Supporting Information for

Coseismic Fault Slip and Transtensional Stress Field in the Hovsgol basin Revealed by the 2021 Mw 6.7 Turt, Mongolia Earthquake

Xiaoge Liu[1], Wenbin Xu[1,*], Natalia A. Radziminovich[2], Nan Fang[1], Lei Xie[3]

[1]School of Geosciences and Info-Physics, Central South University, Changsha 410083, Hunan, P.R. China

[2]Institute of the Earth's Crust, Siberian Branch of the Russian Academy of Sciences, Lermontov Str., 128, Irkutsk 664033, Russia

[3]The Department of Land Surveying and Geo-Informatics, The Hong Kong Polytechnic University, Hong Kong, China

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Introduction

This supporting information includes figures showing teleseismic data location (Fig. S1), comparison between the observed teleseismic P waves and the synthetic waveforms (Fig. S2), regional geology, and lithology map (Fig. S3), Coulomb stress change on surrounding active faults induced by 2021 Turt earthquake (Fig. S4) and stress triggers on Hovsgol Fault caused by 1950 Mw 6.9 Mondy earthquake (Fig. S5). We also include tables describing the moment tensors (Table S1), coseismic InSAR data information (Table S2), optimal fault geometry parameters and their searching intervals in the non-linear inversion (Table S3) and geometry parameters of receiver faults for Coulomb stress change calculation (Table S4).

