

Supplementary Materials for:

Antarctic Ice Velocities from GPS Locations Logged by Seismic Stations

Meijian An¹ Douglas Wiens² Chunlei An³ Guitao Shi³ Yue Zhao¹ Yuansheng Li³

1. Institute of Geomechanics, Chinese Academy of Geological Sciences, Beijing 100081, China
2. Dept. of Earth and Planetary Sci., Washington University, St. Louis MO, USA
3. Polar Research Institute of China, Shanghai 200136, China

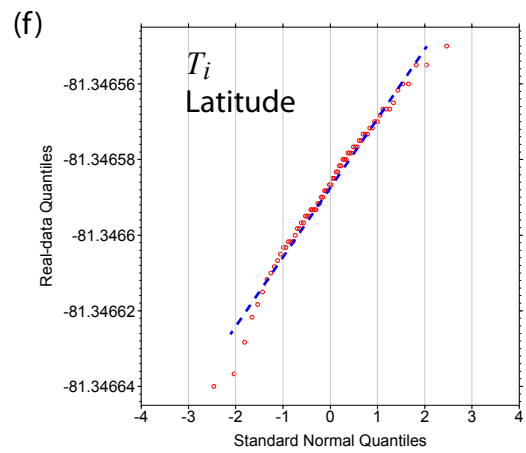
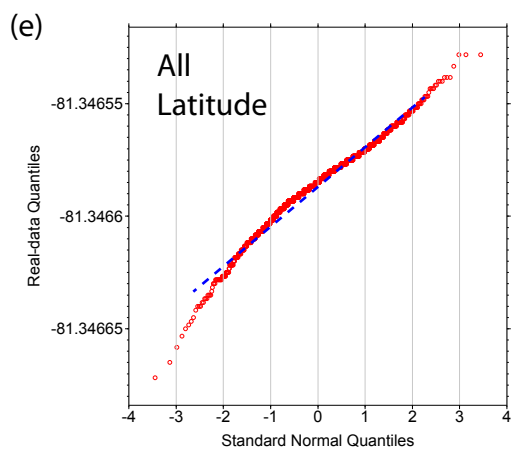
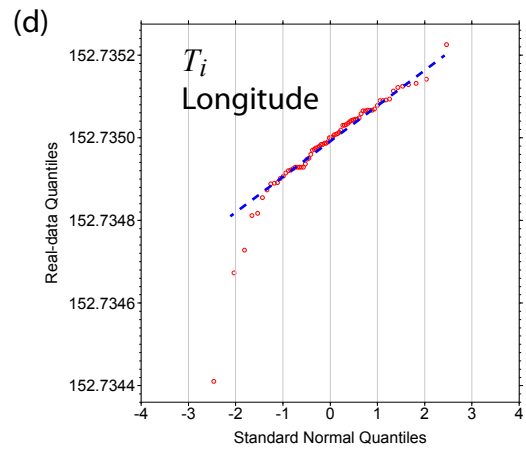
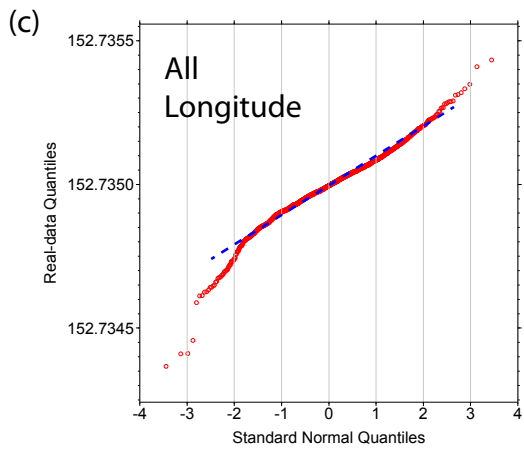
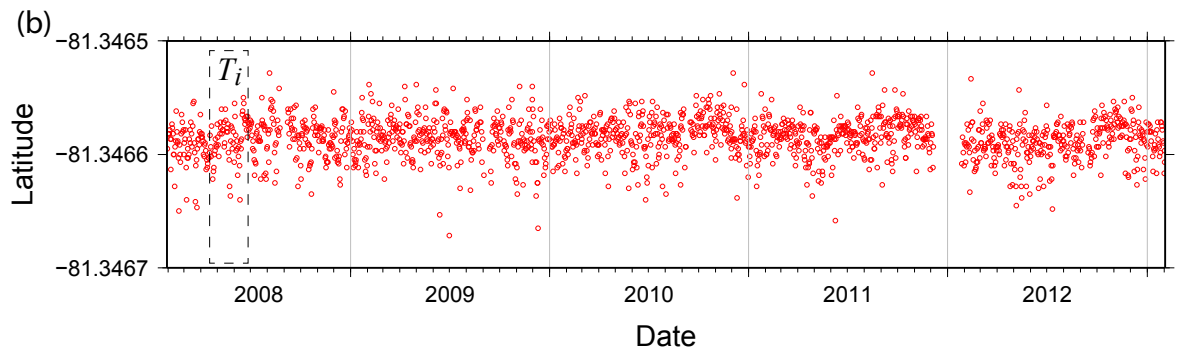
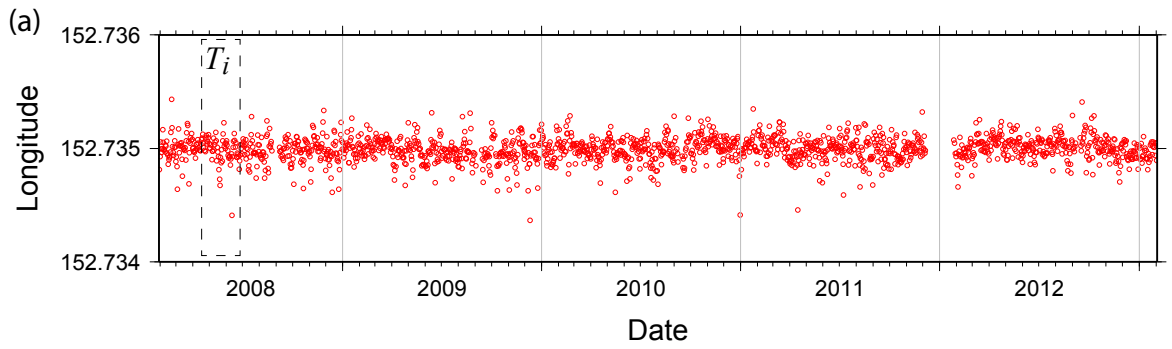


