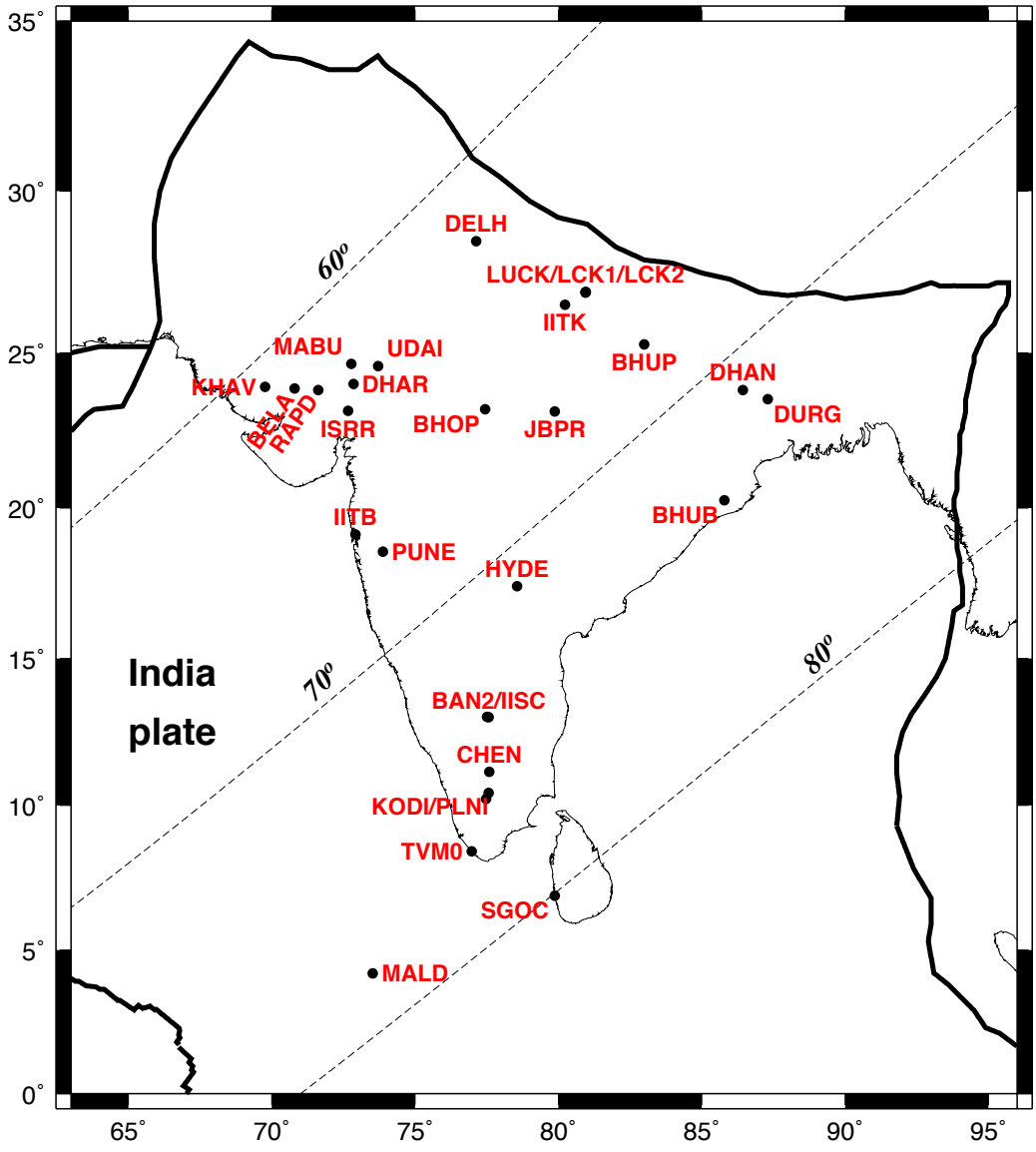
References in addition to those provided in the main document

Altamimi, Z., Rebischung, P., Metivier, L., & Collilieux, X., 2016. ITRF2014: A new release of the International Terrestrial Reference Frame modeling nolinear staiton motions, *J. Geophys. Res. Solid Earth*, **121**, 6109–6131.

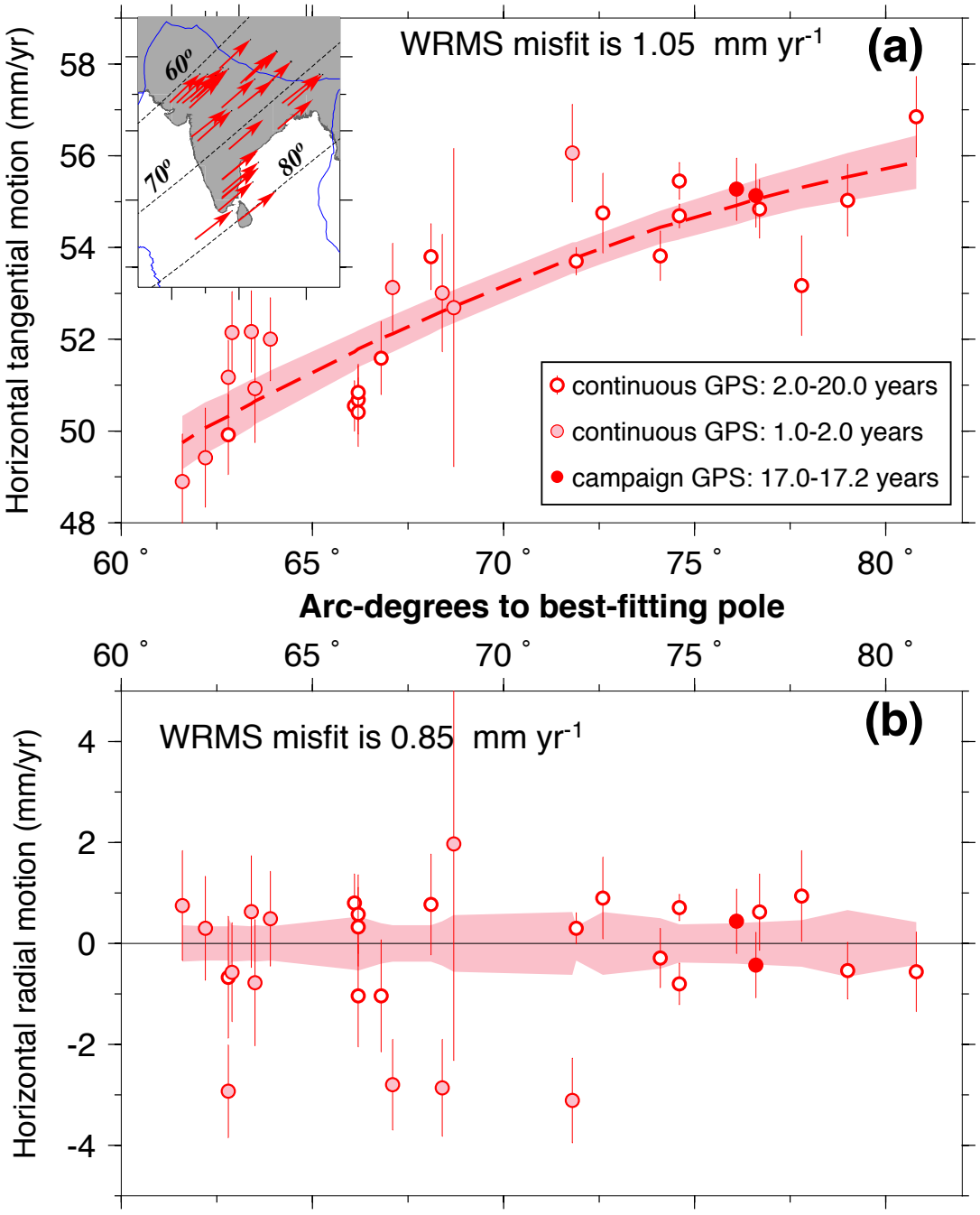
Bertiger, W., Desai, S. D., Haines, B., Harvey, N., Moore, A. W., Owen, S., & Weiss, J. P., 2010. Single receiver phase ambiguity resolution with GPS data, *J. Geodesy*, **94**, 327–337.

Jade, S., Shrungeshwara, T. S., Kumar, K., Choudhury, P., Dumka, R. K., & Bhu, H., 2017. India plate angular velocity and contemporary deformation rates from continuous GPS measurements from 1996 to 2015, *Scientific Reports*, **7**, 11439, doi: 10.1038/s41598–017-11697.w.

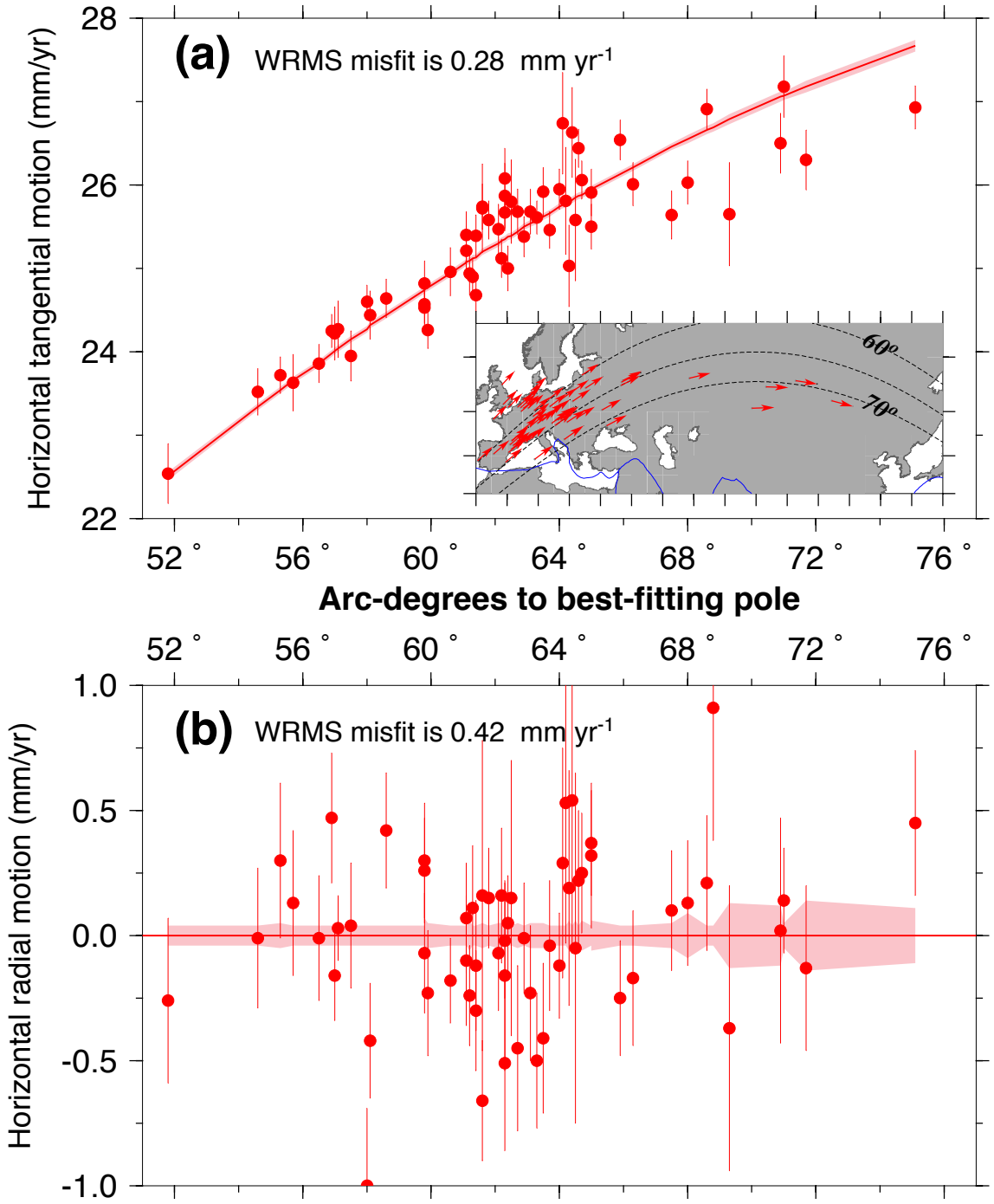
Zumberge, J. F., Heflin, M. B., Jefferson, D. C., Watkins, M. M., & Webb, F. H., 1997. Precise point positioning for the efficient and robust analysis of GPS data from large networks, *J. Geophys. Res.*, **102**, 5005–5017.



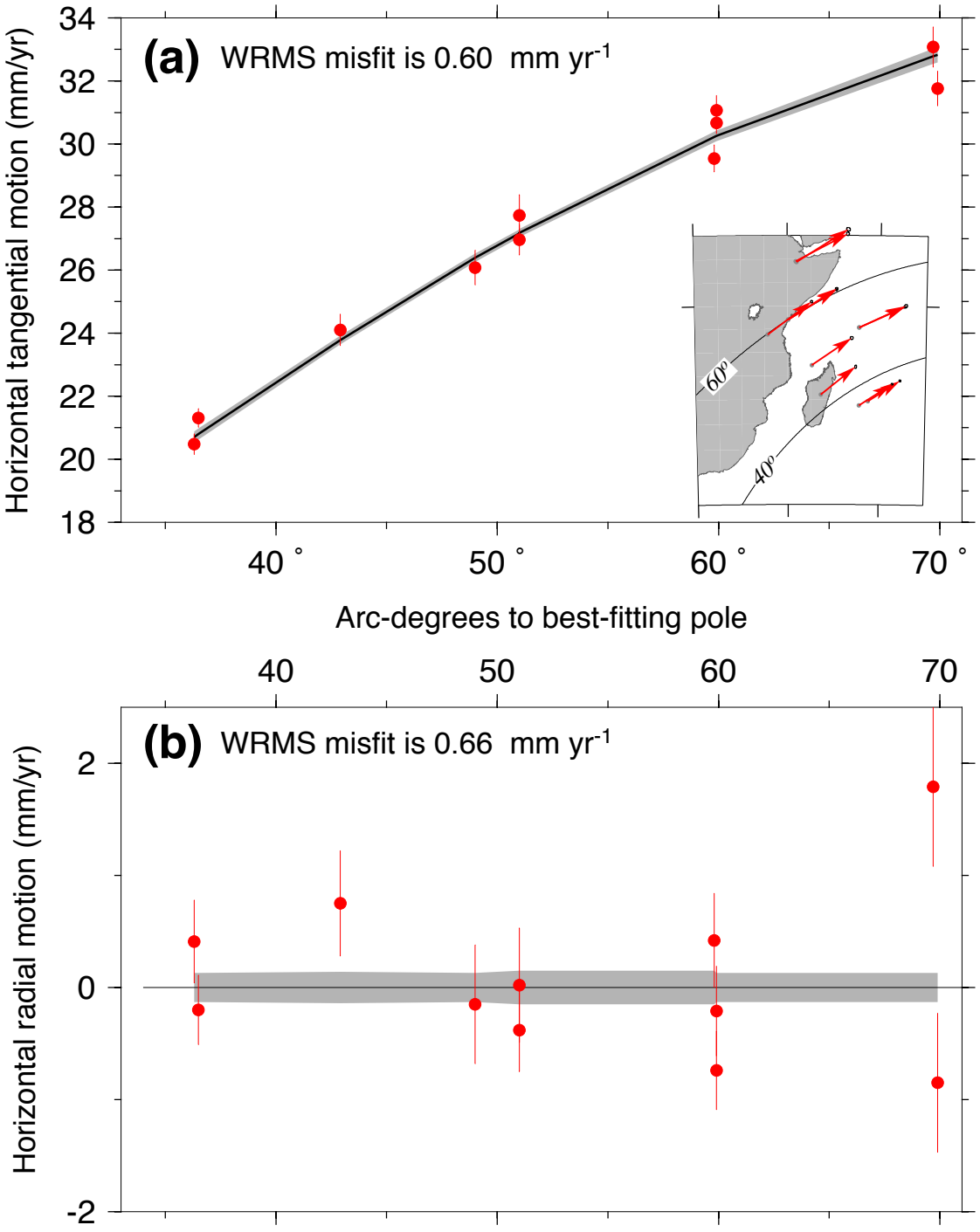
Supplemental Figure 1. Codes for the 29 India plate GPS stations used to estimate the India-ITRF2014 angular velocity from Table 1 of the main document. The small circles labeled 60^o, 70^o, and 80^o are centered on the India-ITRF2014 best-fitting angular velocity (see Supplemental Figure 2).



