

# Supplementary Materials: The Arkalochori Mw = 5.9 Earthquake of 27 September 2021 Inside the Heraklion Basin: A Shallow, Blind Rupture Event Highlighting the Orthogonal Extension of Central Crete

**Table S1.** Data from the EMSC web pages of the seven major foreshocks, the Mw = 6 mainshock of September 27 and the main Mw = 5.3 aftershock of September 28, 2021.

Date (in 2021)	Time UTC	Magnitude and type	Intensity	Testimonies	EMSC link
4/6	1:05	4.6 mb	IV	93	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=992375">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=992375</a>
2/7	19:46	4.2 mb	IV	119	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1005840">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1005840</a>
5/7	20:40	4.2 ML	IV	117	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1006719">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1006719</a>
18/7	4:56	4.4 mb	IV	58	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1010729">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1010729</a>
20/7	17:44	4.2 ML	IV	70	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1011547">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1011547</a>
24/7	2:07	4.8 ML	V	208	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1012874">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1012874</a>
8/8	19:15	4.2 mb	IV	45	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1021061">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1021061</a>
27/9	6:17	6 Mw	VI	346	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1041084">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1041084</a>
28/9	4:48	5.3 Mw	V	278	<a href="https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1041541">https://www.emsc-csem.org/Earthquake/Testimonies/comments.php?id=1041541</a>

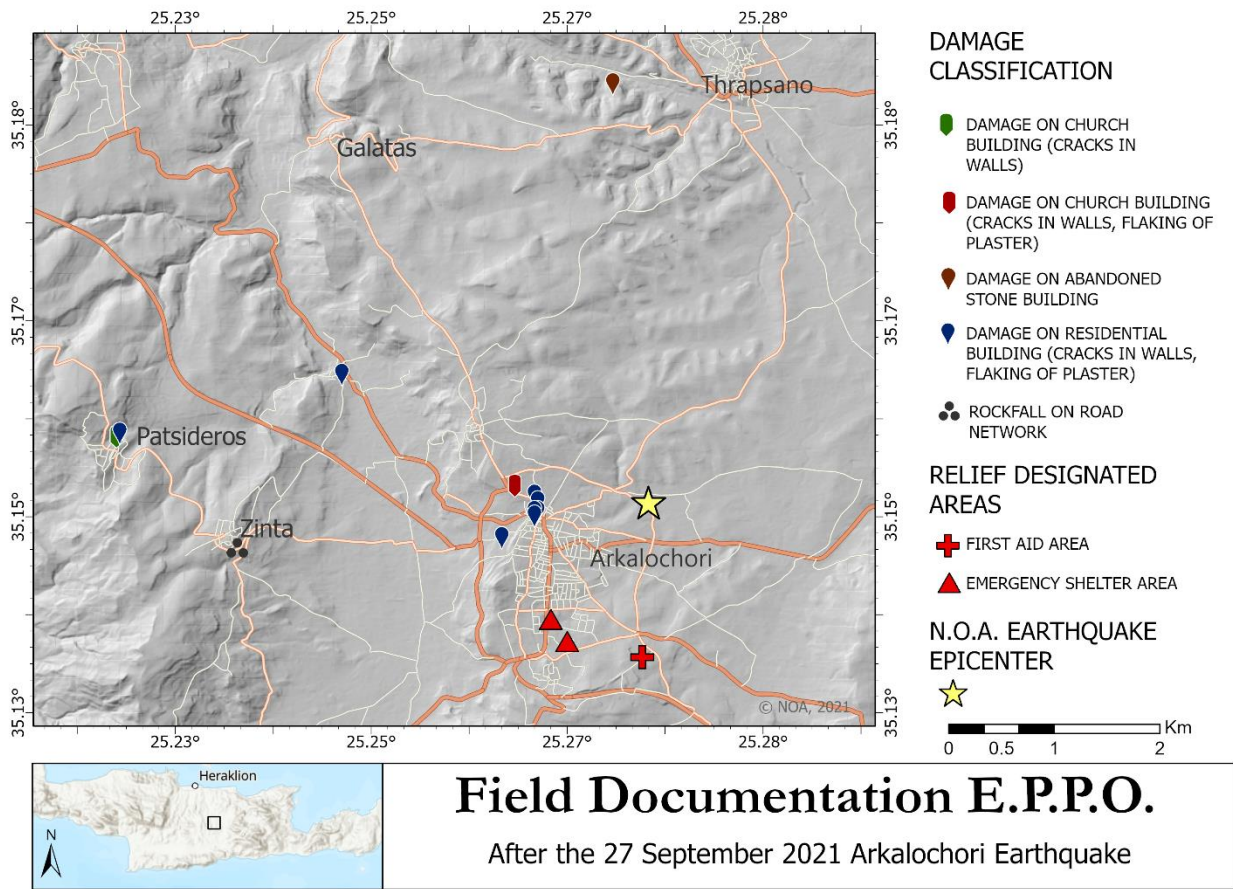
**Table S2.** Moment tensor solutions of events with Mw ≥ 4.0. The events are plotted on the map of Fig. 3.

