

Supporting information for

Rapid tsunami potential assessment using GNSS ionospheric disturbance: Implications from three megathrusts

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Tables S1 to S3 summarize station name, location, and receiver type of 108 GNSS stations used in this study.

Figures to S3 show the disturbance time series during the three earthquakes for three consecutive days. Each solid line represents the observation result of one station, and the vertical red dashed line indicates the time of the mainshock. Some missing stations indicate that the observations are discontinuous or data during this period is incomplete.

Table S1. Basic information on GNSS stations (33 in total) used in the present study during the 2014 M_w 8.2 Iquique earthquake.

MARKER NAME	Longitude (°)	Latitude (°)	Distance (km)	Type of receiver
AREV	-71.493	-16.466	356.402	JAVAD TRE_G3TH DELTA3.5.3
ATIC	-73.697	-16.231	485.745	TRIMBLE NETR8
ATJN	-70.137	-19.301	74.719	TRIMBLE NETR9
CBAA	-68.448	-22.746	422.727	TRIMBLE NETRS
CGTC	-70.069	-20.177	96.532	TRIMBLE NETRS
CHMZ	-69.194	-19.669	165.388	TRIMBLE NETRS
CJNT	-67.760	-23.027	490.561	TRIMBLE NETR8
CMPN	-70.686	-29.028	1042.263	TRIMBLE NETRS
COLO	-67.804	-22.167	418.801	TRIMBLE NETRS
COPO	-70.338	-27.385	861.536	TRIMBLE NETRS
CBRO	-71.790	-16.996	308.777	TRIMBLE NETRS
CRSC	-70.080	-20.918	161.706	TRIMBLE NETR9
GLRV	-74.404	-14.670	669.541	TRIMBLE NETR8
GOLG	-65.761	-24.691	763.303	TRIMBLE NETRS
IQQE	-70.132	-20.274	99.229	TRIMBLE NETRS
JRGN	-70.575	-23.289	407.778	TRIMBLE NETRS
LCEN	-68.603	-25.326	670.982	TRIMBLE NETRS
LYAR	-70.568	-18.134	164.711	TRIMBLE NETRS
MCLA	-70.247	-22.746	351.378	TRIMBLE NETR9
NZCA	-74.964	-14.856	689.404	TRIMBLE NETR8
PCCL	-70.107	-18.458	145.377	TRIMBLE NETR9
PTCL	-71.370	-17.701	220.579	TRIMBLE NETR9
PTRE	-69.574	-18.194	201.071	TRIMBLE NETR9
SALC	-66.322	-24.213	685.959	TRIMBLE NETRS
SJUA	-75.188	-15.362	663.830	TRIMBLE NETR8
SOCM	-68.295	-24.455	594.073	TRIMBLE NETR9
SRGD	-69.348	-22.871	390.038	TRIMBLE NETRS
SRSA	-65.953	-24.450	730.642	TRIMBLE NETRS
TRTA	-70.041	-17.482	247.779	TRIMBLE NETRS
TUZG	-66.516	-24.032	657.866	TRIMBLE NETRS
UNSA	-65.408	-24.727	791.120	SEPT POLARX2
UTUR	-67.205	-22.242	471.576	TRIMBLE NETRS
VLZL	-69.965	-23.117	397.170	TRIMBLE NETRS

Table S2. Basic information on GNSS stations (36 in total) used in the present study during the 2015 Mw 8.3 Illapel earthquake.