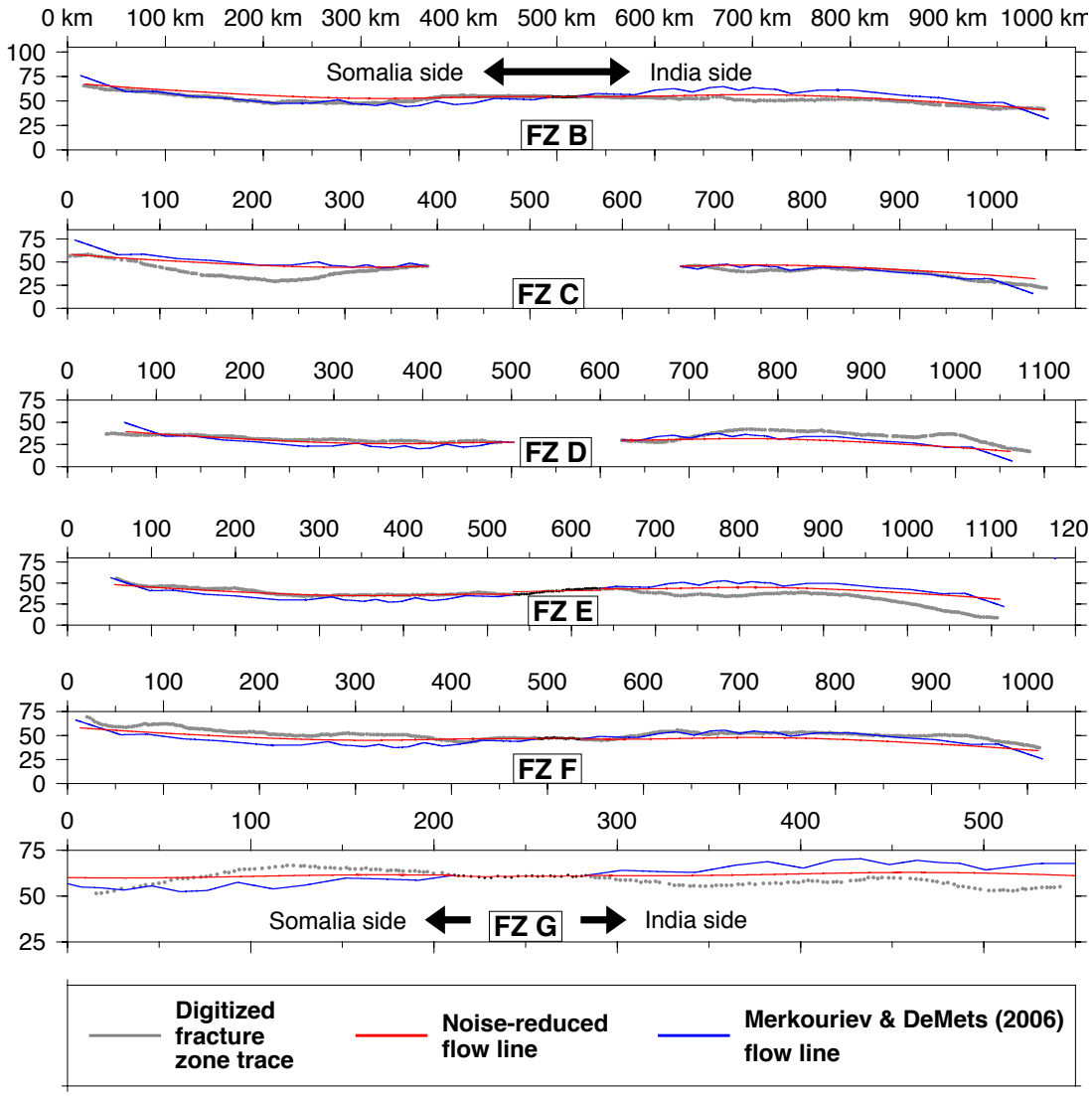
Supplemental Figure 2. Locations (map inset) and ITRF14 velocity components of the 30 India plate GPS sites from Supplemental Table 2 that were used to estimate the India-ITRF2014 angular velocity given in Table 1 of the main document. The red arrows in the inset map show the GPS site velocities in ITRF2014 (see also Figure 1 in the main document). (a) Component of each GPS site's velocity parallel to a small circle around the best-fitting pole. (b) Component of GPS site motion toward or away from the best-fitting pole (the radial component). The pink-shaded regions show the 95 percent velocity uncertainties propagated from the best-fitting angular velocity covariances. Vertical bars show the observed velocity errors. The dotted small circles in the inset map demarcate angular distances from the best-fitting India-ITRF14 angular velocity.



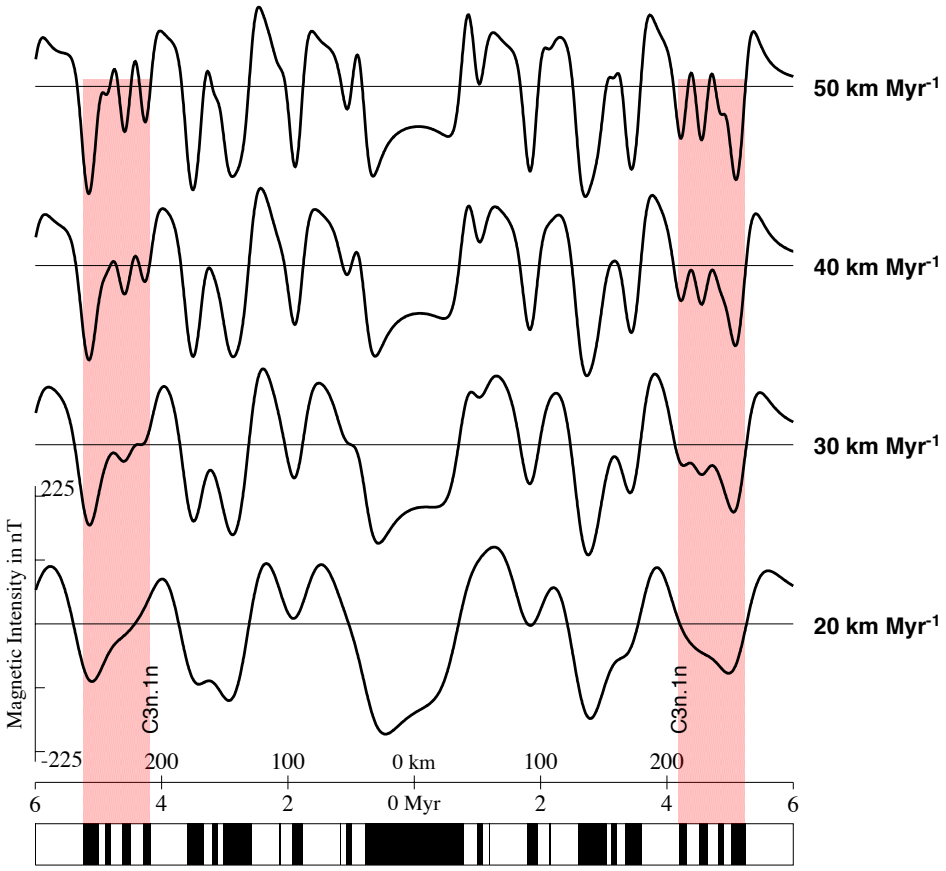
Supplemental Figure 3. Locations (map inset) and velocity components of the 60 Eurasia plate GPS sites from Supplemental Table 2 that were used to estimate the Eurasia-ITRF2014 angular velocity given in Table 1 of the main document. The red arrows in the inset map show the GPS site velocities in ITRF2014. (a) Component of each GPS site's velocity parallel to a small circle around the best-fitting pole. (b) Component of GPS site motion toward or away from the best-fitting pole (the radial component). Standard errors are shown. The dotted small circles in the inset map demarcate angular distances from the best-fitting Eurasia-ITRF14 angular velocity.



Supplemental Figure 4. Locations (map inset) and velocity components for the 11 sites from Supplemental Table 2 that are used to estimate the Somalia-ITRF2014 angular velocity found in Table 1 of the main document. The red arrows in the map show the site velocities in ITRF2014. (a) Station velocity component tangential to small circles around the best-fitting pole. (b) Station velocity component (radial) toward or away from the best-fitting pole. All the velocity and model uncertainties are 1-σ. Small circles in the inset map are centered on the best-fitting pole in Table 1 of the main document and denote the angular distances along the horizontal axes of (a) and (b).



Supplemental Figure 5. Digitized fracture zone flow lines (black dotted lines) compared to India-Somalia flow lines created with stage rotations determined from the noise-reduced rotations in Table 2 of the main document (red lines) and best-fitting rotations from Merkouriev & DeMets (2006) (blue lines). All units in the graph are in kilometers. The flow lines estimated with the latter rotations are identical to those estimated with India-Somalia rotations estimated by Bull *et al*. (2010), who updated the Merkouriev & DeMets (2006) rotations to adjust for outward displacement.



Supplemental Figure 6. Modeled shapes of magnetic anomalies 1 through 3 for the Carlsberg Ridge for full spreading rates of 20 to 50 mm yr^{-1}, with emphasis on the increased difficulty in selecting the precise location of the young edge of the anomaly 3 sequence (C3n.1n) at slower spreading rates. The synthetic magnetic anomaly profiles were created using the magnetic block model at the bottom of the figure, a reversal zone transition width of 1 km, a vertical distance of 3 km to the top of a 500-m-thick magnetic source layer, a spreading ridge azimuth of N55^{o}W, and remament and ambient magnetic inclinations and declinations suitable for the central portion of the Carlsberg Ridge.

Supplemental Table 1. Data and inversion fitting summary

Chron	Reversal age (Ma)	Number of data			WRMS misfits in kilometers Best-fitting			Noise-reduced		
		Rvrsl	FZ	TF	Rvrsl	FZ	TF	Rvrsl	FZ	TF
1no	0.781	337	72	101	1.82	0.26	0.68	1.83	0.21	0.74
2ny	1.778	344	103	–	1.28	0.36	–	1.29	0.45	–
2An.1y	2.581	409	89	–	1.47	0.58	–	1.48	0.74	–
2An.3o	3.596	365	122	–	1.55	0.88	–	1.95	0.93	–
3n.1y	4.187	386	90	–	1.48	0.91	–	1.91	1.12	–
3n.4o	5.235	330	131	–	1.45	1.28	–	1.45	1.37	–
3An.1y	6.033	274	88	–	1.68	2.28	–	1.72	2.30	–
3An.2o	6.733	272	67	–	1.54	3.19	–	1.83	2.97	–
4n.1y	7.528	239	81	–	1.58	3.35	–	2.42	3.28	–
4n.2o	8.108	280	68	–	1.47	3.60	–	1.68	3.58	–
4Ao	9.105	305	102	–	1.47	4.01	–	1.53	3.89	–
5n.1y	9.786	366	66	–	1.71	4.20	–	1.89	4.11	–
5n.2o	11.056	447	143	–	1.87	4.16	–	2.11	4.23	–
5An.2o	12.474	367	154	–	1.65	3.94	–	1.79	4.41	–
5ACy	13.739	328	136	–	2.12	3.73	–	3.15	4.65	–
5ADo	14.609	292	108	–	1.93	3.74	–	2.21	4.48	–
5Cn.1y	15.974	351	171	–	1.84	3.70	–	2.05	4.03	–
5Dy	17.235	339	171	–	1.78	4.95	–	1.76	4.35	–
5Ey	18.056	294	122	–	1.87	5.91	–	2.45	4.39	–
6ny	18.748	264	98	–	2.19	5.48	–	3.29	3.54	–
6no	19.722	269	111	–	2.20	5.02	–	2.51	3.73	–

Chron designators followed by a "y" or "o" respectively indicate the young or old edge of the chron. Reversal ages are from the GTS12 time scale (Hilgen *et al*. 2012; Ogg 2012). Rvrsl, FZ, and TF respectively indicate the number of magnetic reversal, fracture zone, and transform fault crossings used to estimate the finite rotations listed in subsequent. Approximate ages are estimated for the fracture zone crossings based on their distances from their ridge-transform intersections. WRMS is the weighted root-mean-square misfit in km of the best-fitting (Table 2 in main document) or noise-reduced (Table 3 in main document) rotation sequence adjusted for the number of parameters that were estimated to fit the given data subset.

Supplemental Table 2: India, Eurasia, and Somalia plate GPS site velocities

Site code	Lat. (°N)	Long. (°E)	$V_{east} \pm \sigma$ mm yr^{-1}	$V_{north} \pm \sigma$ mm yr^{-1}	C_{en}	Time (yrs)	Days of data
India GPS sites							
BAN2	13.030	77.510	43.2±0.4	34.8±0.4	-0.0835	10.036	2278
BELA	23.870	70.800	36.1±0.9	33.8±1.2	0.0613	1.948	643
BHOP	23.210	77.450	39.0±1.0	33.8±0.9	-0.3302	2.129	692
BHUB	20.260	85.790	41.2±0.6	34.6±0.5	-0.1166	4.992	905
BHUP	25.270	82.990	37.9±4.3	36.6±3.4	-0.2417	1.616	265
CHEN	11.160	77.590	42.5±0.8	35.4±0.5	0.0000	17.163	38
DELH	28.480	77.130	36.5±1.1	34.0±1.0	-0.3274	2.778	666
DHAN	23.820	86.440	44.4±1.0	34.4±0.9	0.2090	1.803	355
DHAR	24.010	72.850	37.9±1.1	35.8±0.9	-0.2374	1.857	467
DURG	23.530	87.310	40.9±0.9	36.4±0.8	0.0504	2.471	607
HYDE	17.420	78.550	40.6±0.3	35.1±0.3	-0.0246	13.173	4069
IISC	13.020	77.570	41.6±0.3	35.5±0.3	-0.0032	19.997	6385
IITB	19.130	72.920	41.8±1.0	32.9±0.8	0.0387	1.674	360
IITK	26.510	80.230	36.6±0.6	34.8±0.6	-0.0587	3.994	427
ISRR	23.160	72.670	38.1±0.9	35.4±1.0	-0.0309	1.857	599
JBPR	23.130	79.880	41.5±1.3	33.1±1.0	0.2625	1.864	311
KHAV	23.920	69.770	35.4±1.0	33.8±1.2	-0.0418	1.997	533
KODI	10.230	77.470	42.1±0.7	35.2±0.7	-0.1708	17.192	3399
LCK1	26.910	80.960	36.9±0.7	34.8±0.8	-0.0285	2.764	962
LCK2	26.910	80.960	36.9±0.7	34.4±0.8	-0.0239	2.784	987
LUCK	26.890	80.940	38.1±0.9	33.7±0.8	-0.4609	4.046	1173
MABU	24.650	72.780	38.6±0.9	35.1±1.0	-0.0959	1.997	384
MALD	4.190	73.530	43.5±0.8	33.6±0.5	0.2493	6.438	1469
PLNI	10.430	77.560	43.0±0.8	34.5±0.6	0.0000	17.185	29
PUNE	18.560	73.880	40.1±0.9	35.9±0.8	-0.3511	4.953	782
RAPD	23.820	71.620	39.6±0.9	32.5±0.8	-0.1355	1.997	544
SGOC	6.890	79.870	44.6±0.9	35.2±0.7	0.0681	6.601	1408
TVM0	8.420	76.970	40.8±1.2	34.2±0.8	0.1184	3.016	647
UDAI	24.580	73.710	37.9±1.2	34.0±1.2	-0.0563	0.990	361
Eurasia GPS sites							
ALAC	38.340	359.520	19.9±0.2	16.8±0.2	-0.0280	19.693	6718
ARTU	56.430	58.560	25.3±0.3	6.1±0.2	-0.0553	19.682	6902
BELL	41.600	1.400	19.8±0.3	16.3±0.3	0.0224	16.137	4593
BOR1	52.280	17.070	19.9±0.2	14.6±0.2	-0.2494	24.279	8774
BRST	48.380	355.500	16.5±0.3	17.0±0.2	-0.3393	19.367	5939
BRUS	50.800	4.360	17.7±0.3	16.1±0.3	0.1675	17.805	6436
CAGL	39.140	8.970	21.5±0.3	16.2±0.3	-0.1163	17.543	6058
CASC	38.690	350.580	17.9±0.2	16.8±0.2	0.0921	19.351	6634
CREU	42.320	3.320	20.2±0.3	16.2±0.3	-0.0268	12.791	4146
DENT	50.930	3.400	17.9±0.3	16.3±0.2	0.5136	20.964	6873
DOUR	50.090	4.590	18.5±0.3	16.0±0.2	0.2017	20.964	6999
DRES	51.030	13.730	19.9±0.3	15.5±0.3	0.2567	18.875	5990

EBRE	40.820	0.490	19.9±0.2	16.1±0.2	-0.2721	22.995	6980
ENGL	51.450	358.720	16.6±0.3	16.7±0.3	-0.0131	13.874	4479
ESCO	42.690	0.980	19.4±0.3	16.5±0.3	0.2606	17.146	4309
EUSK	50.670	6.760	18.3±0.2	16.5±0.2	0.0204	21.030	7112
GLSV	50.360	30.500	22.4±0.3	12.4±0.3	0.2537	21.123	7362
GOPE	49.910	14.790	20.0±0.2	15.0±0.2	0.3221	23.573	8234
GRAS	43.750	6.920	20.4±0.2	16.1±0.2	0.1042	23.101	7507
GRAZ	47.070	15.490	20.8±0.3	15.4±0.2	0.2402	25.277	8596
HELG	54.170	7.890	17.8±0.2	15.9±0.2	-0.1185	19.427	6278
HERS	50.870	0.340	16.9±0.3	16.6±0.3	0.1676	21.962	6455
HUEG	47.830	7.600	19.6±0.3	16.1±0.3	0.0880	16.841	5895
IRKT	52.220	104.320	25.4±0.3	-6.8±0.3	-0.1533	18.323	6332
JOZE	52.100	21.030	21.0±0.2	14.3±0.2	0.0976	24.351	8581
KARL	49.010	8.410	19.4±0.2	15.8±0.2	0.4983	21.789	7642
KLOP	50.220	8.730	18.9±0.2	16.1±0.3	0.2496	21.789	7073
KOSG	52.180	5.810	18.0±0.3	16.3±0.3	0.7606	20.477	6562
KRTV	50.710	78.620	26.9±0.3	0.9±0.3	0.0770	18.596	6483
KSTU	55.990	92.790	25.4±0.6	-3.9±0.6	-0.0953	7.056	1632
LAMA	53.890	20.670	20.3±0.2	14.4±0.2	-0.1574	24.279	8343
LLIV	42.480	1.970	19.9±0.3	16.2±0.3	-0.2096	13.899	3919
MADR	40.430	355.750	18.8±0.2	16.4±0.2	0.2989	24.348	6841
MARS	43.280	5.350	19.8±0.2	16.0±0.2	-0.1530	20.279	6573
MDVO	56.030	37.220	22.4±0.5	11.2±0.5	-0.0004	7.562	2559
MIKL	46.970	31.970	24.1±0.3	12.6±0.3	0.5577	15.915	5671
MOBN	55.110	36.570	22.7±0.3	11.6±0.3	-0.0157	18.049	6239
MOPI	48.370	17.270	21.5±0.3	15.4±0.2	-0.2196	21.156	6589
MORP	55.210	358.310	15.4±0.3	16.4±0.4	0.0526	20.175	6267
NVSK	54.840	83.240	26.5±0.4	-0.9±0.5	-0.1998	18.752	5855
OBER	48.090	11.280	20.2±0.5	16.0±0.5	-0.0796	4.580	1617
PENC	47.790	19.280	22.1±0.2	14.6±0.2	0.0590	22.023	7684
PFAN	47.520	9.780	20.7±0.4	15.8±0.4	0.0343	10.419	3437
POTS	52.380	13.070	19.3±0.2	15.2±0.2	-0.0182	23.507	7436
RIGA	56.950	24.060	20.2±0.2	13.4±0.2	-0.1338	20.118	6808
RTMN	47.520	14.340	20.5±0.7	15.7±0.5	0.0618	4.377	1181
SJDV	45.880	4.680	19.6±0.2	16.1±0.3	0.0118	18.789	4726
SRJV	43.870	18.410	23.1±0.4	16.4±0.5	-0.5643	18.690	2203
STPO	48.200	15.630	21.5±0.6	15.9±0.5	0.2641	4.512	1396
TLSE	43.560	1.480	20.0±0.3	16.3±0.2	0.1080	18.268	5839
TOUL	43.560	1.480	19.4±0.6	16.9±0.6	-0.1591	3.847	1263
UZHL	48.630	22.300	22.0±0.3	13.9±0.3	-0.0590	18.290	5581
VLNS	54.650	25.300	21.1±0.2	13.7±0.3	-0.1557	18.186	4466
WARE	50.690	5.250	19.0±0.3	15.6±0.2	-0.4177	20.964	6313
WIEN	48.220	16.370	21.4±0.6	15.9±0.5	-0.1873	5.621	1713
WSRT	52.910	6.600	17.7±0.2	16.6±0.2	-0.2157	21.797	7825
WTZR	49.140	12.880	20.4±0.2	15.6±0.2	-0.0473	21.889	7811
WTZT	49.140	12.880	20.6±0.4	15.6±0.4	0.0166	7.882	2580
ZIMM	46.880	7.470	19.7±0.2	16.3±0.2	0.1476	25.279	9091

ZWEN	55.700	36.760	22.9±0.6	11.3±0.8	0.1966	9.600	2766
Somalia GPS sites							
ABPO	-19.020	47.230	18.8±0.3	15.1±0.6	0.2308	11.405	3145
DAMY	9.420	42.030	28.1±0.7	17.6±0.7	-0.1534	2.685	858
DODM	-6.190	35.750	23.7±0.4	17.6±0.4	0.0629	7.737	1647
ETDD	9.610	41.860	28.2±0.6	14.7±0.6	-0.0582	5.258	979
MAL2	-3.000	40.190	26.1±0.4	16.0±0.3	-0.0497	10.755	3681
MALI	-3.000	40.190	26.2±0.5	16.7±0.4	0.0866	12.817	4269
MAYG	-12.780	45.260	21.6±0.5	14.6±0.5	0.0459	4.378	1491
REUN	-21.210	55.570	17.8±0.3	11.7±0.3	-0.0907	20.279	5260
SEY1	-4.670	55.480	24.6±0.5	11.2±0.3	0.0188	20.797	4359
SEYG	-4.680	55.530	25.1±0.6	11.8±0.6	0.3008	5.572	1677
VACS	-20.300	57.500	17.2±0.4	11.1±0.3	-0.1489	10.987	3631

Column 6 gives the correlation coefficient between the north and east velocity component uncertainties. Time specifies the interval spanned by the GPS data. All site velocities are given relative to ITRF14.