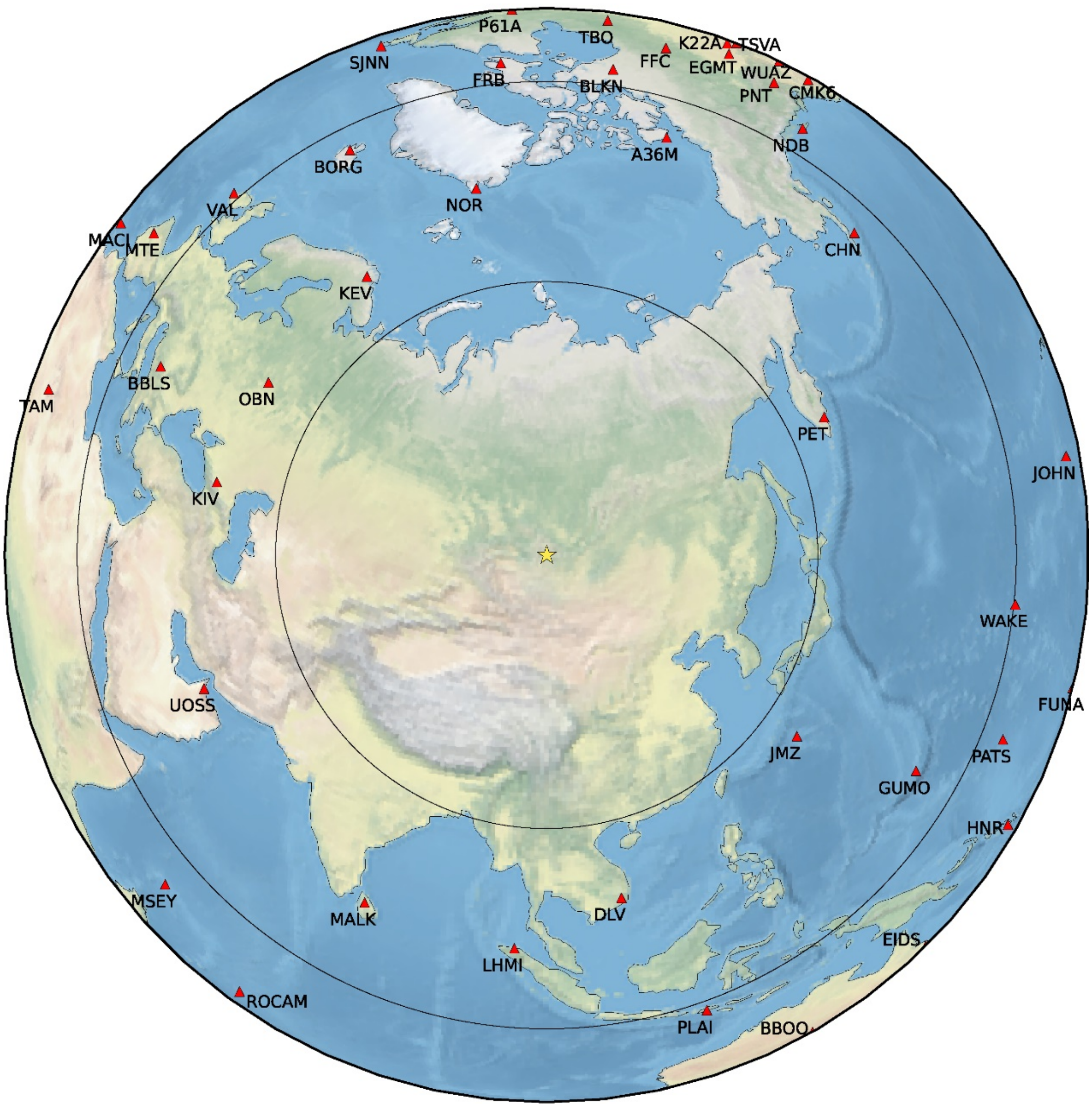

Fig. S1. Map in azimuthal equidistant projection centered on the epicenter of the 2021 Hovsgol earthquake (yellow star). Red triangles show the seismic