MARKER NAME	Longitude (°)	Latitude (°)	Distance (km)	Type of receiver
AMDE	-67.627	-20.242	1316.913	TRIMBLE NETR9
ANGO	-72.692	-37.796	696.249	LEICA GR10
ARCO	-73.226	-37.206	640.635	TRIMBLE NETRS
BDEC	-68.598	-19.265	1395.532	TRIMBLE NETR9
BDJC	-67.427	-19.132	1439.920	TRIMBLE NETR9
BLOV	-68.245	-19.854	1340.804	TRIMBLE NETR9
BMWS	-67.970	-21.059	1220.358	TRIMBLE NETR9
BWSZ	-68.258	-18.794	1453.911	TRIMBLE NETR9
CBQC	-72.805	-36.147	517.882	TRIMBLE NETR9
CGTC	-70.069	-20.177	1270.676	TRIMBLE NETR9
CHML	-70.150	-37.359	656.698	TRIMBLE NETR9
CJNT	-67.760	-23.027	1022.166	TRIMBLE NETR9
CMPN	-70.686	-29.028	297.728	TRIMBLE NETRS
COLO	-67.804	-22.167	1109.564	TRIMBLE NETRS
CRRL	-68.354	-36.152	593.376	TRIMBLE NETRS
CSQM	-66.386	-23.425	1041.836	TRIMBLE NETR9
HLNE	-71.744	-35.004	380.603	TRIMBLE NETRS
IQQE	-70.132	-20.274	1259.232	TRIMBLE NETR9
LCEN	-68.603	-25.326	754.578	TRIMBLE NETRS
LLFN	-71.789	-39.333	860.405	TRIMBLE NETR9
LNQM	-71.362	-38.455	763.649	TRIMBLE NETR9
LVRA	-66.306	-22.518	1134.362	TRIMBLE NETR9
MGUE	-69.398	-35.777	511.755	SEPT POLARX4
NIEB	-73.401	-39.869	932.727	TRIMBLE NETRS
NRVL	-72.095	-35.544	442.037	TRIMBLE NETR9
PANE	-71.202	-35.718	461.705	TRIMBLE NETRS
PMQE	-71.630	-34.548	329.952	TRIMBLE NETRS
PTRE	-69.574	-18.194	1493.978	TRIMBLE NETR9
RDEO	-66.768	-18.902	1484.692	TRIMBLE NETR9
SANT	-70.668	-33.150	198.870	ASHTech UZ-12
SCTC	-66.050	-21.948	1202.247	TRIMBLE NETR9
SOCM	-68.295	-24.455	855.465	TRIMBLE NETR9
TRGN	-72.672	-38.236	744.326	TRIMBLE NETR9
UNSA	-65.408	-24.727	975.597	JAVAD TRE_G3TH DELTA3.5.10
UTUR	-67.206	-22.242	1123.812	TRIMBLE NETRS
YAVC	-65.471	-22.124	1212.797	TRIMBLE NETR9

Table S3. Basic information on GNSS stations (39 in total) used in the present study during the 2021 Mw 8.2 Alaska earthquake.

MARKER NAME	Longitude (°)	Latitude (°)	Distance (km)	Type of receiver
AB02	-168.855	52.971	764.447	TRIMBLE NETRS
AB07	-160.477	55.349	167.264	TRIMBLE NETRS
AB13	-158.504	56.307	116.999	TRIMBLE NETRS
AB14	-159.092	59.108	427.950	TRIMBLE NETRS
AB21	-176.663	51.864	1297.483	TRIMBLE NETR9
AC06	-150.891	59.764	645.286	TRIMBLE NETRS
AC10	-164.887	54.523	460.180	SEPT POLARX5
AC12	-159.590	54.831	124.482	TRIMBLE NETRS
AC13	-155.622	55.822	150.473	TRIMBLE NETRS
AC14	-147.999	60.849	843.621	TRIMBLE NETRS
AC15	-149.724	60.481	747.783	TRIMBLE NETRS
AC18	-152.250	58.926	524.386	TRIMBLE NETRS
AC21	-159.128	55.921	104.760	TRIMBLE NETRS
AC24	-156.653	58.682	380.625	TRIMBLE NETRS
AC25	-162.314	55.089	285.923	TRIMBLE NETRS
AC26	-154.150	58.214	392.837	TRIMBLE NETRS
AC27	-154.163	59.252	490.127	TRIMBLE NETRS
AC28	-160.049	55.078	143.248	TRIMBLE NETRS
AC32	-150.737	61.473	799.483	TRIMBLE NETRS
AC35	-150.793	59.376	618.434	TRIMBLE NETRS
AC37	-153.865	60.440	616.118	TRIMBLE NETRS
AC38	-153.342	57.754	386.765	TRIMBLE NETRS
AC39	-152.394	58.610	493.100	TRIMBLE NETRS
AC41	-160.407	55.909	174.254	TRIMBLE NETRS
AC42	-162.784	54.472	330.904	TRIMBLE NETRS
AC47	-152.624	60.081	613.690	TRIMBLE NETRS
AC51	-151.835	61.498	770.861	TRIMBLE NETRS
AC67	-152.425	57.791	431.307	TRIMBLE NETRS
AV06	-165.766	54.147	526.574	TRIMBLE NETRS
AV08	-166.028	54.136	543.294	TRIMBLE NETRS
AV14	-165.842	54.119	532.248	TRIMBLE NETRS
AV25	-164.779	54.530	453.267	SEPT POLARX5
AV26	-164.580	54.572	439.656	TRIMBLE NETRS
AV29	-164.586	54.472	442.780	SEPT POLARX5
AV34	-163.713	54.725	381.273	SEPT POLARX5
AV35	-164.387	54.847	421.168	SEPT POLARX5
AV36	-164.127	54.772	406.271	SEPT POLARX5
AV38	-163.781	54.831	383.171	SEPT POLARX5
AV39	-163.998	54.811	397.334	SEPT POLARX5