Site BAN2 position time series reduced by India plate motion

BAN2 at 13.034°N 77.512°E — Processed with GAMIT

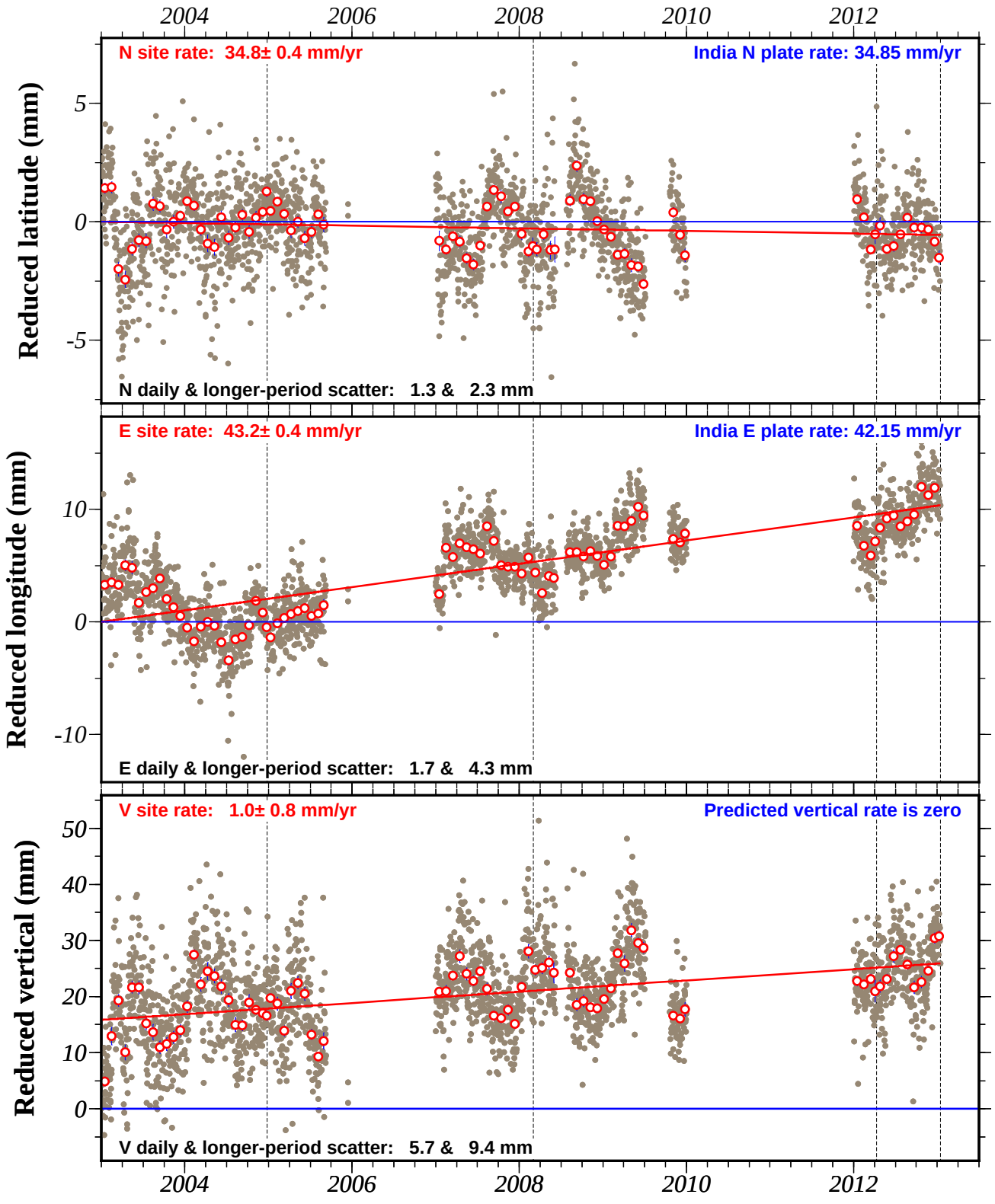
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site BELA position time series reduced by India plate motion

BELA at 23.874°N 70.801°E — Processed with GAMIT

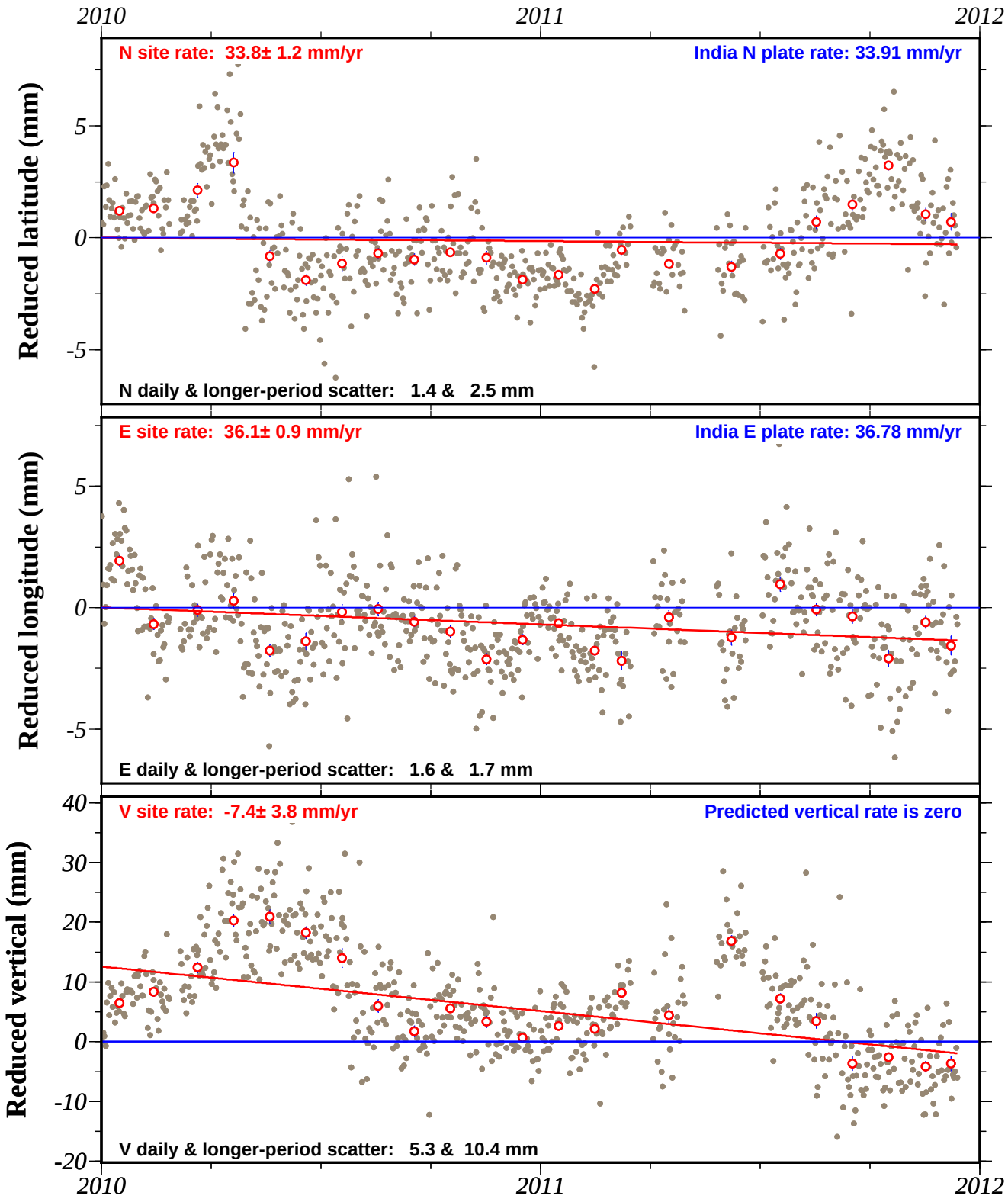
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site BHOP position time series reduced by India plate motion

BHOP at 23.209°N 77.447°E — Processed with GAMIT

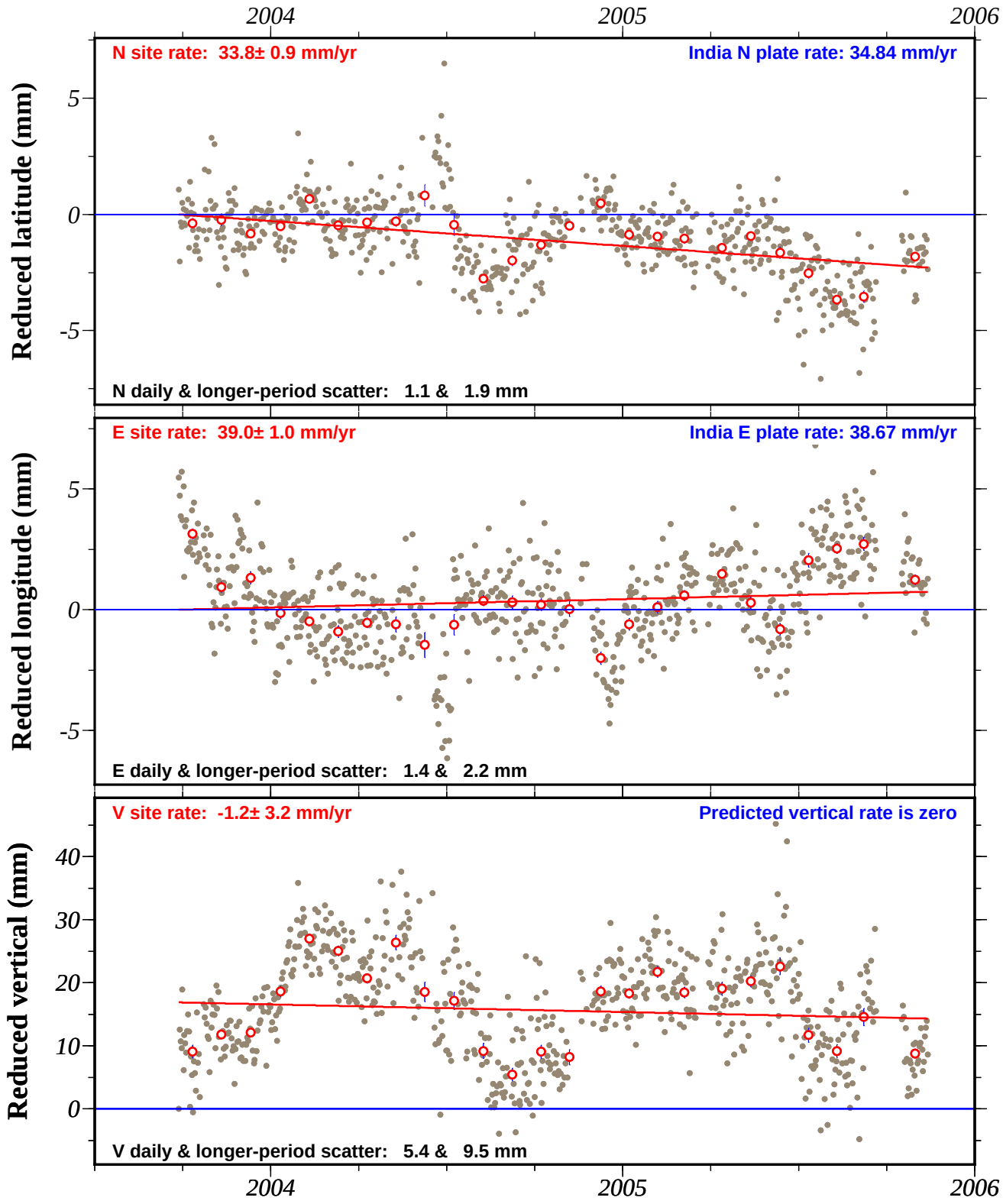
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site BHUB position time series reduced by India plate motion

BHUB at 20.263°N 85.792°E — Processed with GAMIT

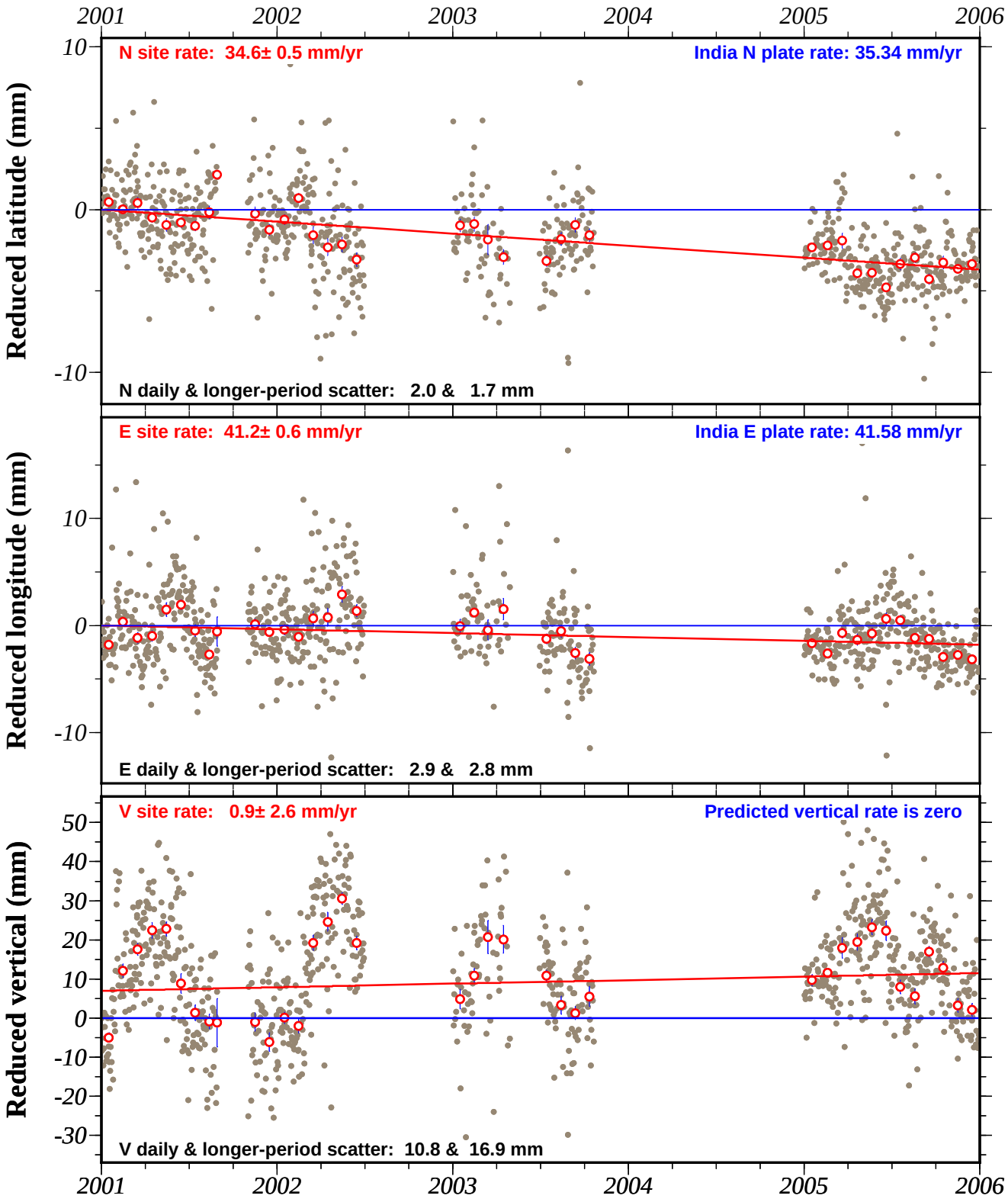
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site BHUP position time series reduced by India plate motion