stations that have been used in this study. The black circles mark the distances of 30, 60 and 90 degrees.

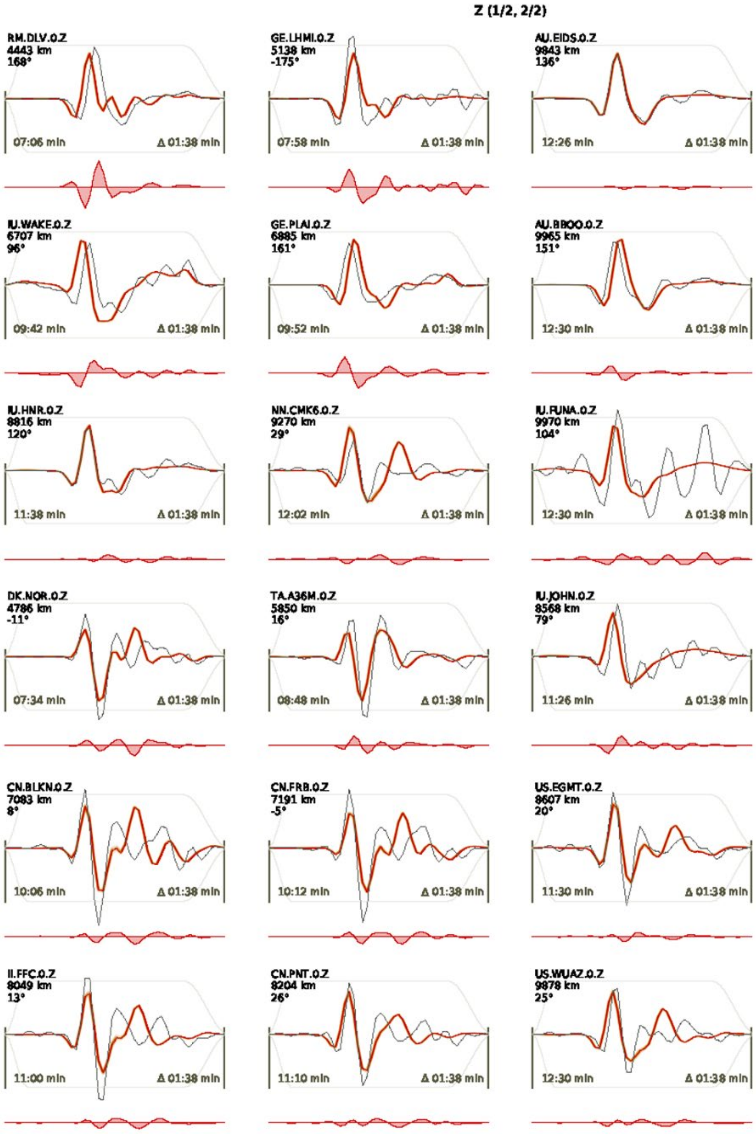

Fig. S2. Same as Fig. 2 but for other stations.