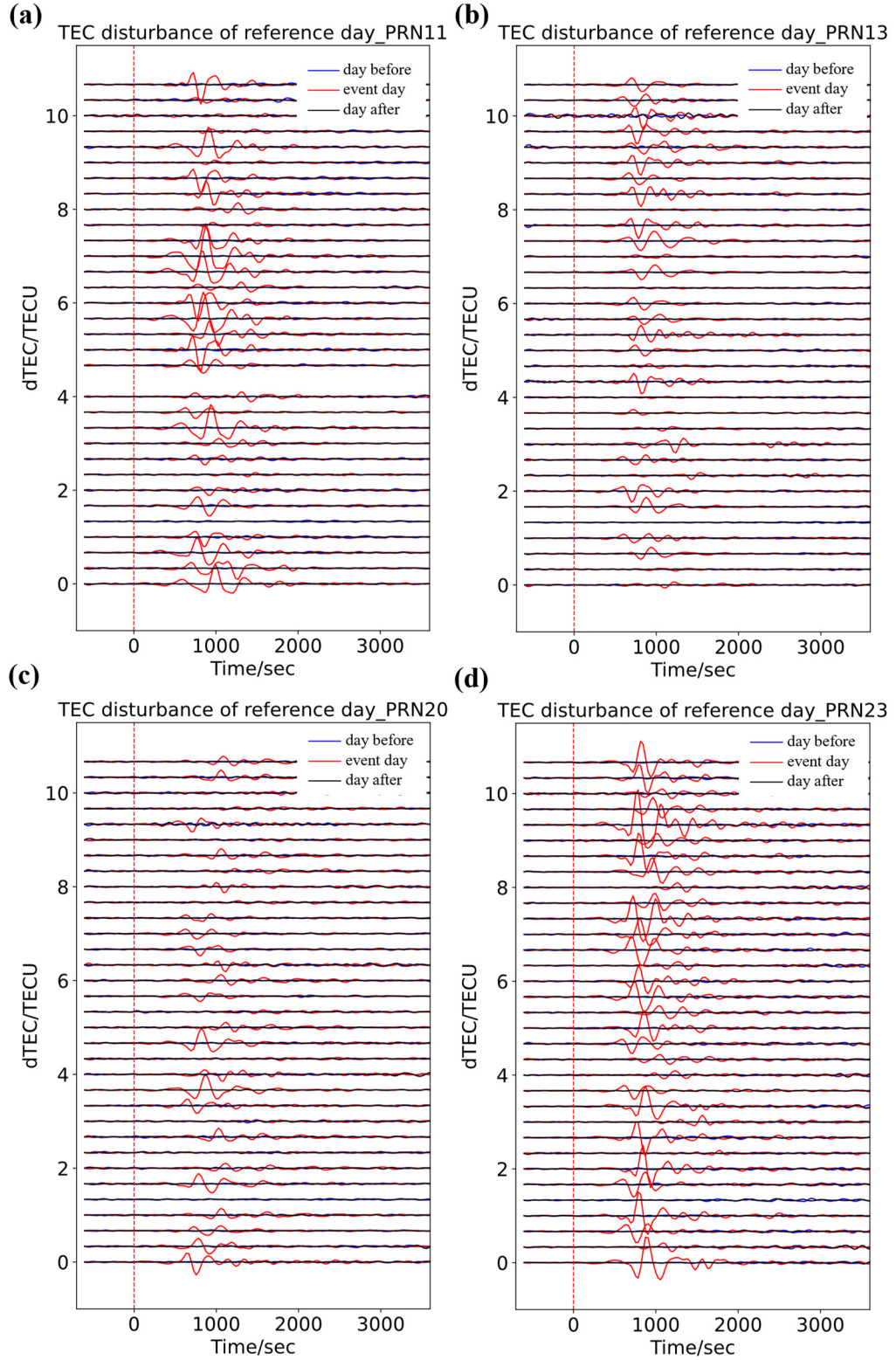


Figure S1. Examples (PRN11, 13, 20, 23) of co-seismic ionospheric disturbances (CIDs) triggered by the Iquique earthquake occurred at 23:46 UTC on 1 April 2014. TEC series for the three consecutive days (31 March–2 April) are plotted. The vertical red dashed line indicates the time of the mainshock according to USGS (<https://earthquake.usgs.gov/earthquakes/search/>) and the horizontal axis represents the time interval from the earthquake.