BHUP at 25.269°N 82.993°E — Processed with GAMIT

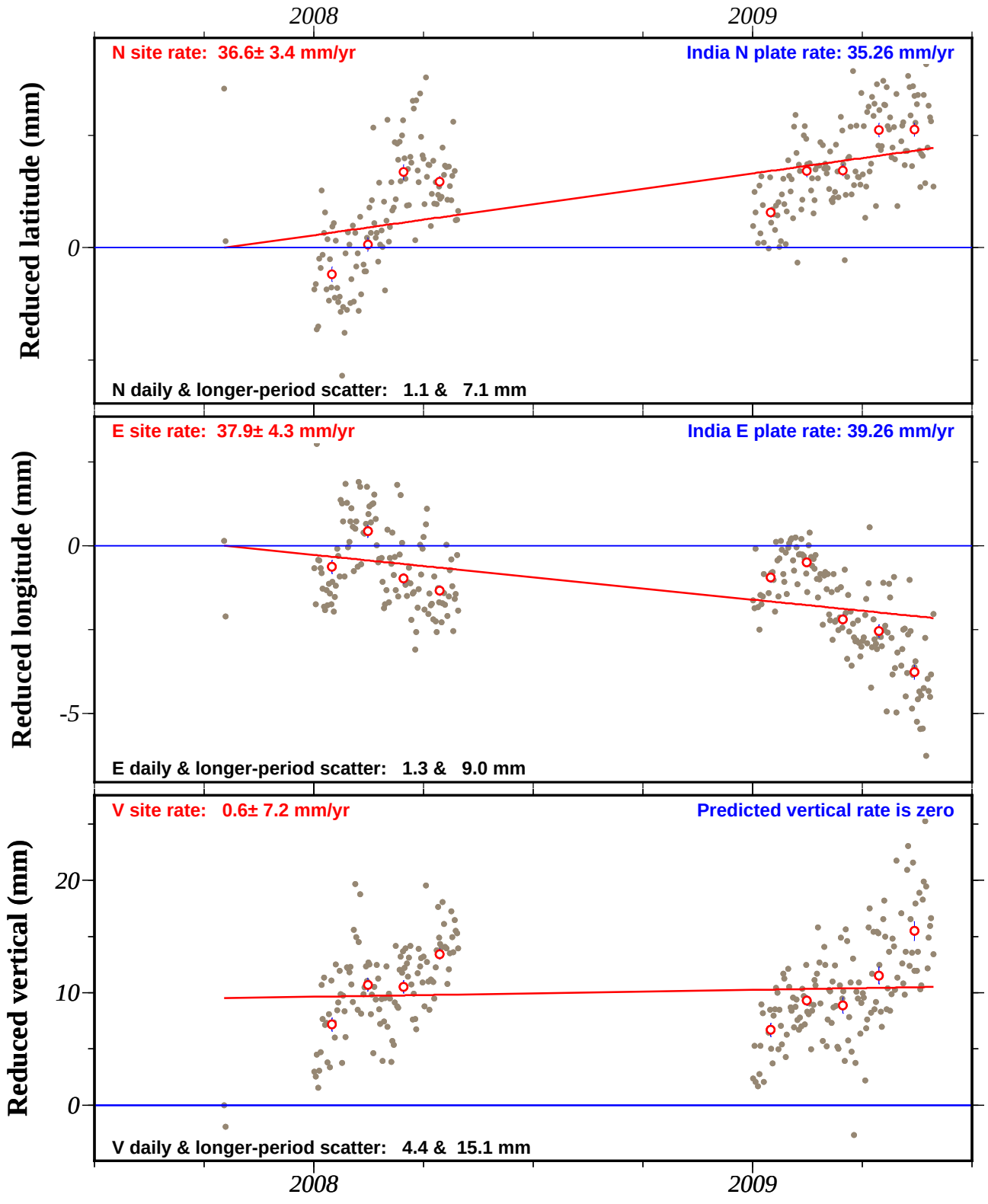
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site CHEN position time series reduced by India plate motion

CHEN at 11.157°N 77.587°E — Processed with GAMIT

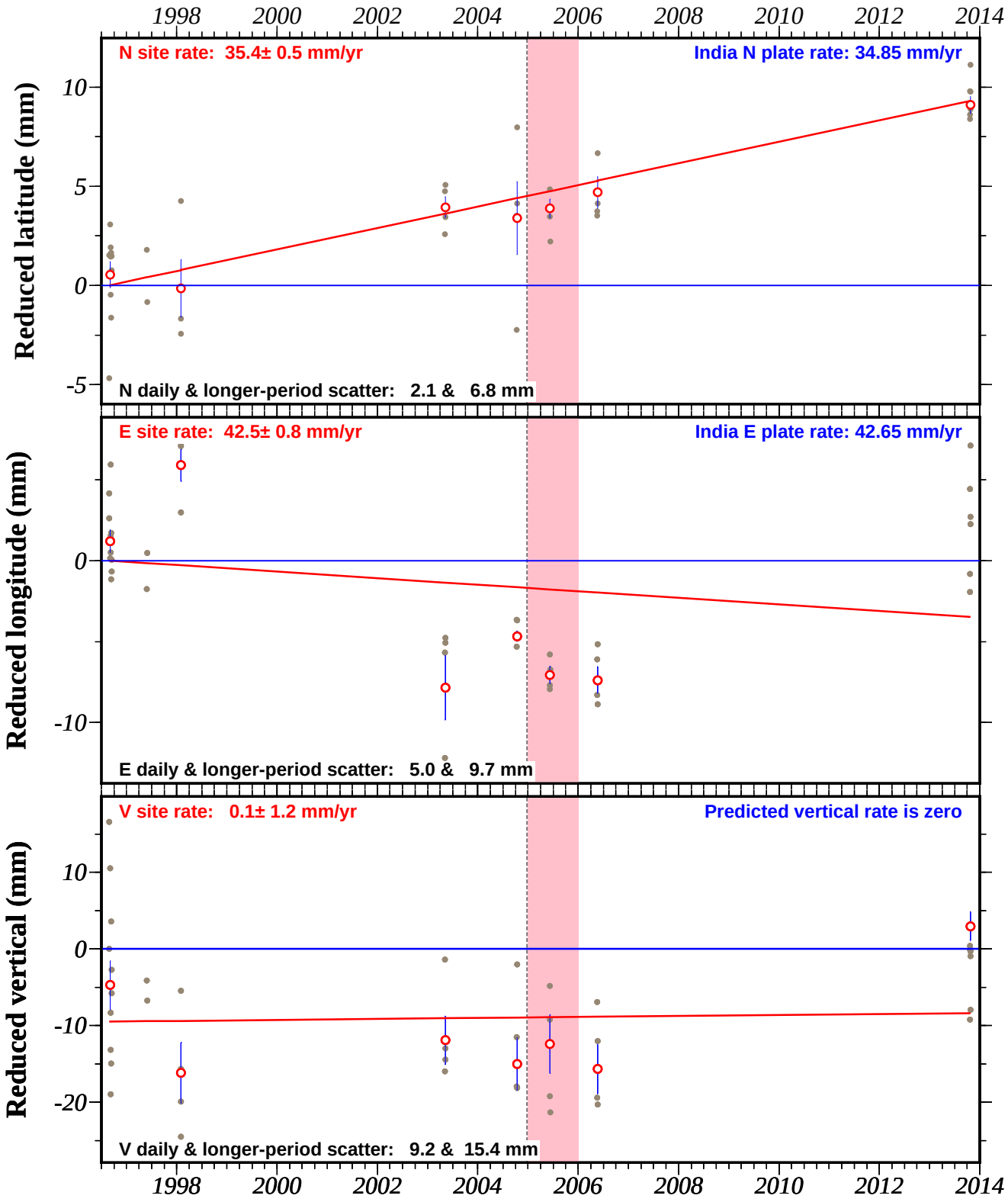
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site DELH position time series reduced by India plate motion

DELH at 28.482°N 77.126°E — Processed with GAMIT

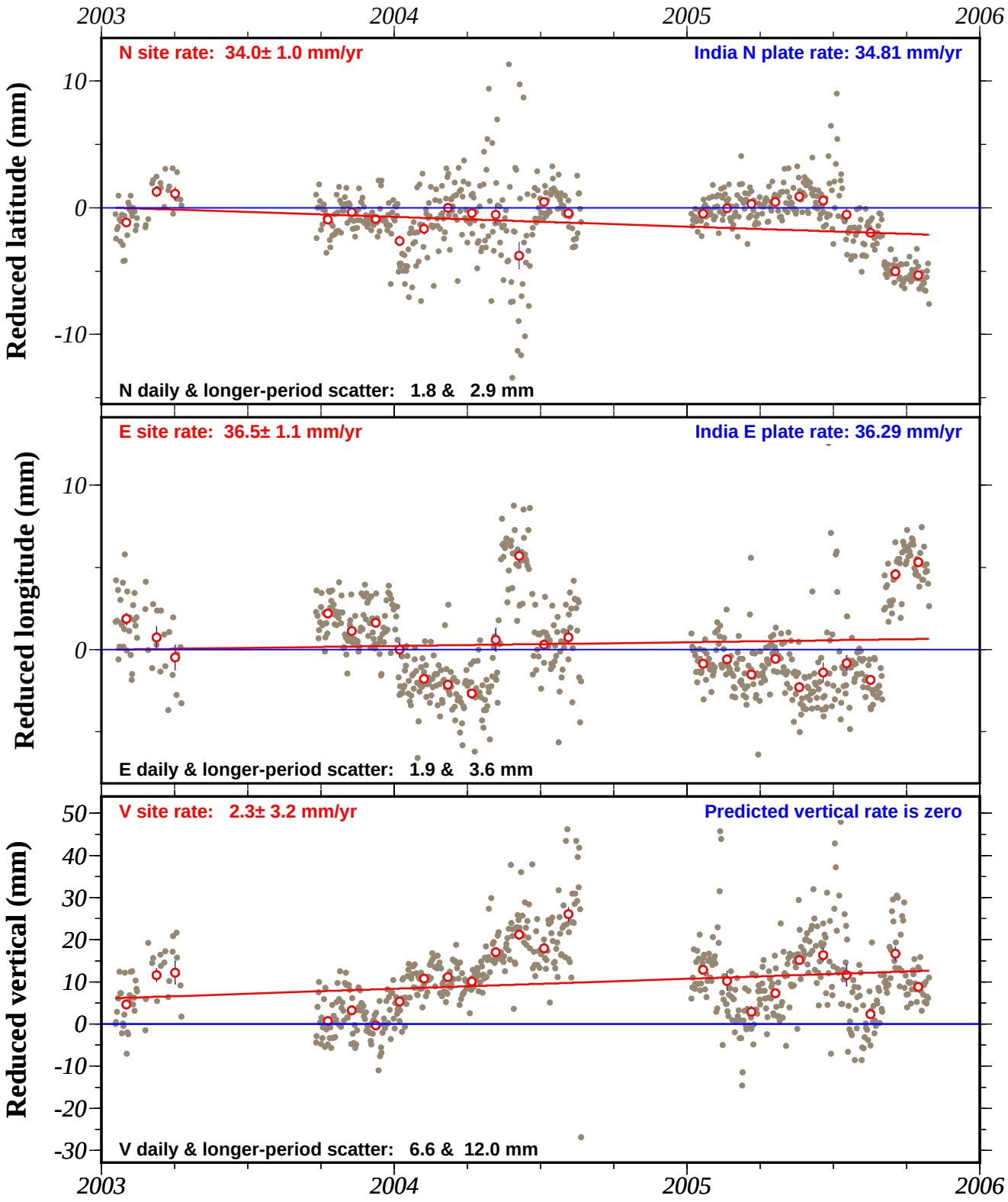
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site DHAN position time series reduced by India plate motion

DHAN at 23.815°N 86.444°E — Processed with GAMIT

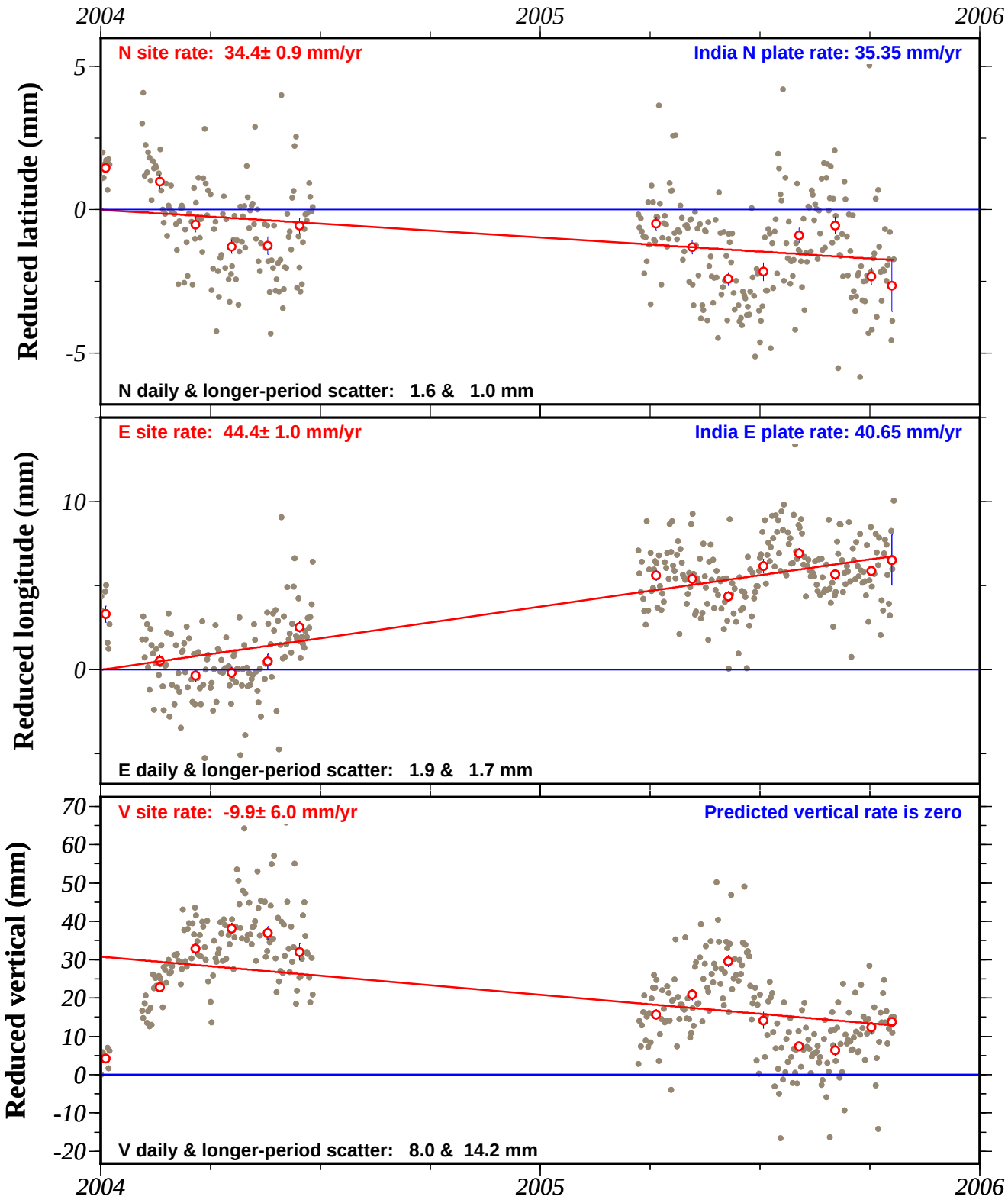
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site DHAR position time series reduced by India plate motion

DHAR at 24.007°N 72.847°E — Processed with GAMIT

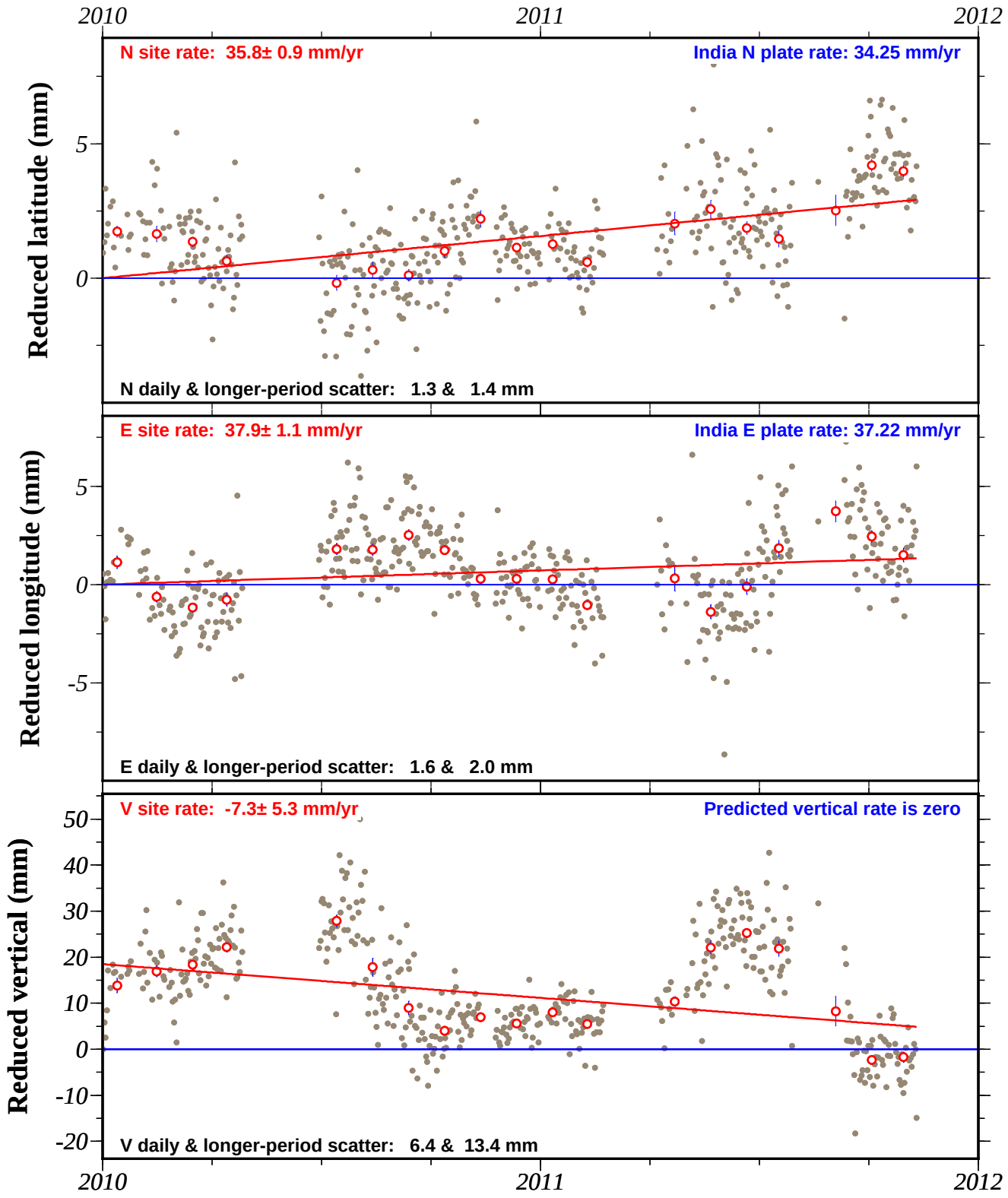
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site DURG position time series reduced by India plate motion