Origin yyymmdd hh:mm:ss	Centroid Latitude (o)	Centroid Longitude de	Centroid Depth	Strike (o)	Dip (o)	Rake (o)	Moment Mo (Nm)	Mw	VR (%)	DC (%)
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		(o)	(Km)								
210604 01:05:26	35.2154	25.2531	12.9	0	63	-128	1.300e+15	4.0	54.0	50.30	
210724 02:07:37	35.1118	25.2333	8.0	43	37	-82	9.116e+15	4.6	63.3	64.60	
210927 06:17:24	35.1429	25.4340	6.0	25	33	-81	8.663e+17	5.9	61.3	97.20	
210927 07:30:45	35.0361	25.2495	12.0	4	41	-172	5.304e+15	4.4	62.2	58.80	
210927 08:21:59	35.2523	25.3098	3.0	232	63	-97	6.232e+15	4.5	50.4	46.30	
210927 11:02:25	35.0482	25.2548	3.0	15	80	-93	7.537e+15	4.6	58.8	71.60	
210927 20:09:59	35.1712	25.2041	11.0	270	79	-36	2.107e+15	4.2	46.5	38.10	
210927 21:37:09	35.1467	25.2739	4.0	55	36	-63	1.967e+15	4.2	42.2	71.10	
210928 04:48:06	35.2470	25.2249	5.0	5	64	-112	4.635e+16	5.1	57.4	81.20	
210928 15:13:14	35.1501	25.2775	7.0	31	35	-91	5.326e+15	4.5	60.3	74.90	
210929 11:54:49	35.1439	25.2058	8.0	21	51	-95	2.011e+15	4.2	58.8	77.40	
211020 02:44:05	35.1505	25.3089	16.0	286	55	25	1.715e+15	4.1	62.1	63.60	
211021 08:12:57	35.0936	25.2538	7.0	256	48	-55	2.478e+15	4.2	62.5	40.90	
211021 09:38:30	35.0426	25.2533	21.0	237	29	111	3.006e+15	4.3	52.2	46.60	
211022 10:11:31	35.1052	25.3221	11.0	8	59	-135	1.285e+15	4.0	60.2	98.00	
211229 23:06:40	35.1332	25.2021	9.0	9	54	-138	9.649e+14	4.0	93.3	79.20	