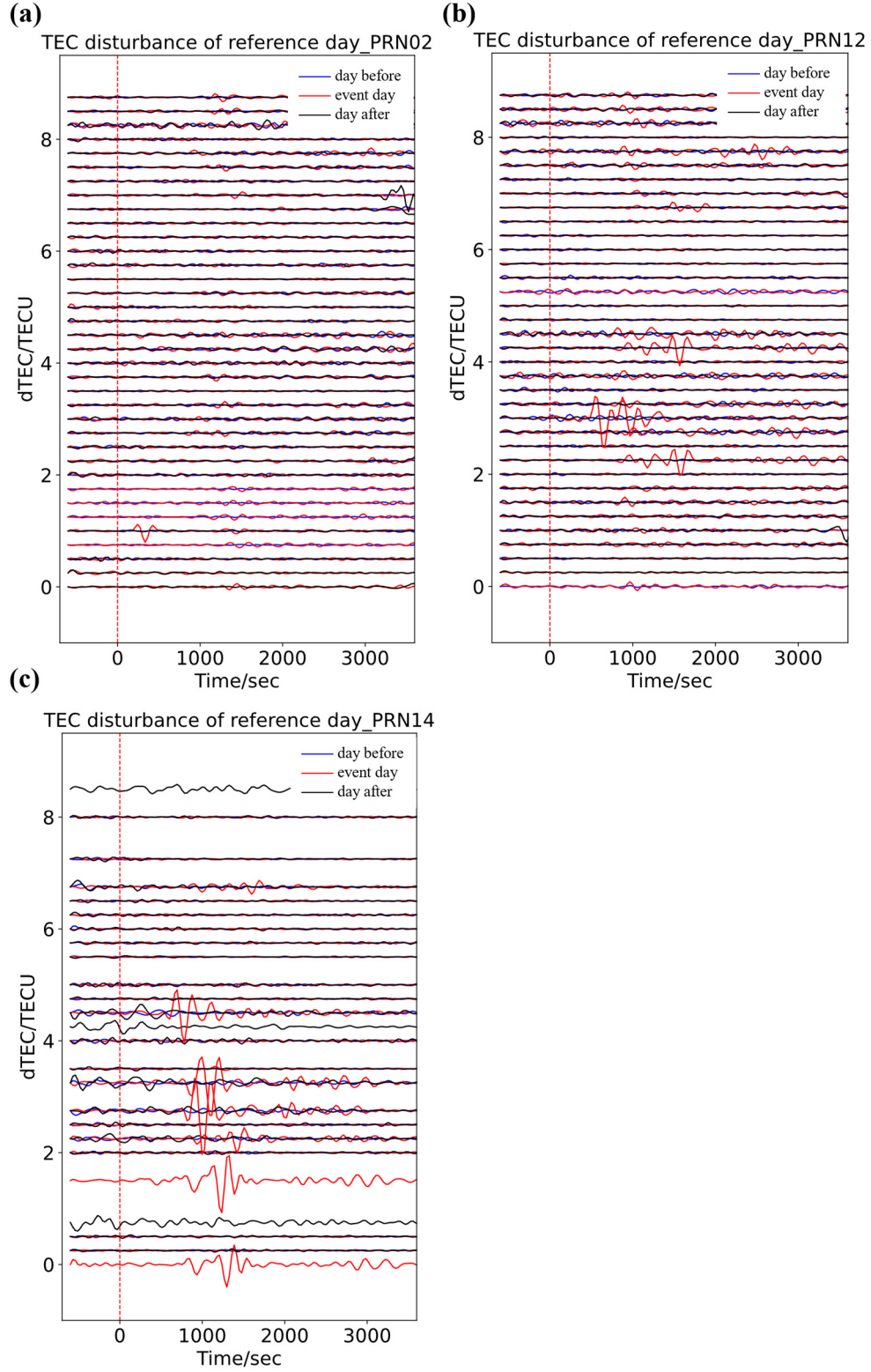


Figure S2. Examples (PRN02, 12, 14) of co-seismic ionospheric disturbances (CIDs) triggered by the Illapel earthquake occurred at 22:54 UTC on 16 September 2015. TEC series for the three consecutive days (15-17 September) are plotted. The vertical red dashed line indicates the time of the mainshock according to USGS (<https://earthquake.usgs.gov/earthquakes/search/>) and the horizontal axis represents the time interval from the earthquake.