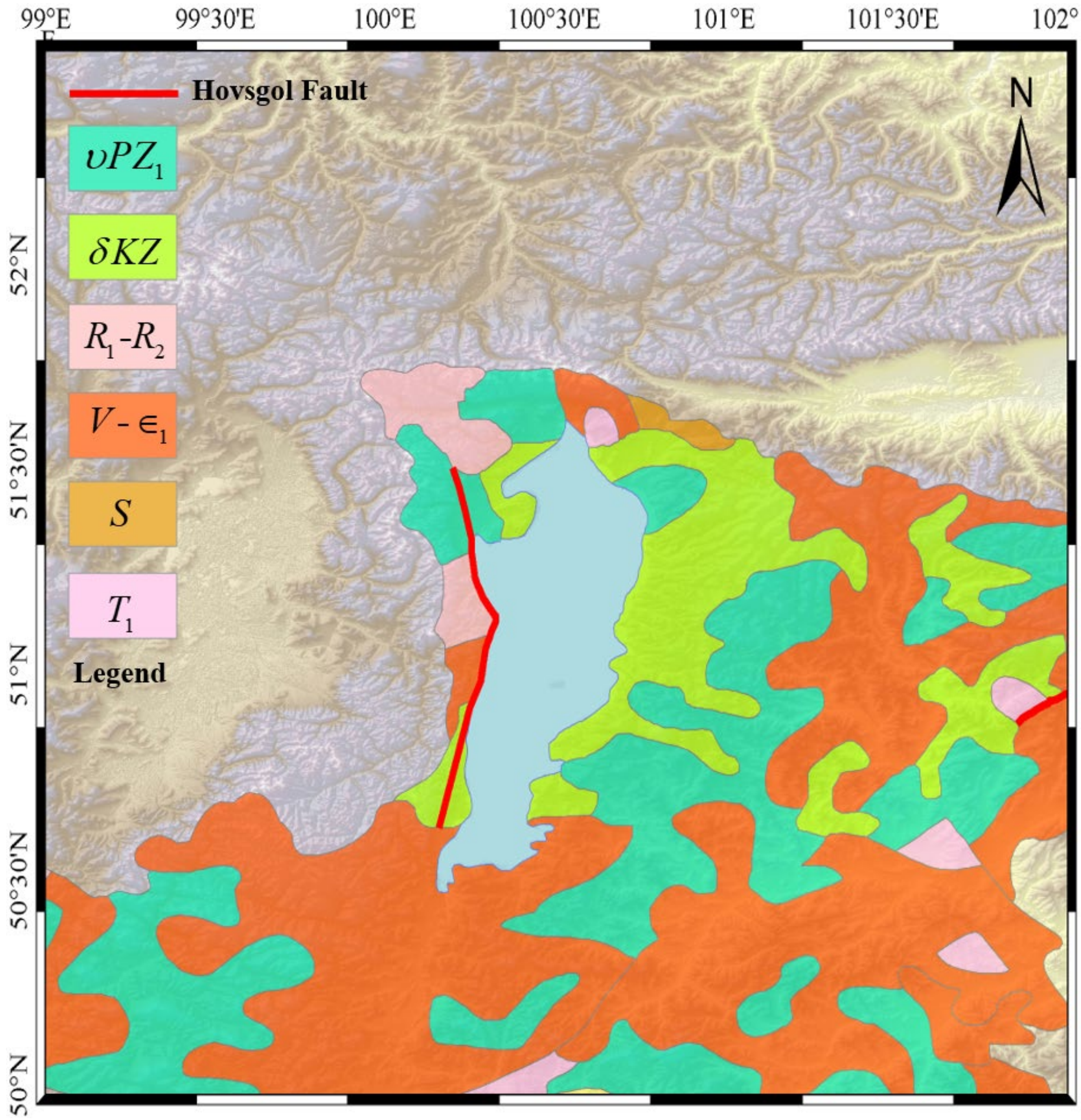

Fig. S3. The geology and lithology map are adopted from Atlas of the Hovsgol basin. υPZ_1: Dzhidinsky sedimentary sequence – gabbro, gabbro-norite, norite, diabase (Middle Cambrian); δKZ : Basalts (Pliocene); R_1-R_2 : Sedimentary volcanic units (Middle Riphean); V-$\in_1$: Sedimentary volcanic units (Early Cambrian); S : Sedimentary volcanic units (Silurian); T_1: Chernoyarovskay suite - basic rocks, tuffaceous conglomerates, tuffaceous and stones. (Early-Middle Triassic). Detail lithology and geology information can be found from http://bic.iwlearn.org/en/atlas/atlas-of-the-baikal-basin-eng/view.