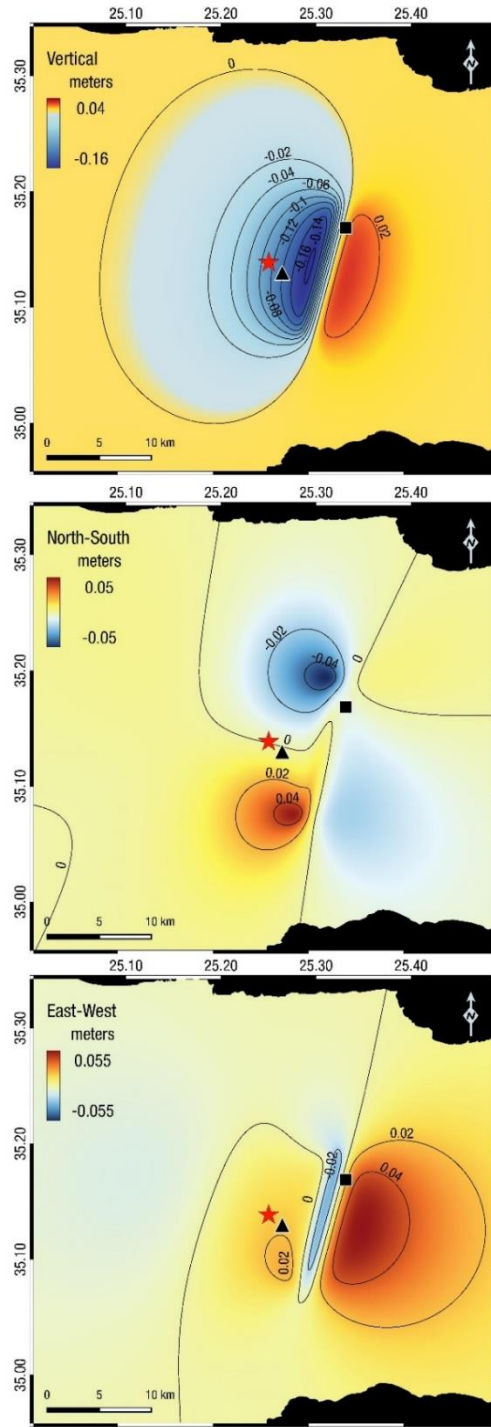




**Figure S2.** Map showing damage locations according to EPPO field report (communicated to Athanassios Ganas on 22 October 2021)

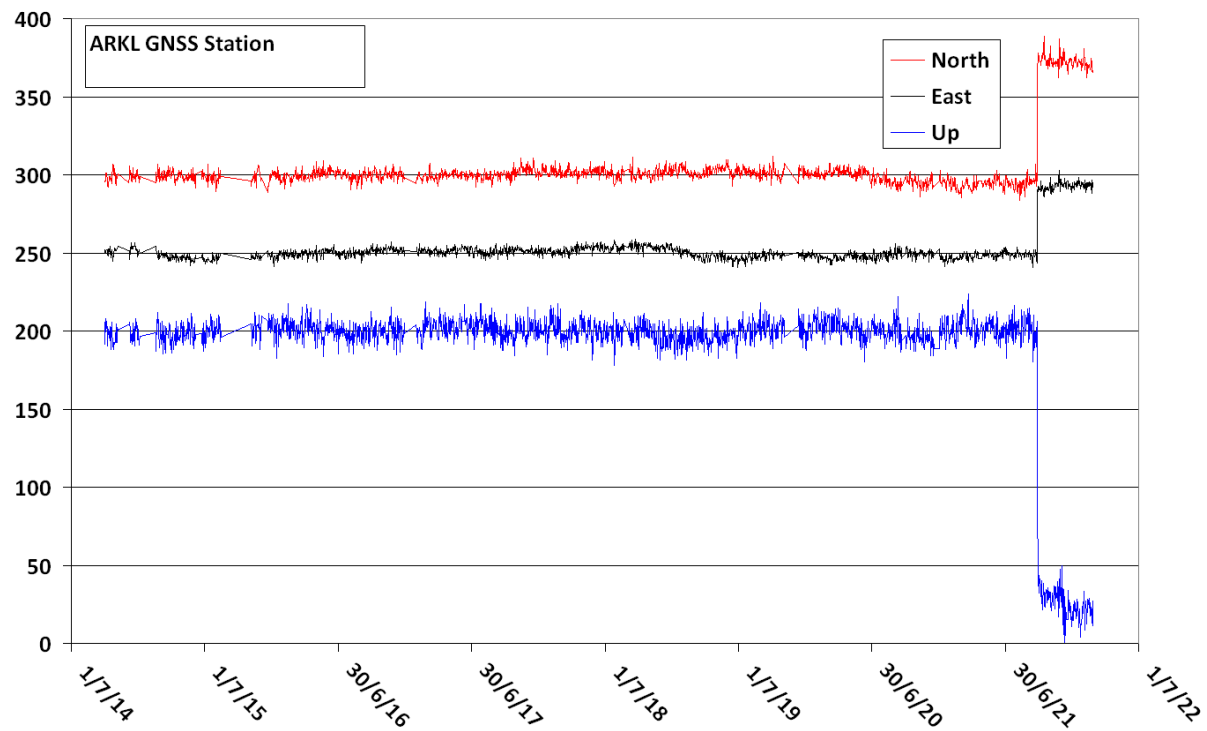


**Figure S3.** Field photograph of the ARKL station antenna (top google earth view – bottom building photo looking east; photo taken by Athanassios Ganas, Nov. 11, 2021)