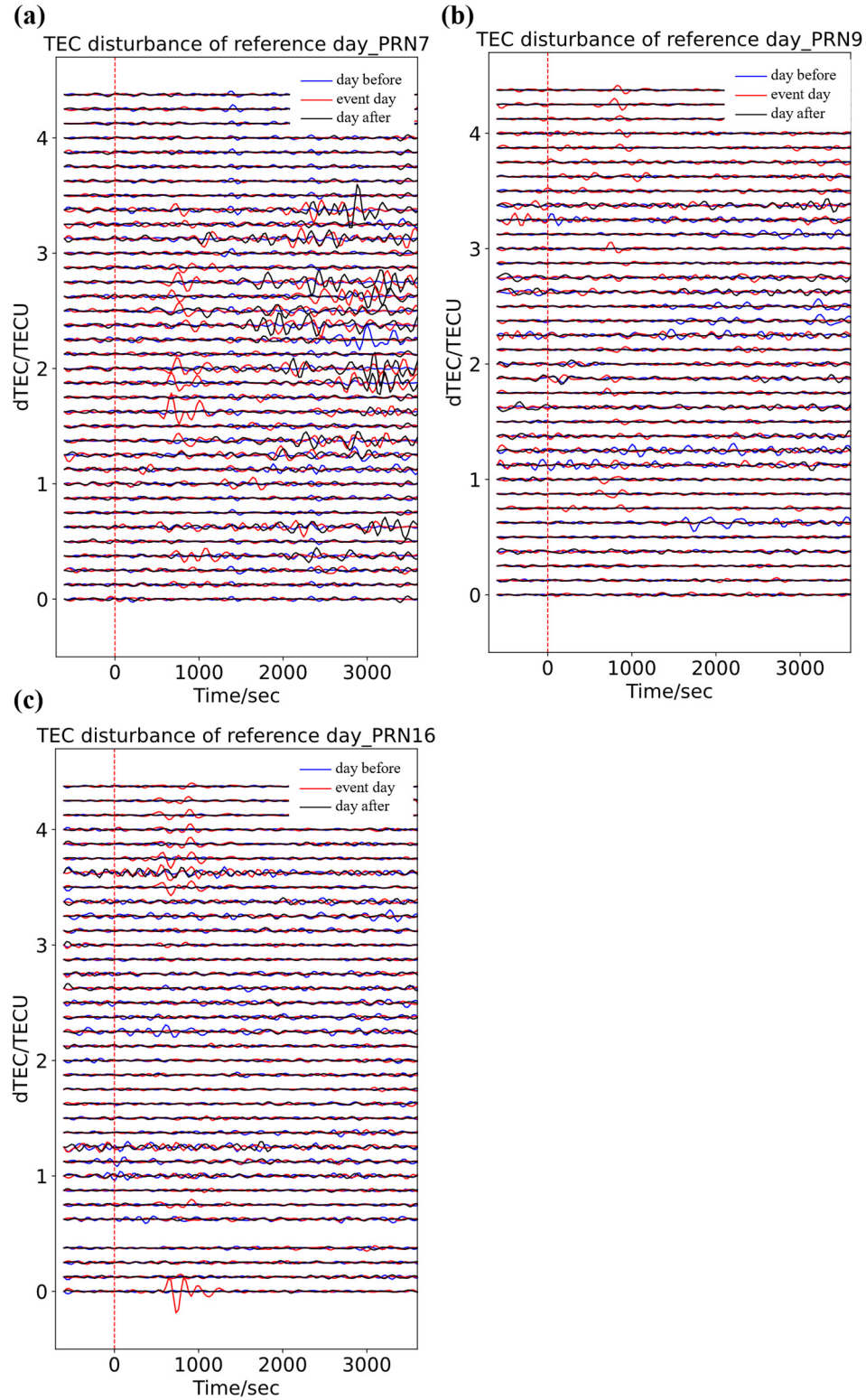


Figure S3. Examples (PRN07, 09, 16) of co-seismic ionospheric disturbances (CIDs) triggered by the Alaska earthquake occurred at 06:15 UTC on 29 July 2021. TEC series for the three consecutive days (28-30 July) are plotted. The vertical red dashed line indicates the time of the mainshock according to USGS (<https://earthquake.usgs.gov/earthquakes/search/>) and the horizontal axis represents the time interval from the earthquake.