DURG at 23.533°N 87.308°E — Processed with GAMIT

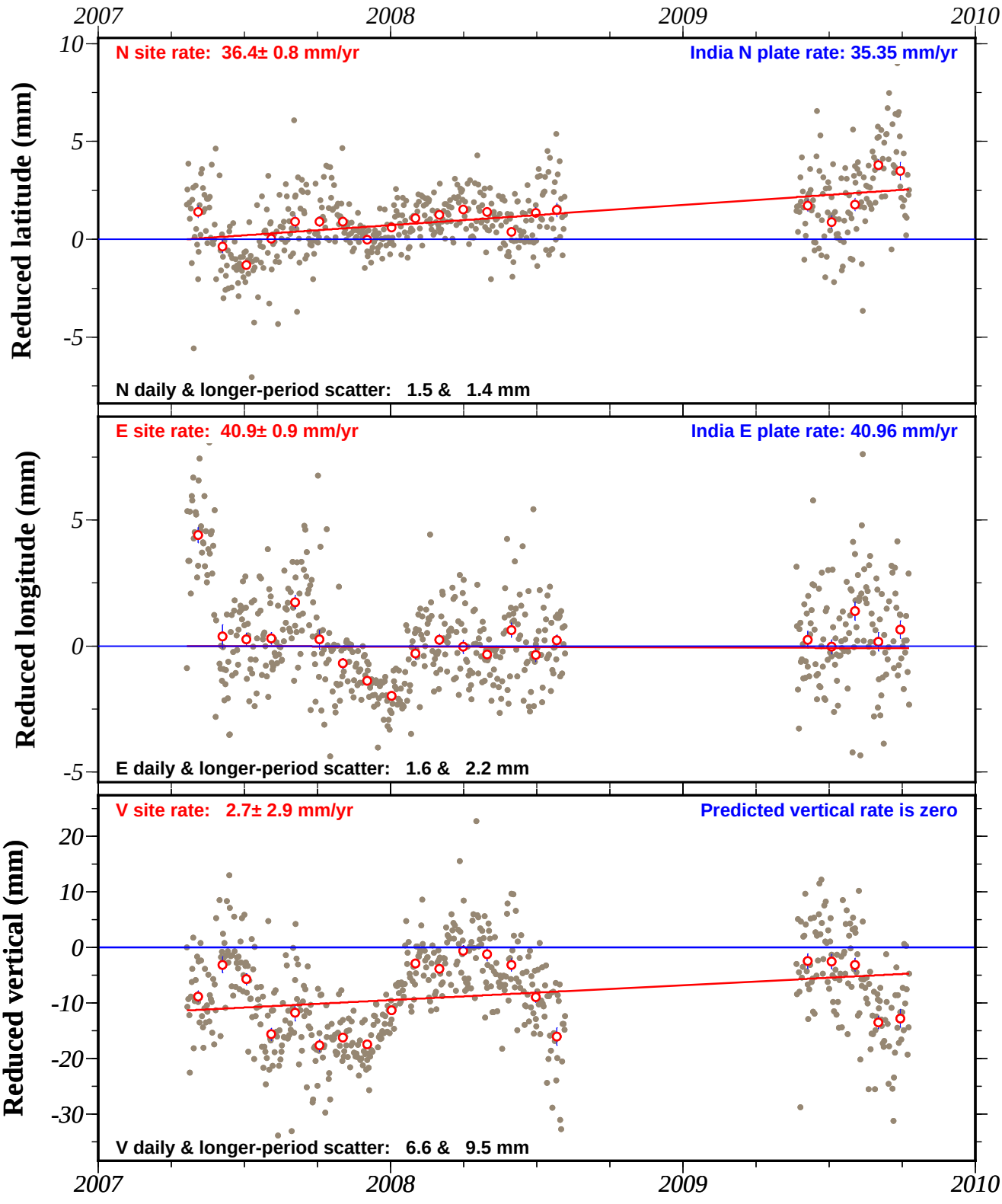
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site HYDE position time series reduced by India plate motion

HYDE at 17.417°N 78.551°E — Processed with GAMIT

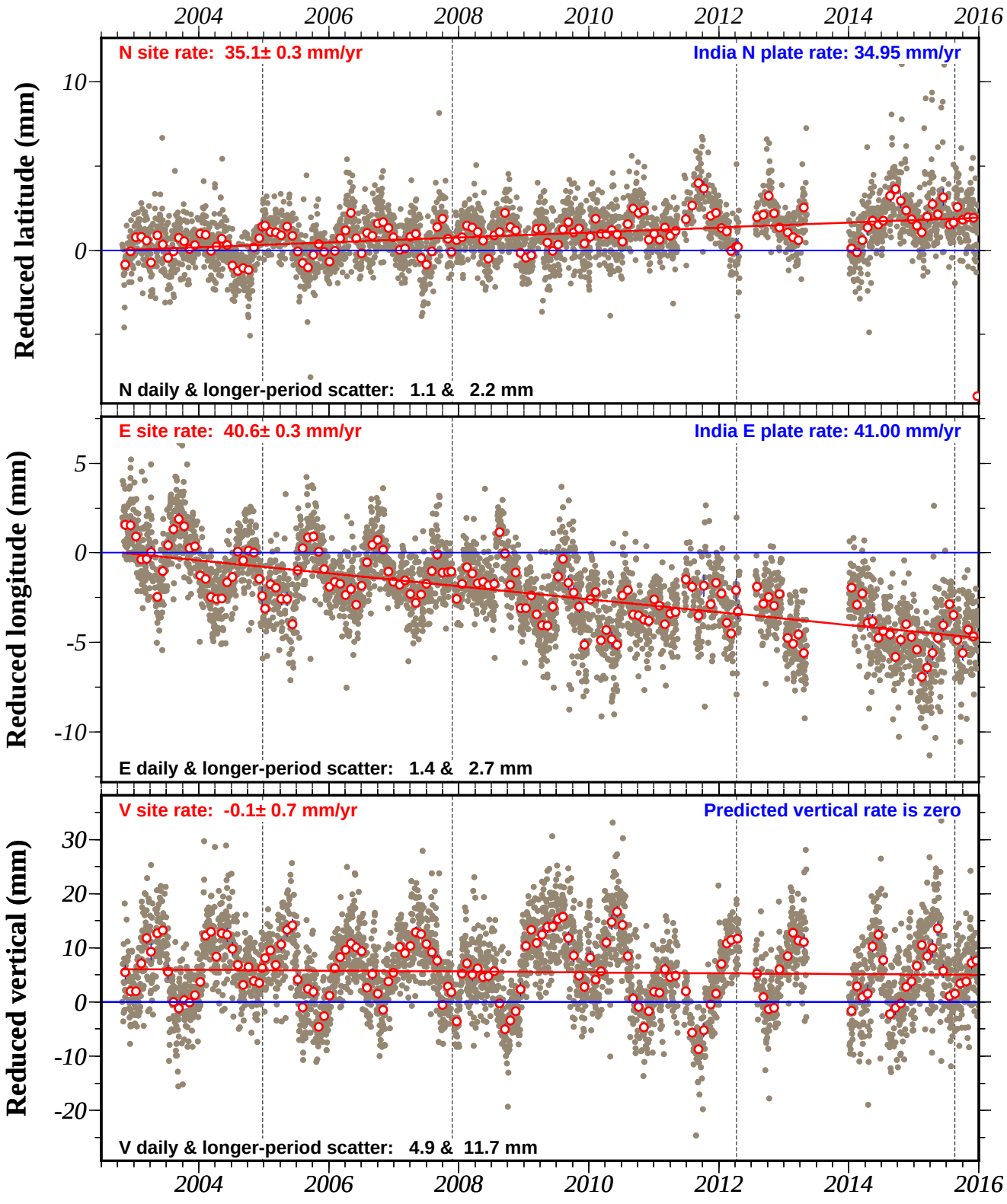
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site IISC position time series reduced by India plate motion

IISC at 13.021°N 77.570°E — Processed with GAMIT

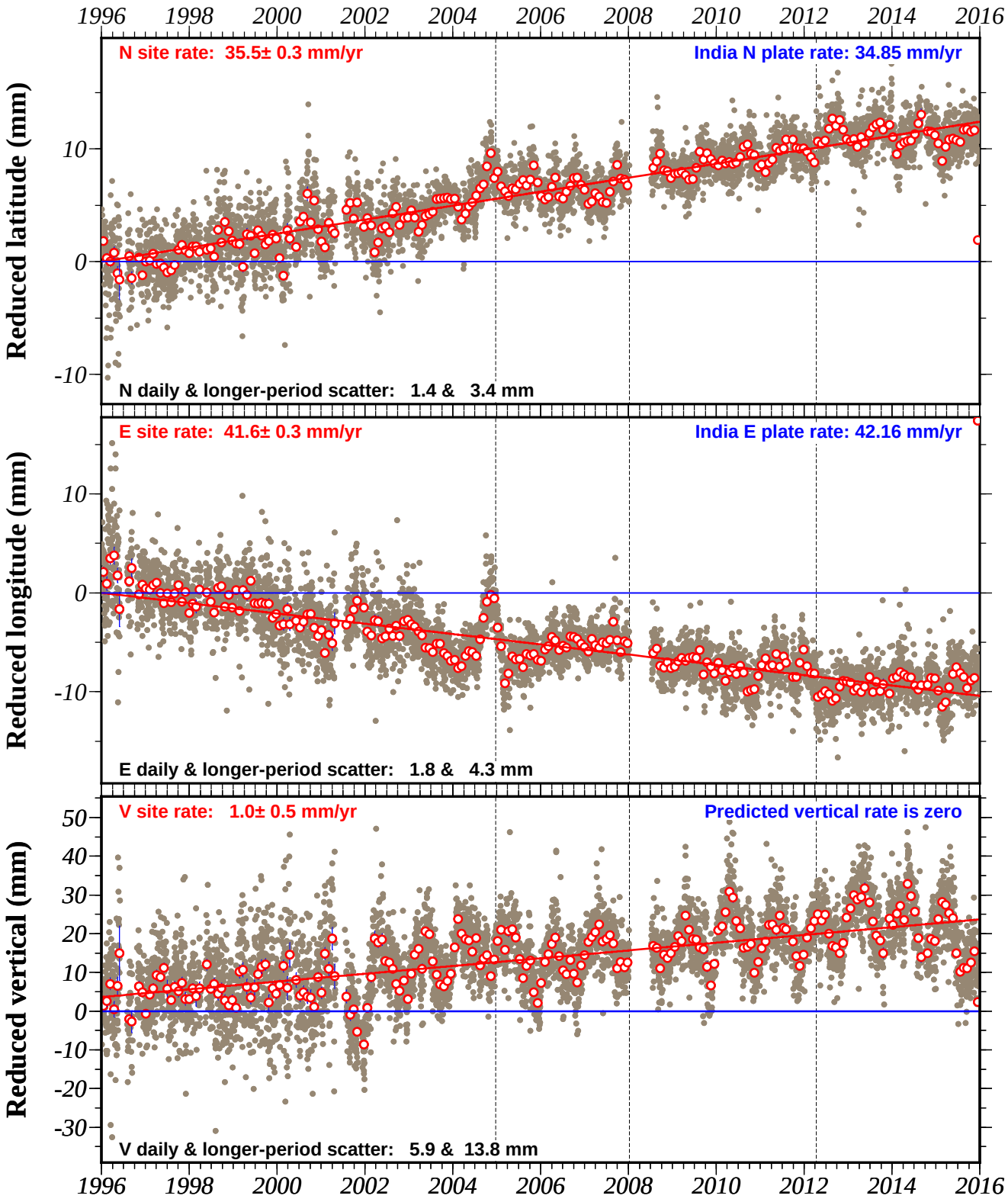
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site IITB position time series reduced by India plate motion

IITB at 19.133°N 72.916°E — Processed with GAMIT

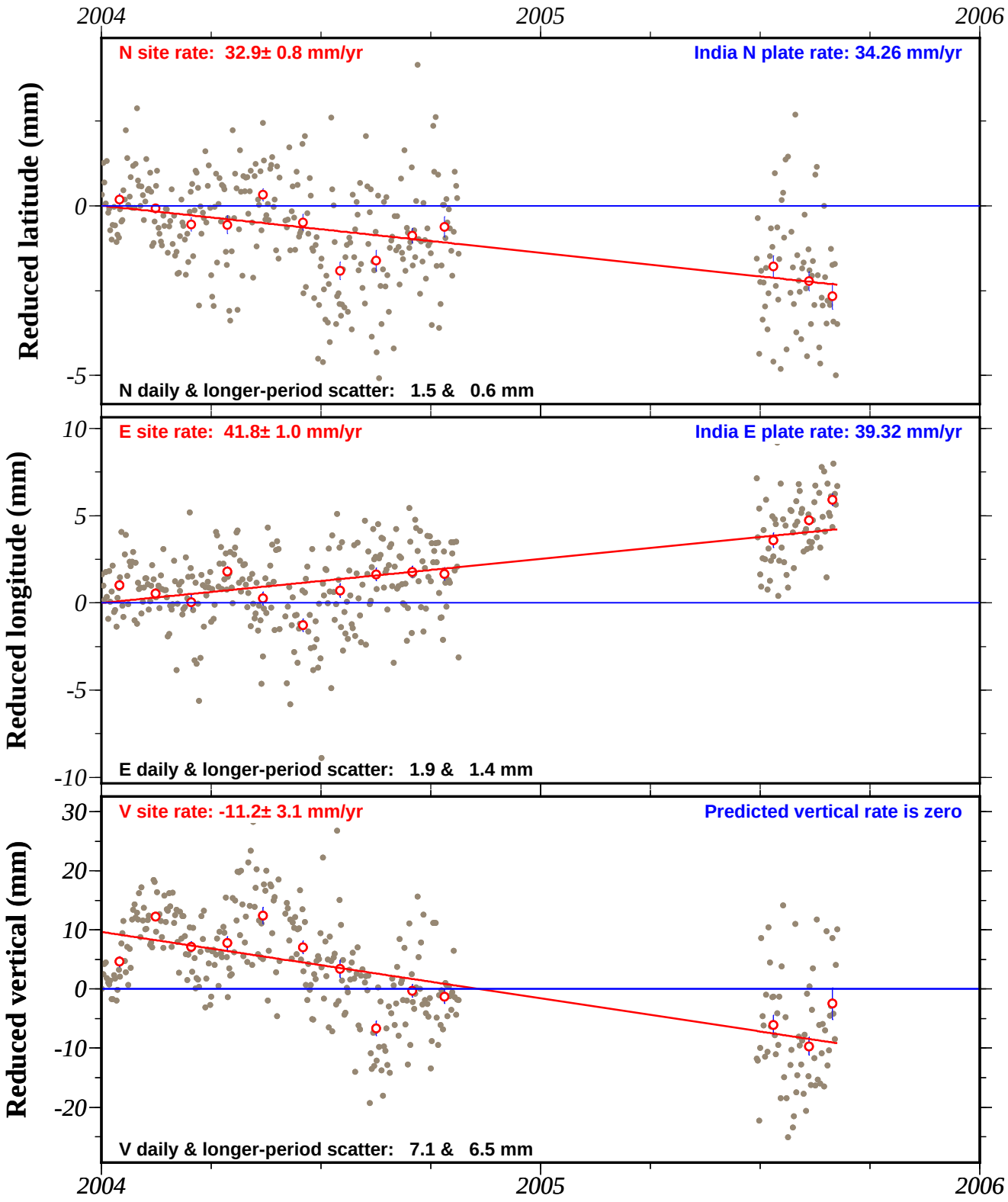
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site IITK position time series reduced by India plate motion

IITK at 26.513°N 80.232°E — Processed with GAMIT

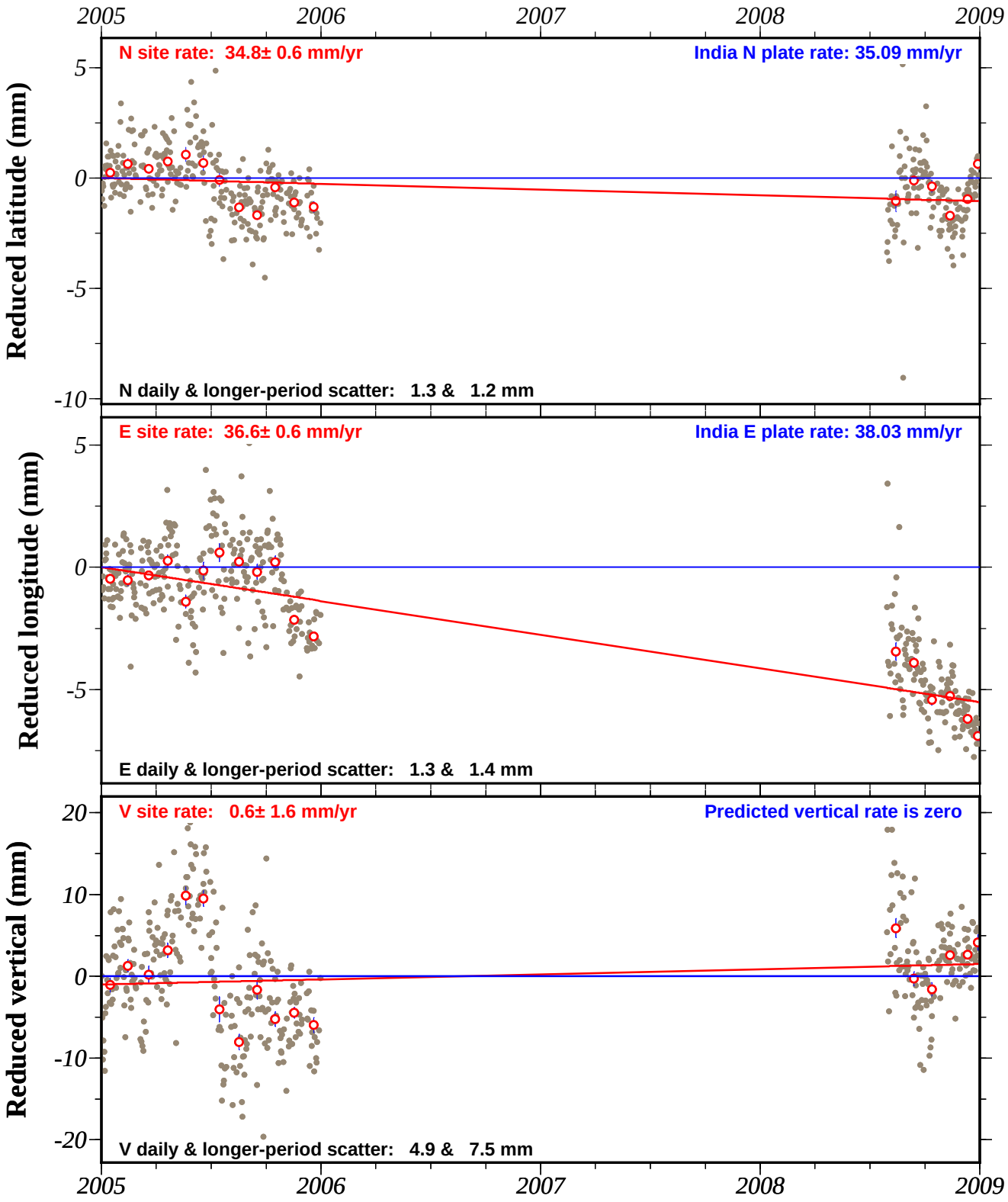
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site ISRR position time series reduced by India plate motion