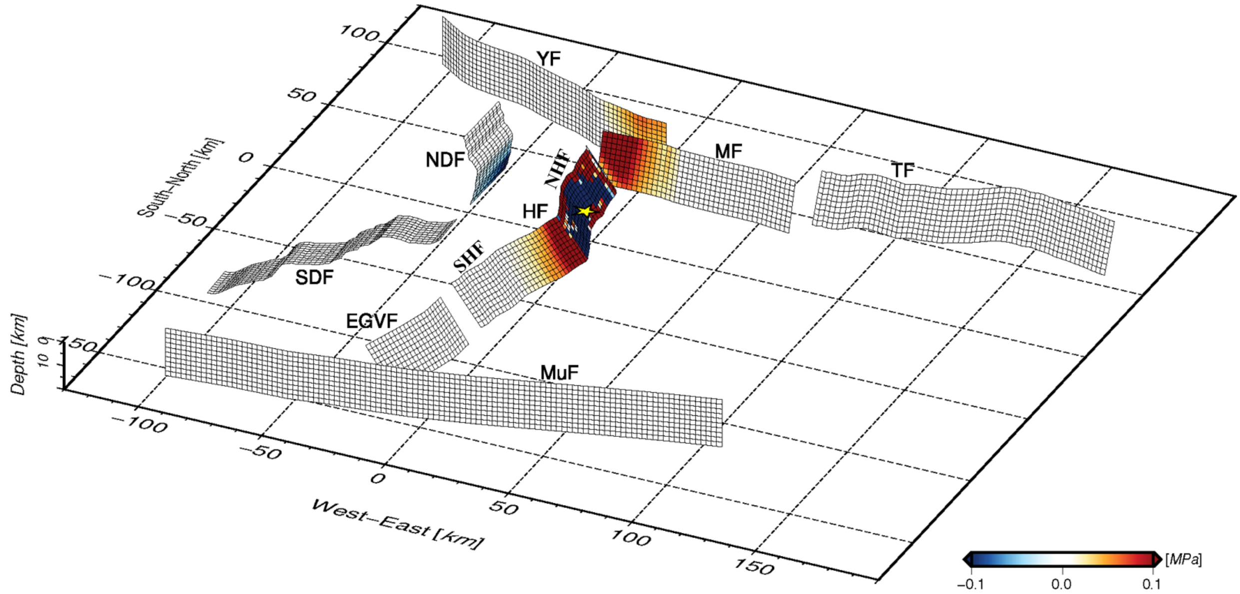

Fig. S4. Same as Fig. 8 but color scale saturated at [-0.1, 0.1] MPa

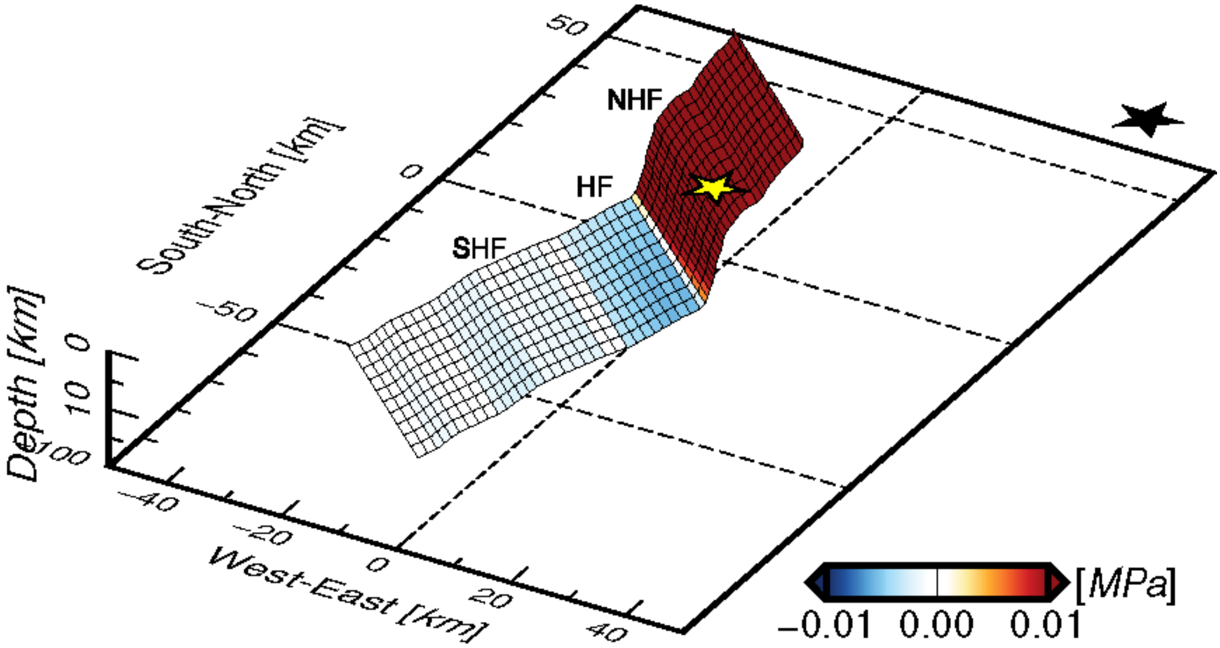

Fig. S5. Same as Fig. 9 but color scale saturated at [-0.01, 0.01] MPa

Table S1. Fault plane solutions for earthquakes in the Hovsgol area. Earthquakes with multiple focal mechanism solutions are highlighted in bold.