Figure S1. Longitudinal and latitudinal positions of the station LONW. Subfigures (a,b) show all longitudes and latitudes as a function of time, in which the dashes marks the time duration (~90 days) in a time interval of " T_i ". Subfigures (c,e) are QQ plots of all the positions respectively in (a,b); Subfigures (d,f) are QQ plots of the data only in T_i . QQ plot displays the relationship between the distribution of a given data set and a theoretical distribution. If the two distributions are matched, the points in the plot should align along a straight line (such as the blue dashed line in the QQ plot). QQ plots of all positions in (c,e) are almost a linear line inside the interval ranging from -2σ to 2σ ($\sigma=1$), indicating that most of the positions are normally distributed. The positions in T_i (d,f) are almost a line inside -1.6σ to 1.6σ , and a small number of data are outside the range.

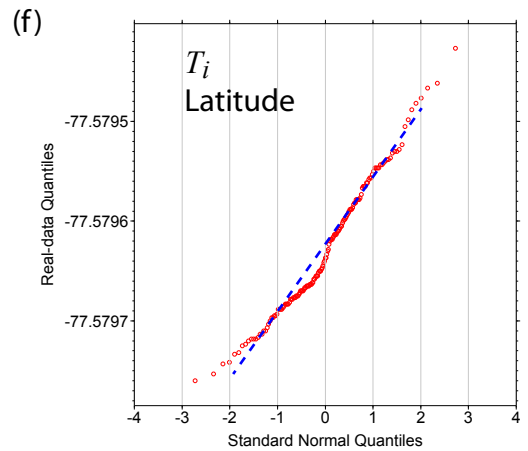