ISRR at 23.160°N 72.669°E — Processed with GAMIT

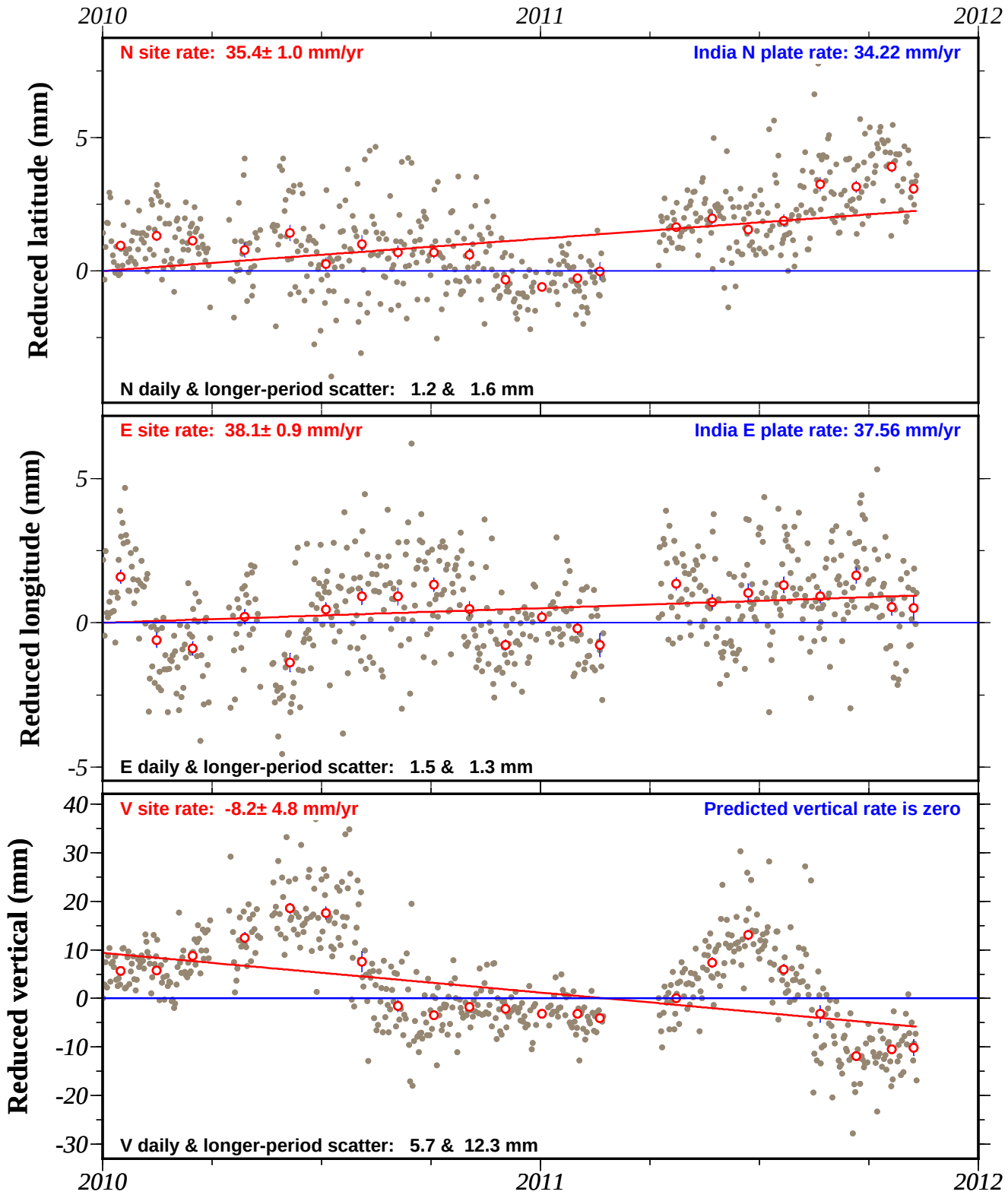
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site JBPR position time series reduced by India plate motion

JBPR at 23.129°N 79.876°E

Processed with GAMIT

Daily site position

30-day-average site position

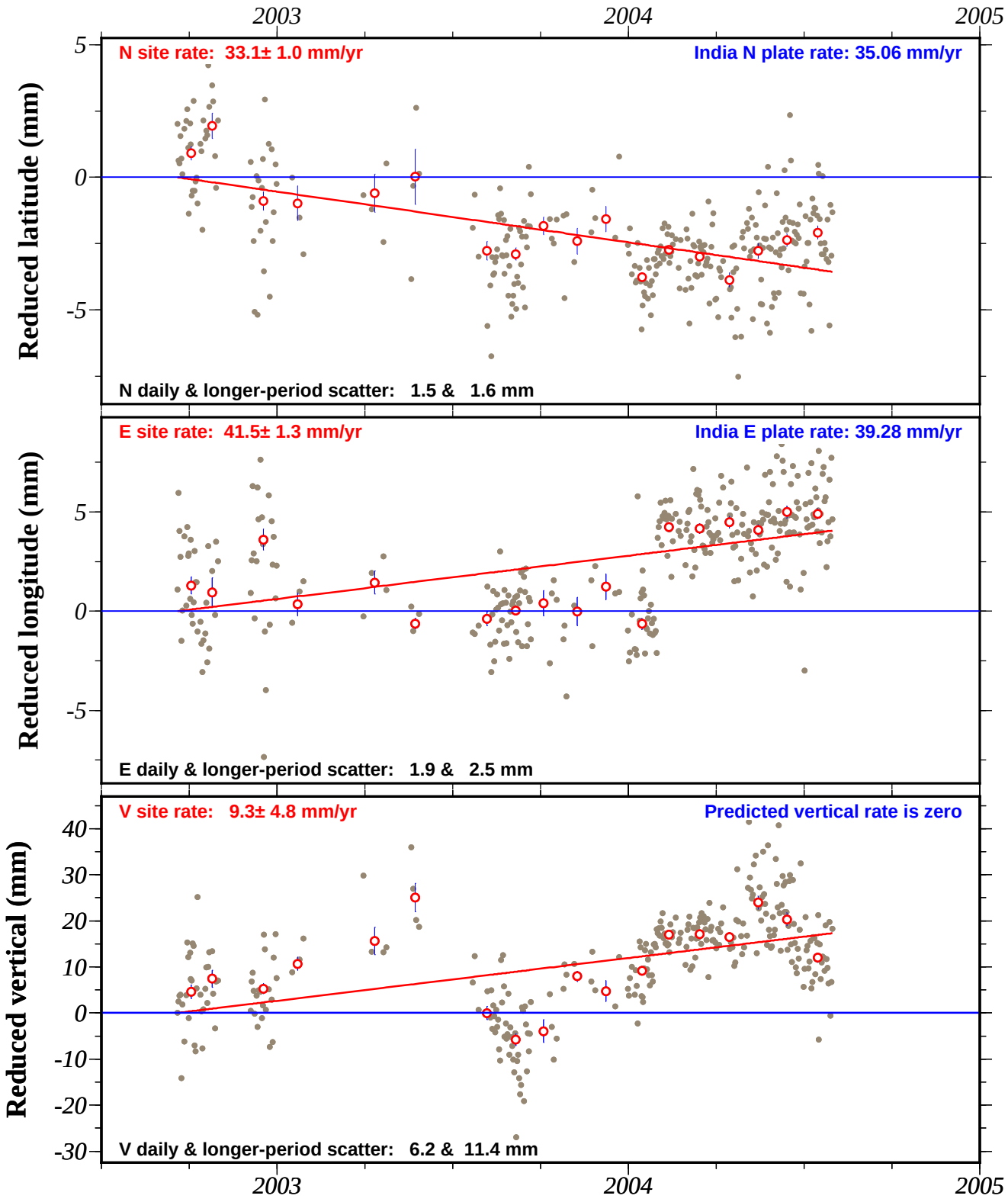
Best-fitting site velocity

Predicted plate velocity

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site KHAV position time series reduced by India plate motion

KHAV at 23.922°N 69.766°E — Processed with GAMIT

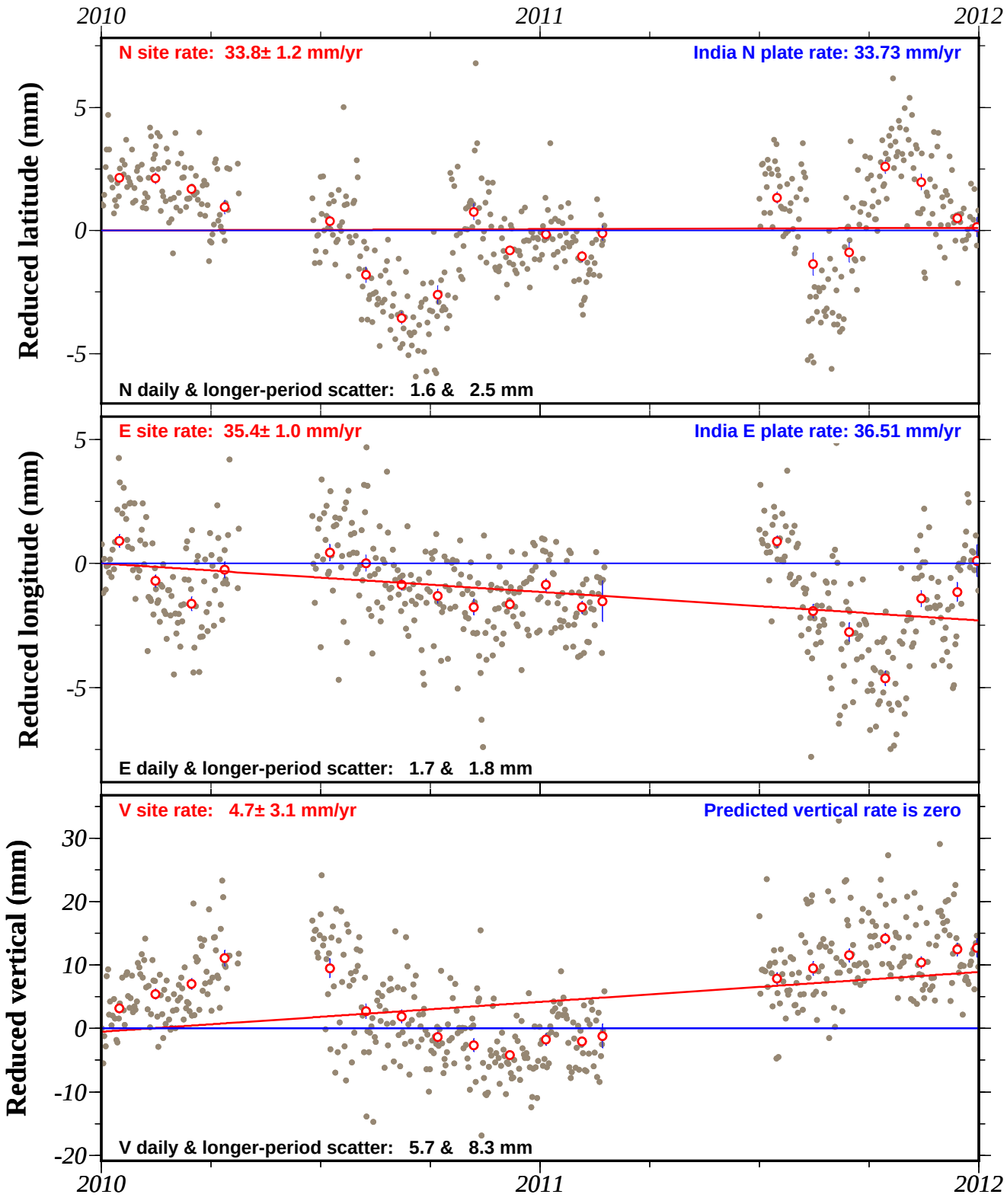
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site KODI position time series reduced by India plate motion

KODI at 10.232°N 77.465°E

Processed with GAMIT

Daily site position

30-day-average site position

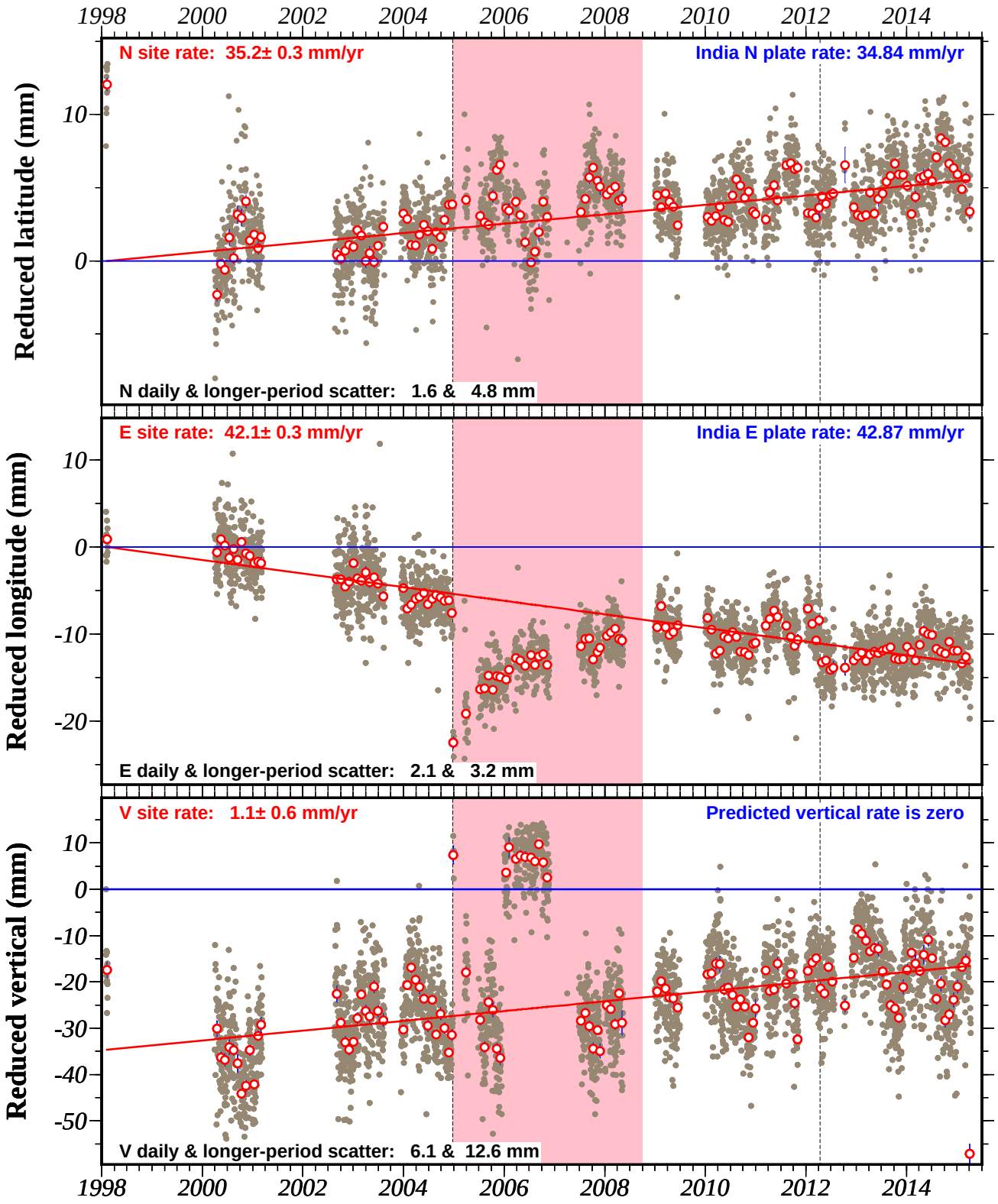
Best-fitting site velocity

Predicted plate velocity

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site LCK1 position time series reduced by India plate motion

LCK1 at 26.912°N 80.956°E — Processed with GAMIT

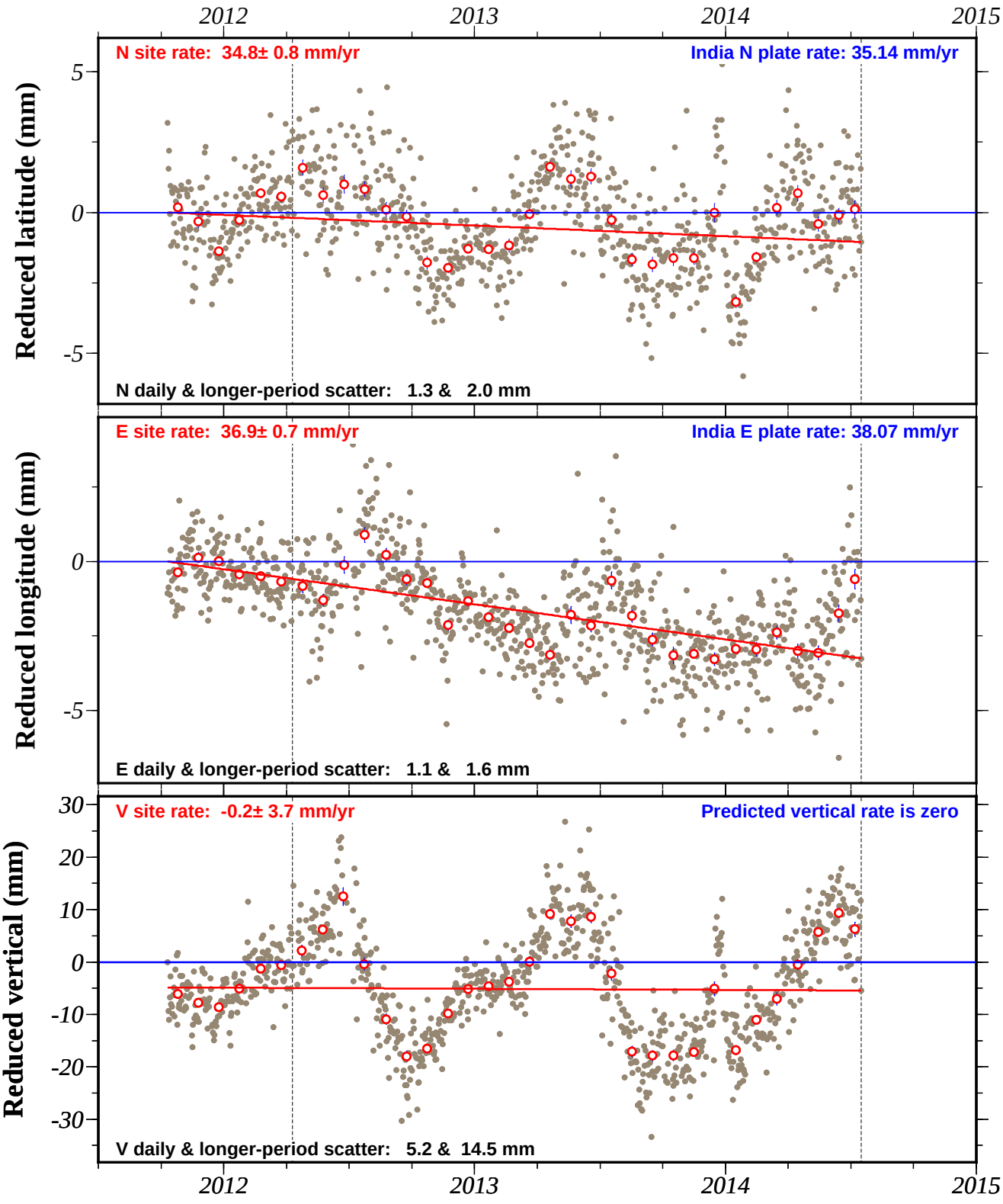
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site LCK2 position time series reduced by India plate motion