dd/mm/yyyy	Hour	Lat.	Lon.	Mag.	T pl	T az	N pl	N az	P pl	P az	Strike	Dip	Slip	Strike	Dip	Slip	reference
04/04/1950	18:44	51.8	101	Mw6.9	11	324	74	190	11	56	100	75	0	10	90	165	Delouis et al., 2002
21/12/1961	16:02	51.6	100.3	4.4	10	52	41	151	47	311	353	67	-44	104	50	-149	Khilko et al., 1985
29/08/1964	20:55	51.52	99.5	3.3	39	209	4	116	51	21	115	84	-94	329	7	-56	Khilko et al., 1985
01/04/1976	**19:02**	**50.62**	**100.22**	**5**	**77**	**132**	**13**	**306**	**2**	**36**	**293**	**48**	**72**	**139**	**45**	**109**	Khilko et al., 1985
01/04/1976	**19:02**	**50.62**	**100.22**	**5**	**46**	**137**	**41**	**344**	**14**	**242**	**182**	**70**	**133**	**292**	**47**	**28**	Golenetskii, 1980
14/03/1980	21:34	51.87	100.45	4.4	49	350	39	151	9	249	16	50	146	129	65	45	Khilko et al., 1985
03/12/1982	05:16	51.7	101.37	4.4	84	16	3	132	5	222	130	50	87	315	40	94	Golenetskii, 1986
06/04/1985	05:32	51.36	100.61	5	3	123	10	34	80	229	25	48	-102	223	44	-77	Solonenko et al. 1993
24/08/1985	22:57	51.2	100.4	3.9	6	295	24	28	64	190	0	44	-126	225	56	-60	Solonenko et al., 1993
08/03/1987	05:16	51.3	100.36	3.9	7	96	22	4	66	204	348	56	-117	210	42	-57	Solonenko et al., 1993
04/03/1989	19:43	50.79	99.35	4.6	2	140	14	50	76	236	37	48	-109	244	45	-70	Filina, 1993
05/02/1992	10:57	50.16	99.97	5.3	72	206	17	6	6	98	206	42	116	353	53	69	Melnikova, Radziminovich, 1998
13/01/1993	05:18	51.68	102.14	4.3	44	141	42	291	16	34	167	46	155	275	72	46	Melnikova, Radziminovich, 1998
02/09/1997	15:35	51.7	101.65	3.5	21	143	7	236	68	342	58	66	-83	221	25	-105	Melnikova, Radziminovich, 2003
17/09/2003	**02:59**	**51.75**	**101.53**	**Mb4.6**	**55**	**136**	**23**	**8**	**25**	**267**	**196**	**74**	**114**	**318**	**29**	**35**	Radziminovich et al., 2
17/09/2003	**02:59**	**51.75**	**101.53**	**Mw4.9**	**62**	**41**	**26**	**196**	**10**	**291**	**180**	**60**	**60**	**49**	**41**	**131**	Seredkina, Melnil 2013
17/09/2003	03:31	51.76	101.58	3.7	3	328	16	59	74	228	253	50	-69	42	44	-113	Radziminovich et al., 2
20/09/2003	05:01	51.32	100.27	4.2	3	150	3	60	86	285	243	42	-86	57	48	-94	Radziminovich et al., 2
19/01/2004	**23:50**	**51.89**	**100.15**	**Mb4.5**	**48**	**342**	**37**	**130**	**16**	**233**	**4**	**44**	**152**	**115**	**71**	**50**	Melnikova et al., 2010
19/01/2004	**23:50**	**51.89**	**100.15**	**Mw4.8**	**26**	**326**	**45**	**85**	**34**	**217**	**270**	**85**	**-45**	**5**	**45**	**-173**	Seredkina, Melnil 2013
11/03/2004	09:39	52.14	100.74	Mb4.1	48	161	40	360	10	261	202	66	135	314	50	32	Melnikova et al., 2010
21/10/2004	01:00	51.7	102.25	4.1	26	356	10	261	62	152	258	72	-100	108	21	-62	Melnikova et al., 2010

11/05/2005	2:01	51.7	100.07	3.9	20	99	18	196	63	325	162	30	-128	24	67	-70	Radziminovich et al., 2
03/03/2007	11:20	51.63	99.84	3.6	44	164	10	264	44	4	264	90	100	174	10	0	Melnikova et al., 2013
03/03/2007	13:11	51.81	100.54	Mb3.6	0	154	53	64	37	244	282	65	-28	25	65	-152	Melnikova et al., 2013
05/04/2008	18:56	50.33	100.25	Mb4.5	65	142	24	336	5	244	175	55	120	310	45	55	Melnikova et al., 2014
14/05/2012	16:38	51.25	99.64	Mb4.0	63	154	1	246	27	337	71	18	95	246	72	88	Melnikova et al., 2018
16/07/2012	17:00	51.58	101.94	3.6	1	140	23	50	67	231	251	49	-59	29	50	-120	Melnikova et al., 2018
05/12/2014	**18:04**	**51.37**	**100.63**	**Mw5.0**	**3**	**293**	**70**	**33**	**20**	**202**	**245**	**79**	**-17**	**339**	**74**	**-168**	GCMT
05/12/2014	**18:04**	**51.37**	**100.63**	**5.0**	**36**	**113**	**54**	**301**	**4**	**206**	**154**	**69**	**150**	**256**	**62**	**24**	Melnikova et al., 2020
05/12/2014	**18:04**	**51.37**	**100.63**	**5.0**	**41**	**125**	**0**	**35**	**49**	**305**	**35**	**86**	**-90**	**214**	**4**	**-91**	Dobrynina et al., 2018
29/03/2019	23:22	51.65	101.57	Mw4.8	4	298	31	206	59	34	56	49	-48	182	56	-128	GCMT
11/01/2021	21:33	51.281	100.438	6.74	14	301	10	33	72	158	16	32	-110	219	60	-78	USGS
11/01/2021	21:33	51.31	100.39	6.8	13	300	33	39	54	192	354	45	-143	236	65	-52	GCMT
11/01/2021	21:33	51.21	100.47	6.7	2	295	22	26	68	199	4	47	-121	226	51	-60	GFZ
11/01/2021	21:33	51.241	100.443	6.84	9	301	33	37	55	197	358	46	-139	237	62	-52	IPGP
11/01/2021	21:33	51.32	100.42	Mb6.5	0	309	9	39	81	219	29	46	-103	228	46	0	GSRAS
11/01/2021	21:33	100.33	51.34	6.75	6	287	42	22	47	191	340	54	-146	-	-	-	This study
31/03/2021	00:01	100.29	51.35	5.1	2	130	83	239	5	39	175	84	-177	84	87	-5	GFZ