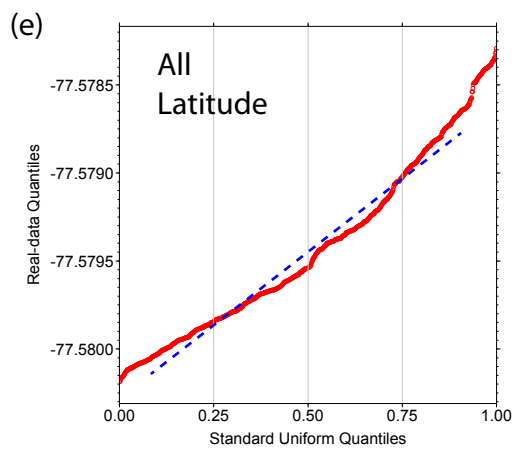
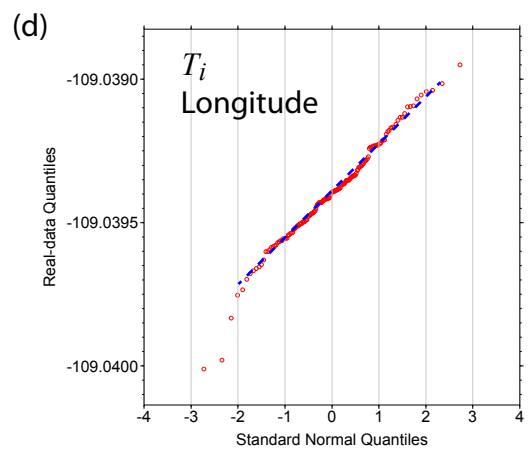
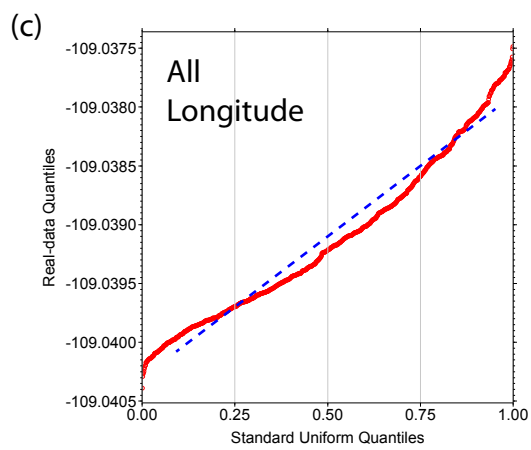
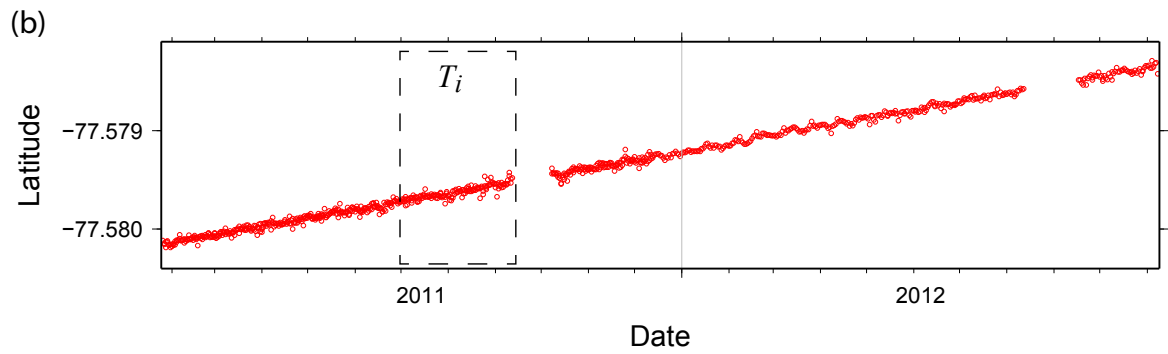
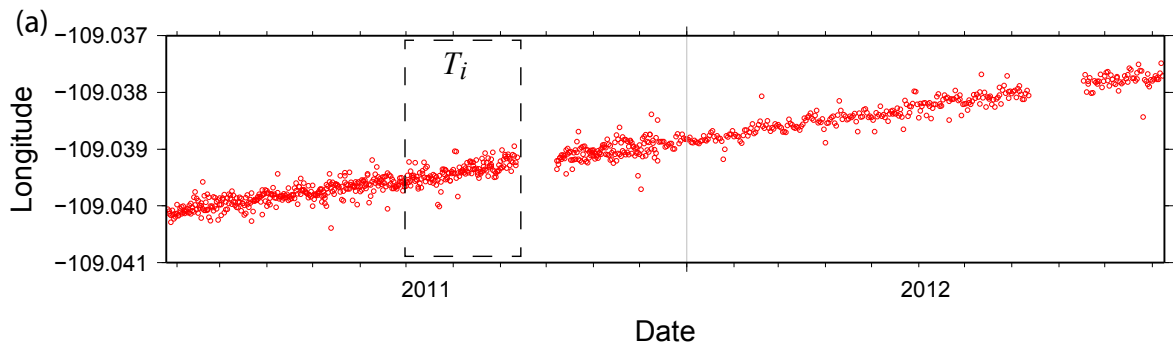


Figure S2. Longitudinal and latitudinal positions of the station UPTW. Subfigures (a,b) show all longitudes and latitudes as a function of time, in which the dashes marks the time duration (~90 days) in a time interval of " T_i ". Subfigures (c,e) show QQ plot of all the positions respectively in (a,b); Subfigures (d,f) show QQ plot of the data only in T_i . QQ plots of all positions in (c,e) almost align along a linear line (blue dashes), indicating the distribution of most of the positions are close to uniform; for the positions in T_i (d,f) almost aligns a line inside -1.8 to 1.8 of a standard normal distribution, indicating that most of the data in 90 days are distributed normally. Other symbols are the same as those in Figure S1.