LCK2 at 26.913°N 80.956°E — Processed with GAMIT

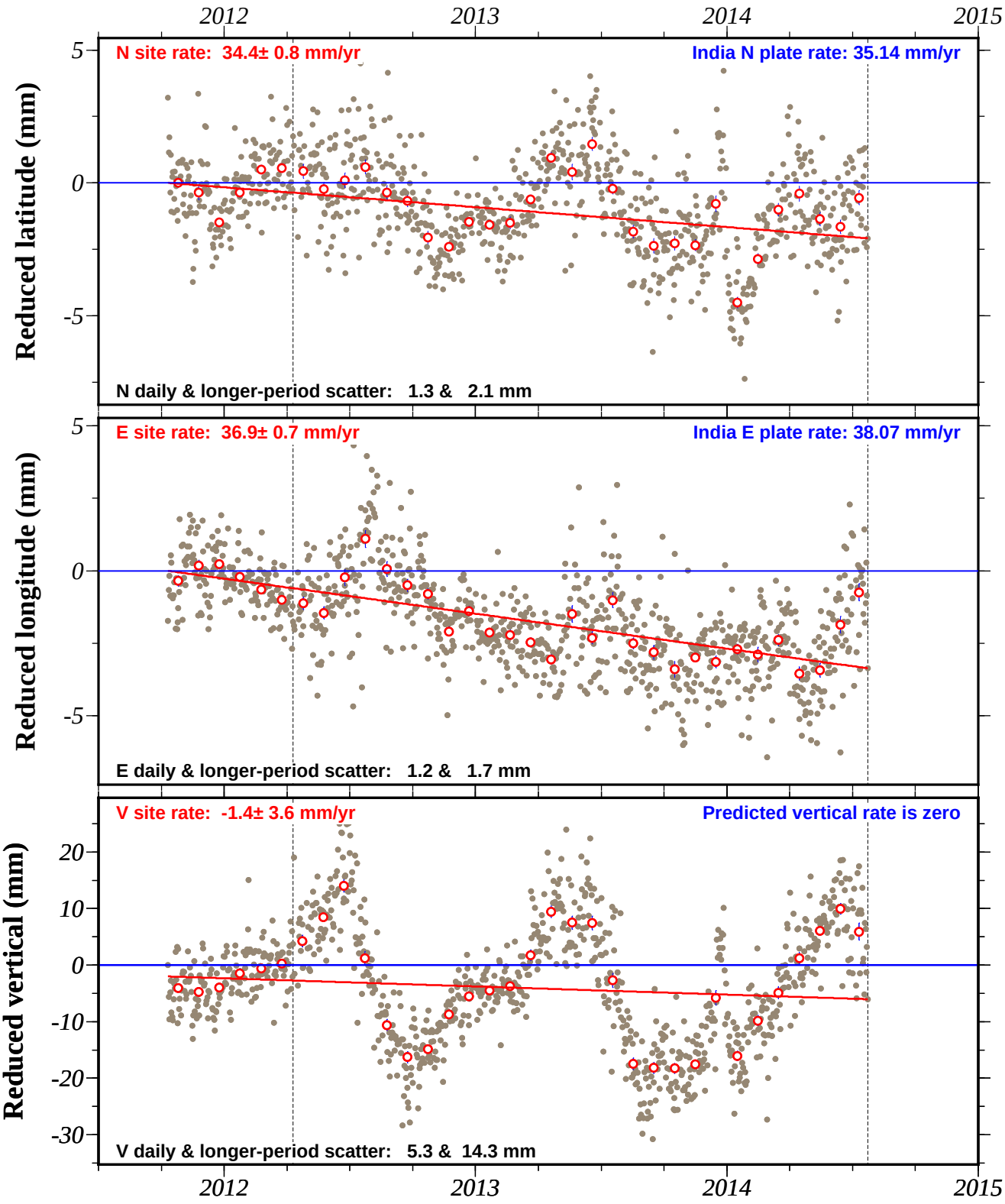
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site LUCK position time series reduced by India plate motion

LUCK at 26.891°N 80.943°E — Processed with GAMIT

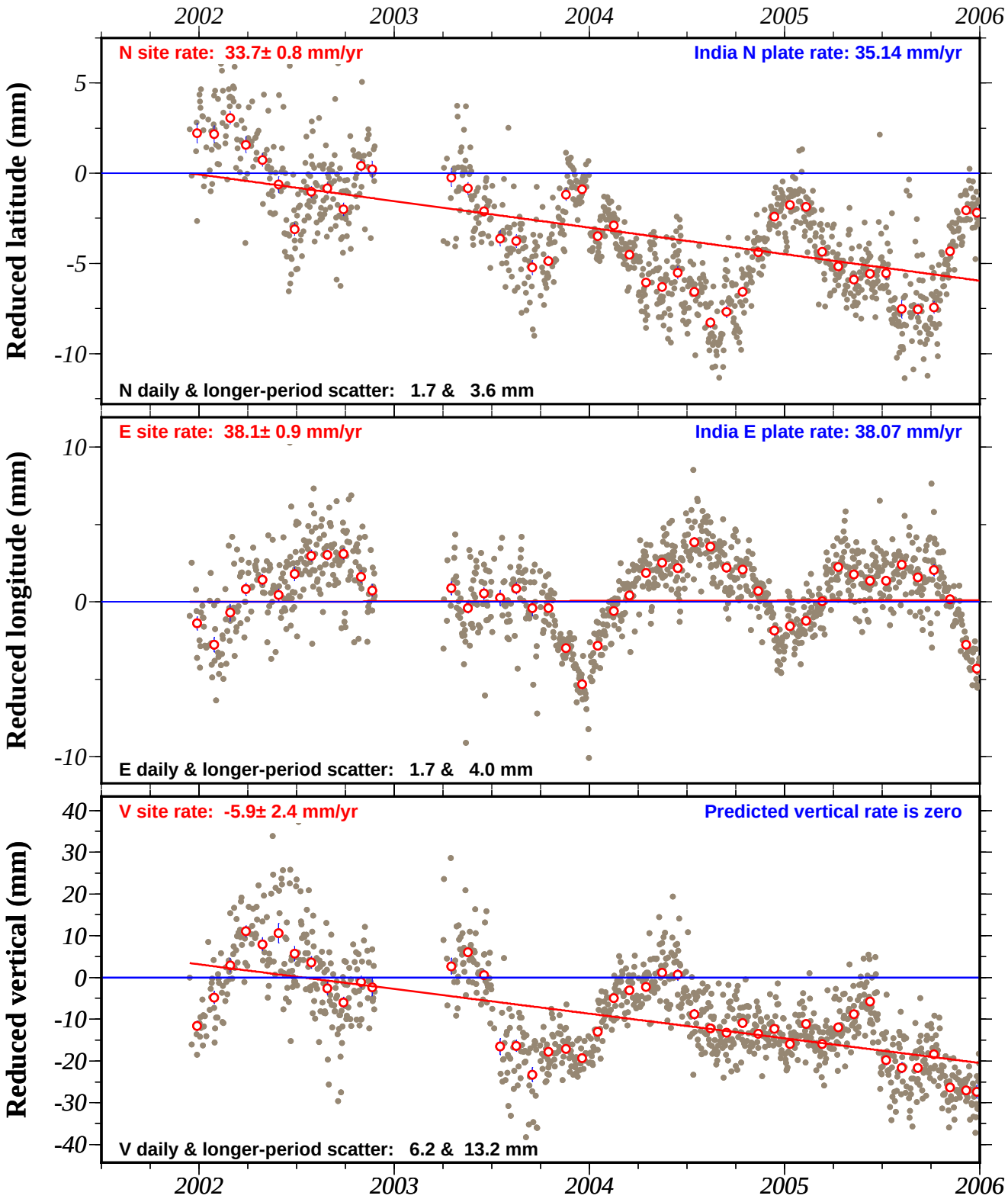
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site MABU position time series reduced by India plate motion

MABU at 24.653°N 72.780°E — Processed with GAMIT

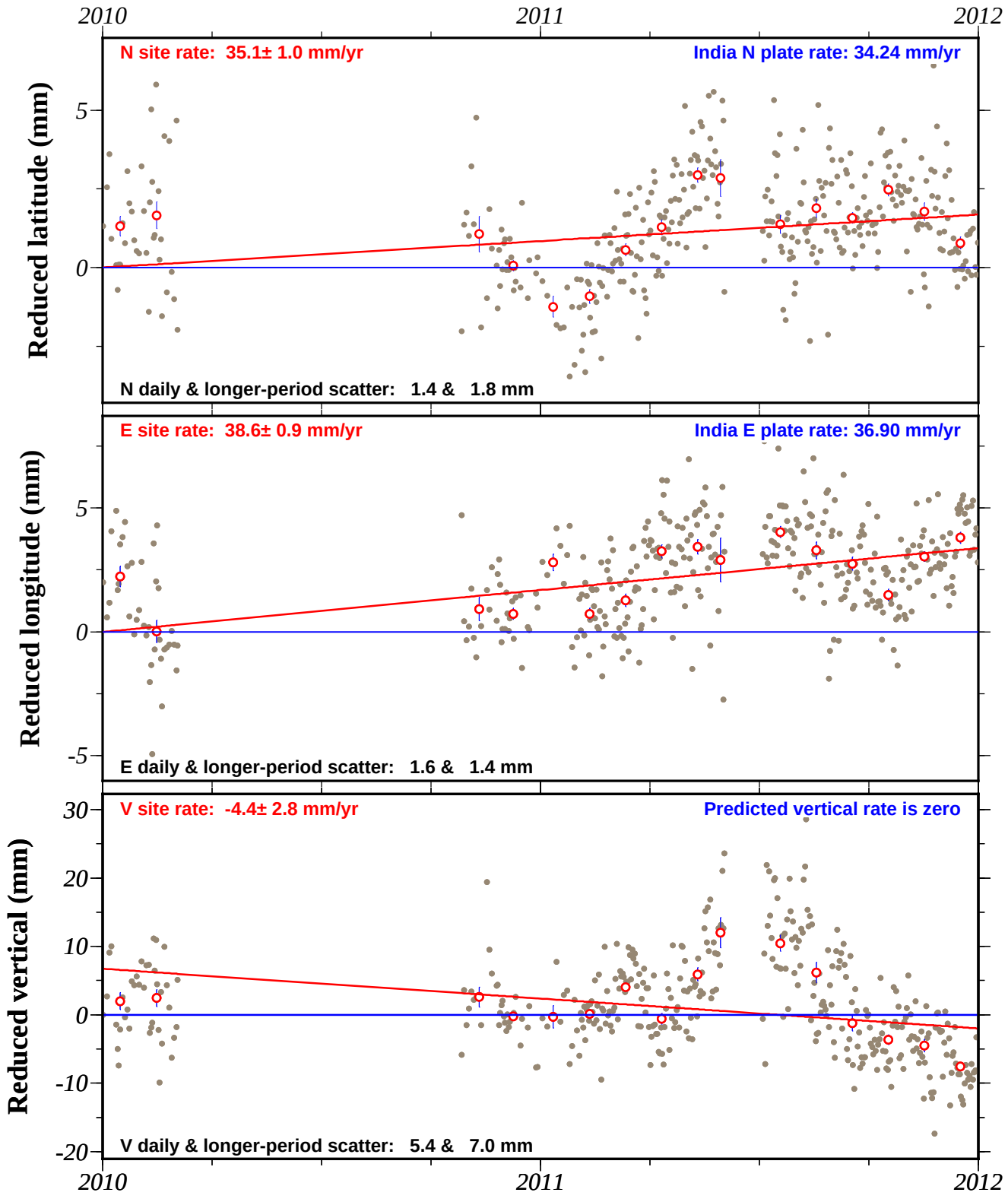
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site MALD position time series reduced by India plate motion

MALD at 4.189°N 73.526°E — Processed with GAMIT

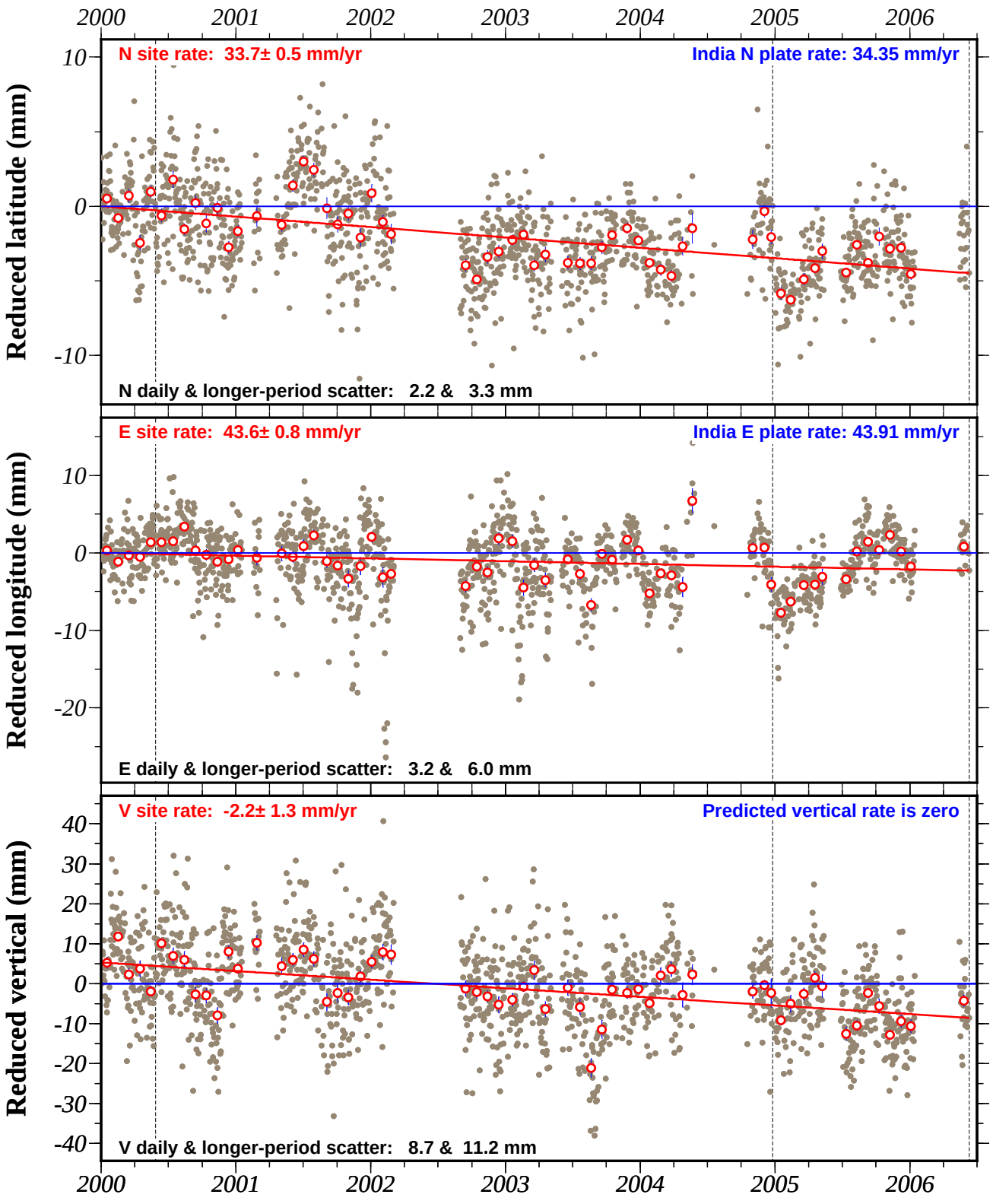
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