USGS, U.S. Geological Survey (https://earthquake.usgs.gov); GCMT, Global Centroid-Moment Tensor Project (https://www.globalcmt.org/); GFZ, GeoForschungsZentrum (GEOFON) Moment Tensor Solutions (http://geofon.gfz-potsdam.de/eqinfo/); IPGP, Institute de Physique du Globe de Paris (http://www.ipgp.fr/fr); GSRAS, Geophysical Survey of Russian Academy of Sciences (http://www.ceme.gsras.ru/new/ssd_news.htm).

Table S2. Details of the coseismic Sentinel-1 SAR data used in this study.

Interferograms	Primary (yyyymmdd)	Secondary (yyyymmdd)	Path	Frame	Direction	Bperp (m)
CoDT77	20201223	20210112	77	419	Descending	4.6

Note: CoDT77 is descending coseismic interferogram.

Table S3. Searching intervals of the co-seismic fault geometry parameters and the optimal solution in the non-linear inversion. E-shift and N-shift are differential E-W and N-S distances with respect to the GCMT epicenter location. Depth is the upper depth of uniform fault. The optimal solutions are maximum-a-posteriori probability solutions, and 2.5% and 97.5% represent confidence interval of posterior probability density functions of fault parameters.

Parameters	E-shift (km)	N-shift (km)	Length (km)	Width (km)	Depth	Strike (°)	Dip (°)	Rake (°)	Slip (m)
Lower boundary	-20	-20	0	0	0	0	0	-180	0
Upper boundary	20	20	40	20	15	360	90	180	5
Optimal	-8.2	2.0	35.3	14.2	3.2	340.4	53.9	-146.4	0.7
2.5%	-8.8	0.0	31.6	10.5	2.9	338.8	49.9	-152.2	0.6
97.5%	-7.5	3.0	38.1	15.6	3.8	341.4	60.9	-141.8	0.9

Table S4. Geometry information of receiver faults. Unit of ΔCFS is MPa

Faults	Strike* (°)	Dip (°)	Rake (°)	Slip-Type	Max. ΔCFS	Min. ΔCFS
NHF	341	54	-146	Dextral-Normal	2.4435	-2.5369
SHF	10	54	-146	Dextral-Normal	0.4683	-0.1780
TF	84	60	-60	Normal	0.0026	-0.0023
MF	100	75	0	Sinistral	0.1631	-0.0382
YF	289	90	0	Sinistral	0.0646	-0.0076
NDF	152	50	-80	Normal	0.0030	-0.1257
SDF	221	50	-80	Normal	0.0113	-0.0068
EGVF	0	50	110	Thrust	0.0001	-0.0001
MuF	80	90	0	Sinistral	0.0015	-0.0023

*Strike angle is the average striking orientation azimuth for individual receiver fault.

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