Table S1. Average movement velocities of seismic stations.

Station	Net	Date of Data Used*		Position Mean			Mean of Velocities in Intervals			Average Velocity			Note [♥]
		From	Until	Longitude (°)	Latitude (°)	Alti. (m)	Azimuth (°)	Rate (m/yr)	Uncertainty (m/yr)	Azimuth (°)	rate (m/yr)	Uncertainty (m/yr)	
DT154	CHN	17/02/2009	22/01/2011	77.02558	-74.58242	2719	-68	12.7	1.2	-71	12.9	0.2	
EAGLE	CHN	04/01/2008	30/01/2010	77.04759	-76.41537	2833	-64	12.7	1.1	-63	13.3	0.1	
EAGLE2	CHN	31/01/2010	19/01/2011	77.04491	-76.41543	2833	-70	14.0	2.4	-63	13.6	0.3	
CHNB	CHN	08/02/2009	29/01/2010	76.97587	-77.17438	2960	-30	19.4	1.4	-31	20.3	0.3	
DOMEA	CHN	14/01/2009	08/01/2011	77.10463	-80.42197	4089	-142	0.4	1.7	165	0.2	0.1	
AGO1	AGAP	15/12/2007	14/12/2012	129.61428	-83.86145	2833	86	7.6	0.8	169	43.9	0.2	
AGO3	AGAP	07/01/2010	02/12/2012	28.58188	-82.75411	2932	-112	9.3	1.3	-111	9.1	0.3	
GM01	AGAP	15/12/2007	15/11/2009	104.72914	-83.98585	3274	111	4.1	1.3	111	3.6	0.5	
GM02	AGAP	24/12/2008	12/09/2011	97.58153	-79.42513	3723	134	0.5	1.1	153	0.9	0.3	
GM03	AGAP	05/01/2009	22/12/2009	85.94388	-80.21687	3917	147	1.0	1.8	147	1.0	1.1	
GM04	AGAP	27/12/2007	17/12/2009	61.11243	-82.99971	3768	-151	1.7	1.6	-141	1.9	0.5	
GM05	AGAP	29/12/2008	23/12/2010	51.15872	-81.18411	3774	-128	0.3	1.3	-95	0.6	0.5	
GM06	AGAP	05/01/2009	25/12/2009	44.31474	-79.33282	3741	-84	0.7	1.8	131	0.2	1.0	
GM07	AGAP	05/01/2009	04/01/2010	39.61321	-77.31360	3827	-167	0.8	1.8	-177	0.7	1.0	
N100	AGAP	02/01/2010	14/12/2012	122.59074	-81.65175	2956	95	3.5	1.0	98	3.1	0.3	
N124	AGAP	05/02/2008	21/12/2009	107.64052	-82.07447	3356	118	2.6	1.3	116	2.2	0.5	
N132	AGAP	23/12/2008	21/12/2009	101.95344	-82.07511	3444	136	4.3	1.8	136	4.3	1.1	
N140	AGAP	04/02/2008	26/12/2012	96.75565	-82.01039	3569	124	2.3	0.8	-134	61.5	0.2	
N148	AGAP	24/12/2008	21/12/2009	91.50757	-81.86250	3697	138	0.9	1.8	133	1.0	1.0	
N156	AGAP	29/12/2007	21/12/2009	86.50448	-81.67256	3845	95	1.9	1.4	121	1.7	0.5	