GMT 2019 Jun 21 08:12:50 **S. Jade: Processed with GAMIT**

Site PLNI position time series reduced by India plate motion

PLNI at 10.428°N 77.556°E — Processed with GAMIT

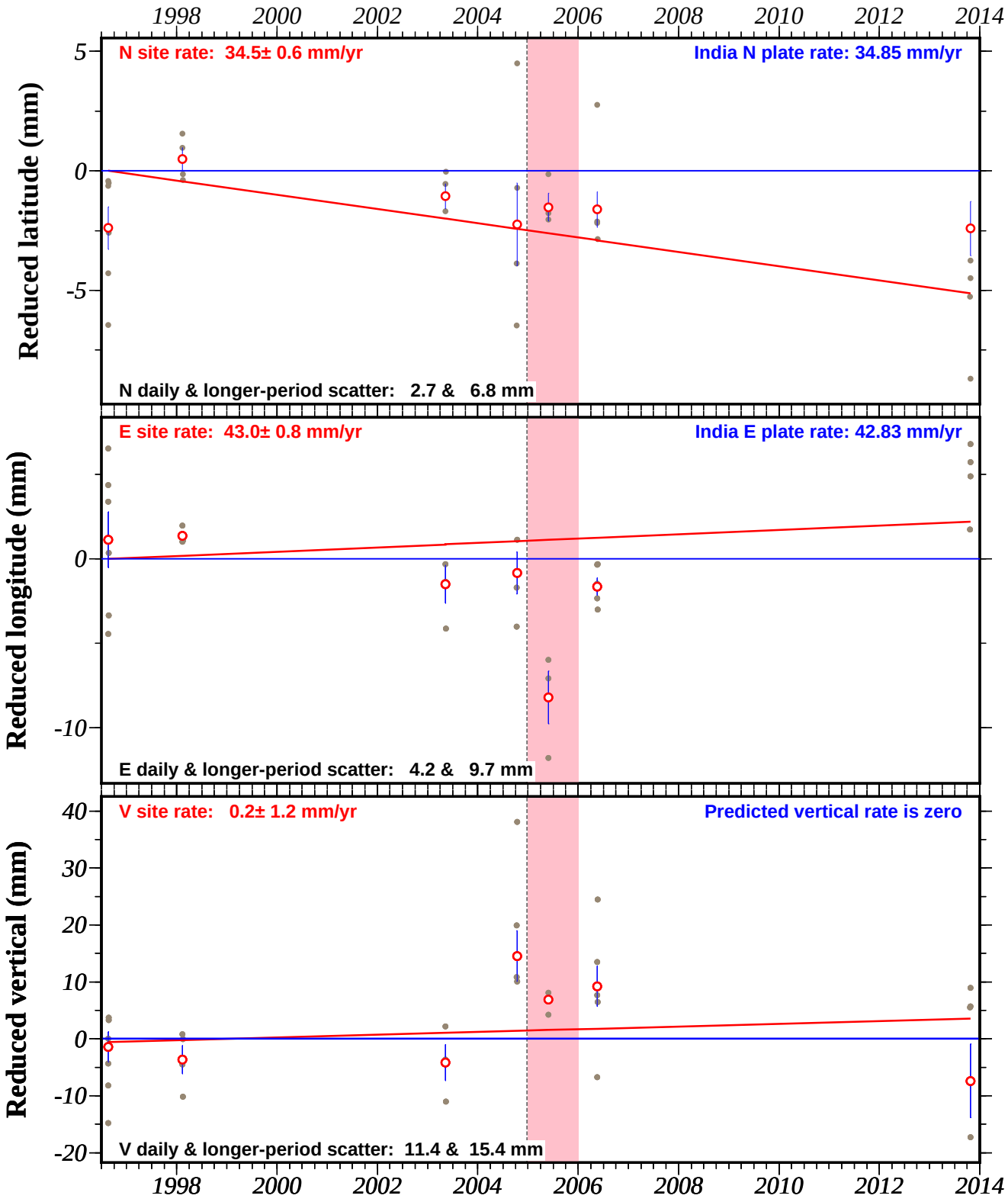
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



GMT 2019 Sep 09 14:14:24 **S. Jade: Processed with GAMIT**

Site PUNE position time series reduced by India plate motion

PUNE at 18.558°N 73.882°E — Processed with GAMIT

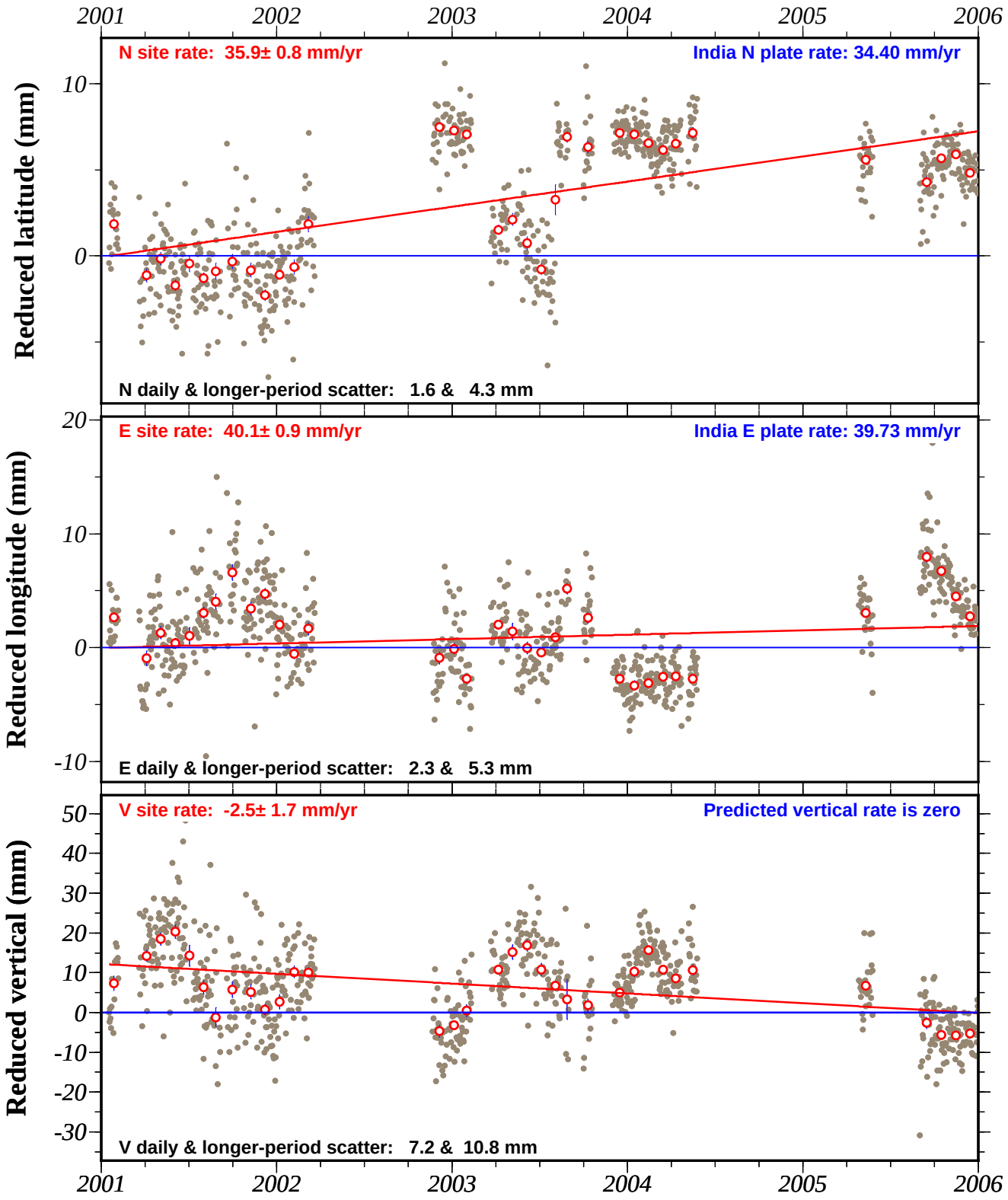
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site RAPD position time series reduced by India plate motion

RAPD at 23.820°N 71.617°E — Processed with GAMIT

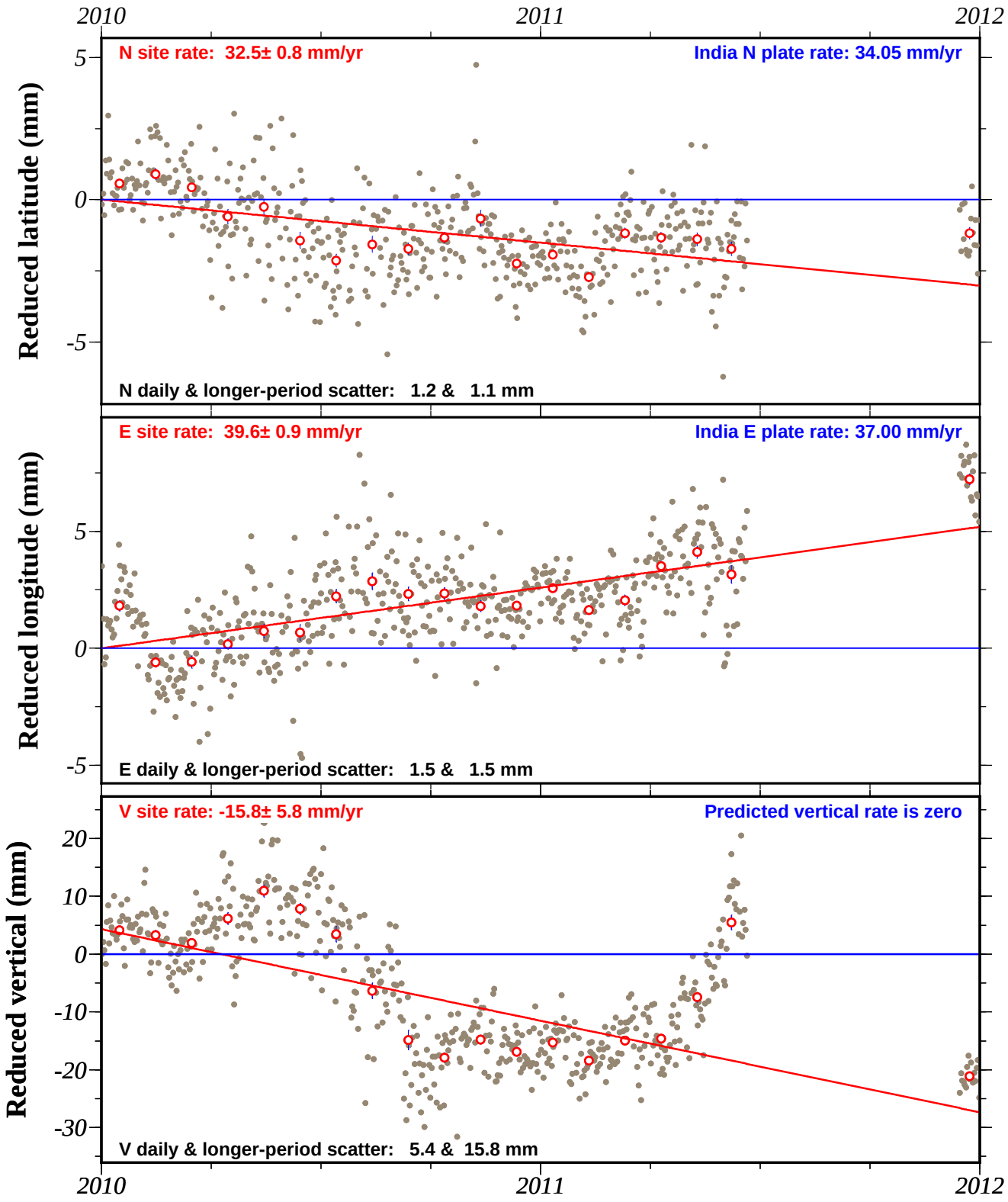
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



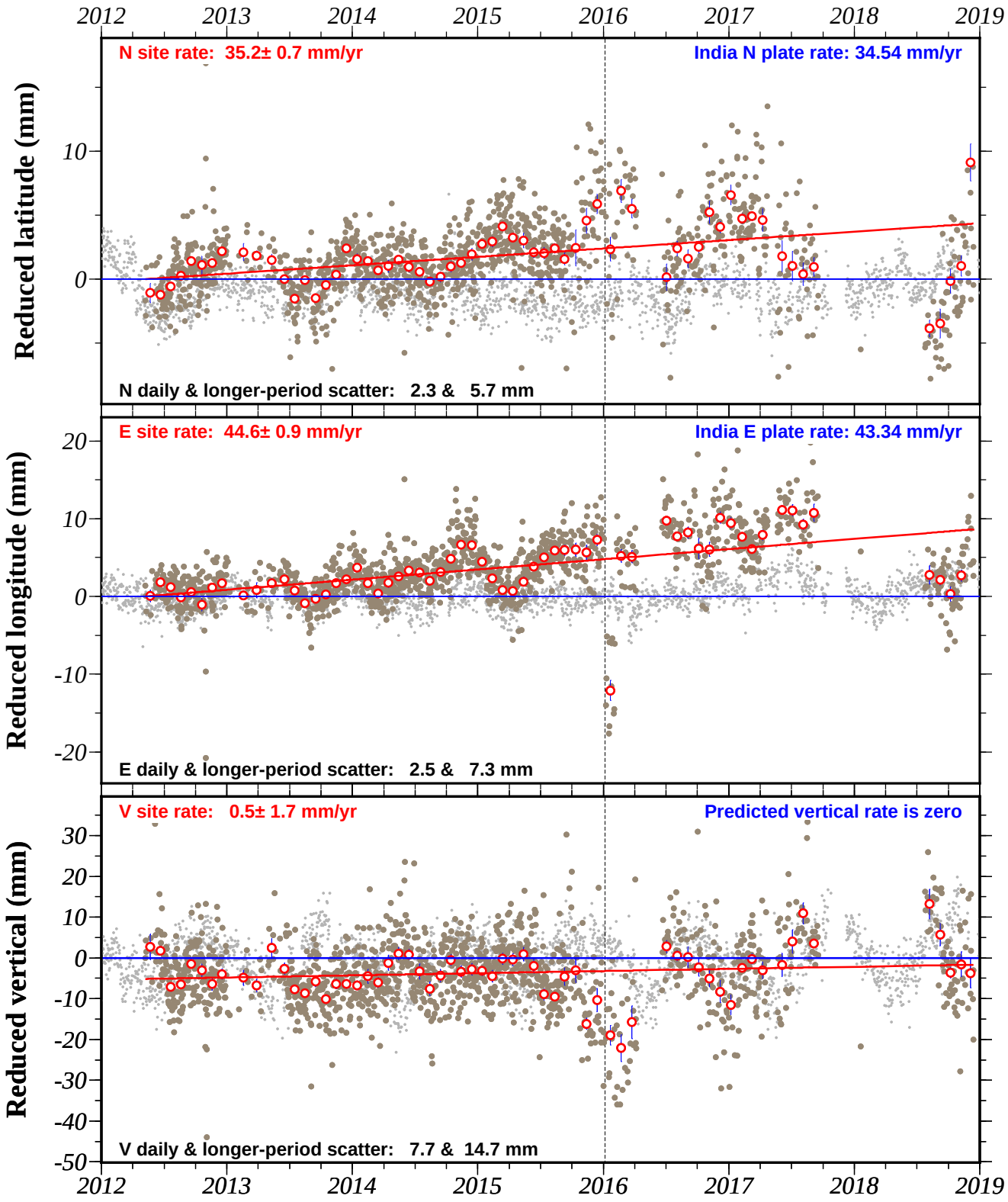
GMT 2019 Jun 21 08:12:56 **S. Jade: Processed with GAMIT**

Site SGOC position time series reduced by India plate motion

SGOC at 6.892°N 79.874°E — Processed with GIPSY v6.3/v6.4

Daily site position — *30-day-average site position* — *Common-mode noise** — *Best-fitting site velocity* — *Predicted plate velocity*

All velocities are given relative to IGS14.
Dotted vertical lines identify offsets that have been repaired
Pink regions identify any observations downweighted in the regression.
** Common-mode noise, which is estimated from the position time series of numerous stable sites far from tectonically active regions, is subtracted from the measured daily site coordinates.*



Site TVM0 position time series reduced by India plate motion

TVM0 at 8.423°N 76.969°E — Processed with GAMIT

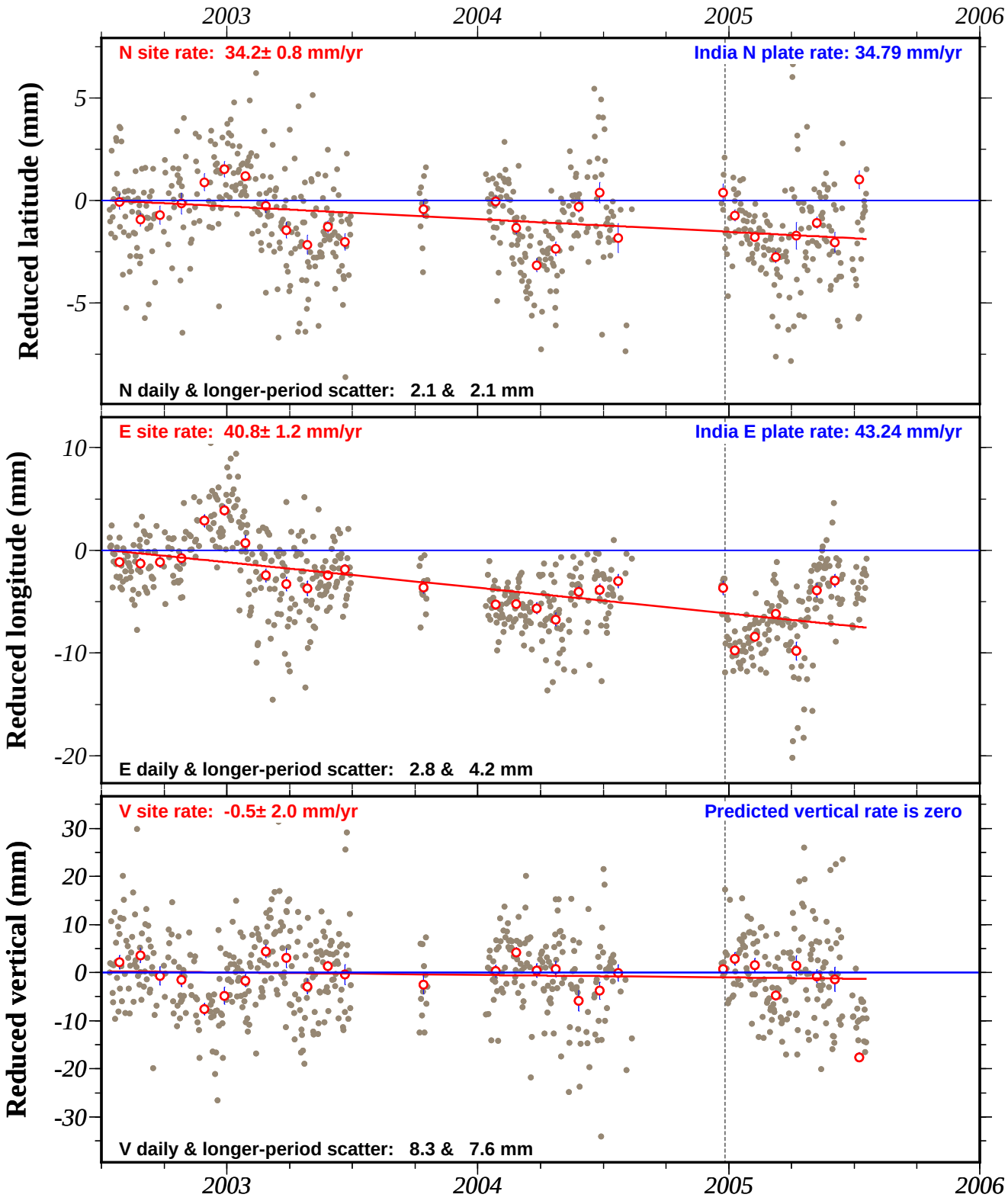
Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.



Site UDAI position time series reduced by India plate motion

UDAI at 24.580°N 73.713°E — Processed with GAMIT

Daily site position — *30-day-average site position*

Best-fitting site velocity — *Predicted plate velocity*

All velocities are given relative to IGS14.

Dotted vertical lines identify offsets that have been repaired

Pink regions identify any observations downweighted in the regression.