N165	AGAP	27/12/2008	23/12/2009	81.76038	-81.40835	3969	130	0.9	1.8	133	0.9	1.1	
N173	AGAP	19/12/2007	19/12/2009	77.47358	-81.11223	4063	-6	0.7	1.6	31	0.5	0.4	
N182	AGAP	29/12/2008	19/12/2009	73.18979	-80.73628	4050	-105	0.6	1.8	-108	0.6	1.1	
N190	AGAP	24/12/2008	23/12/2009	69.43101	-80.32749	3925	-19	0.6	1.8	-19	0.6	1.1	
N198	AGAP	16/12/2007	27/12/2009	65.96070	-79.85968	3781	-26	2.4	1.2	-27	2.4	0.5	
N206	AGAP	02/01/2009	21/12/2009	62.85557	-79.39470	3663	-17	3.8	1.8	-18	3.8	1.1	
P061	AGAP	26/12/2007	23/12/2011	77.22420	-84.49966	3517	149	1.8	0.9	139	2.8	0.2	
P080	AGAP	18/12/2007	21/12/2009	77.36403	-82.80542	3810	148	1.5	1.3	142	1.5	0.5	
P090	AGAP	05/01/2009	23/12/2009	77.31422	-81.93605	4015	-179	0.6	1.8	-160	0.5	1.0	
P116	AGAP	26/12/2008	23/12/2009	77.04506	-79.56690	3931	5	0.8	1.8	5	0.8	1.1	
P124	AGAP	27/12/2008	05/01/2010	77.65704	-78.87184	3609	27	2.4	1.8	27	2.4	1.0	
SWEI	AGAP	13/01/2012	25/12/2012	129.36078	-86.98585	3032	28	3.3	1.8	27	3.3	1.1	
BEAR	POLENT	14/01/2011	02/12/2012	-111.85114	-74.54758	381	30	1.1	1.3	124	0.2	0.5	
BENN	POLENT	17/12/2010	30/12/2012	-117.38989	-84.57310	1307	-81	17.2	1.2	-81	17.2	0.4	
BYRD	POLENT	13/01/2010	12/12/2012	-119.47384	-80.01703	1518	-137	11.7	1.2	-140	11.7	0.3	
CLRK	POLENT	06/01/2010	24/12/2012	-141.84851	-77.32312	1041	-163	0.1	1.0	-69	0.2	0.3	fixed
DEVL	POLENT	17/12/2008	31/01/2013	161.97301	-81.47549	98	93	0.1	0.9	-42	9.6	0.2	fixed
DNTW	POLENT	03/01/2010	10/12/2012	-107.77658	-76.45073	1031	9	331.3	1.1	8	332.8	0.3	
DUFK	POLENT	16/01/2008	30/09/2011	-53.20067	-82.86189	967	109	0.5	1.0	106	0.3	0.2	fixed
FISH	POLENT	29/12/2009	24/12/2012	-143.62838	-85.30662	288	-39	0.5	1.1	94	0.1	0.3	fixed
HOWD	POLENT	10/01/2008	23/11/2011	-86.76933	-77.52857	1497	-152	0.2	0.9	149	1.0	0.2	fixed
KOLR	POLENT	18/01/2010	13/01/2013	-120.72698	-76.15436	1887	40	11.3	1.1	39	10.9	0.3	
LONW	POLENT	31/01/2008	02/02/2013	152.73504	-81.34659	1547	-78	0.3	0.8	-31	0.2	0.2	fixed
MECK	POLENT	09/01/2008	25/11/2011	-72.18498	-75.28081	1084	173	0.8	1.6	-173	1.7	0.2	fixed
MILR	POLENT	11/02/2008	07/02/2013	156.25173	-83.30628	1902	80	0.2	0.8	-62	0.2	0.2	fixed

MPAT	POLENT	19/12/2007	18/01/2012	-155.02206	-78.02974	540	-106	0.3	0.9	171	0.2	0.2	fixed
PECA	POLENT	18/01/2008	02/12/2012	-68.55254	-85.61237	1510	-122	0.5	1.0	136	0.3	0.2	fixed
SILY	POLENT	06/01/2010	16/12/2012	-125.96603	-77.13319	2090	165	0.9	1.1	-136	0.6	0.3	fixed
SIPL	POLENT	07/12/2008	30/12/2012	-148.95533	-81.64047	647	159	0.5	0.9	109	0.8	0.2	
SURP	POLENT	10/02/2008	16/01/2012	-171.20171	-84.71988	408	135	0.3	0.9	-89	0.2	0.2	fixed
THUR	POLENT	19/01/2011	05/10/2012	-97.56062	-72.53009	236	-113	0.3	1.3	-119	0.2	0.5	fixed
UPTW	POLENT	26/01/2011	07/11/2012	-109.03833	-77.57885	1333	16	115.9	1.4	16	117.1	0.5	
WAIS	POLENT	06/02/2009	02/12/2012	-111.77794	-79.41805	1799	-138	2.5	0.9	-95	2.3	0.2	
WHIT	POLENT	19/01/2010	07/12/2011	-104.38675	-82.68226	2341	43	0.3	1.3	-16	0.6	0.5	fixed
WILS	POLENT	11/01/2008	23/12/2010	-80.55867	-80.03962	694	143	0.2	1.3	23	0.7	0.3	fixed
WNDY	POLENT	27/01/2010	15/12/2010	-119.41369	-82.36950	946	-96	24.0	1.8	-96	24.1	1.2	

*The date format is DD/MM/YYYY.

♥ “fixed” indicates that the station is installed on a rock base or in stationary snow near a nunatak, at which real movement is smaller than 0.1

m/yr.