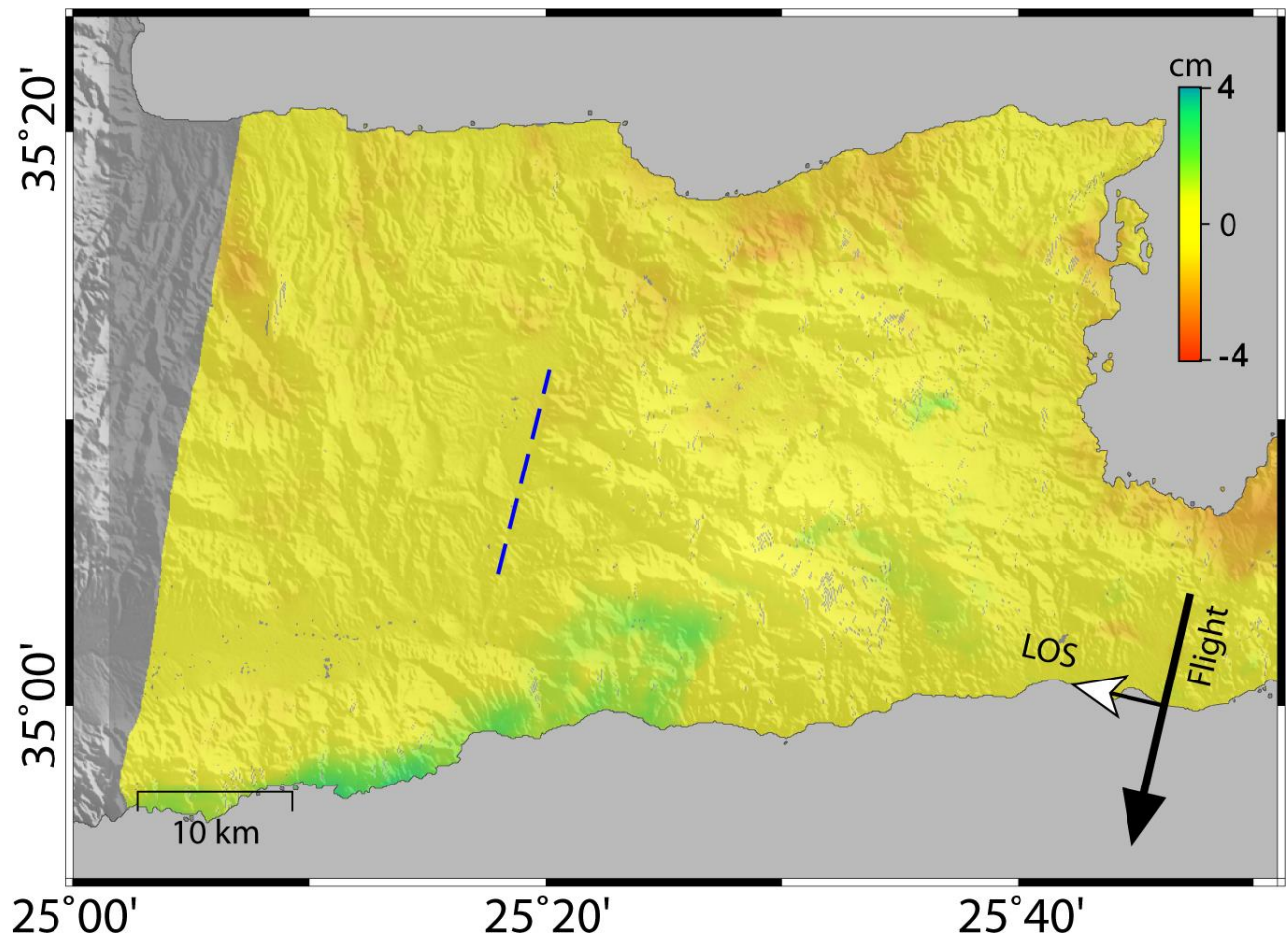


**Figure S4.** Ground displacement maps predicted by an Okada-type dislocation model (west-dipping; using parameters of Table 3 with uniform slip 0.2 m), assuming elastic half-space. Black triangle shows the location of GNSS station ARKL. Black square shows the location of GPS benchmark AS15.



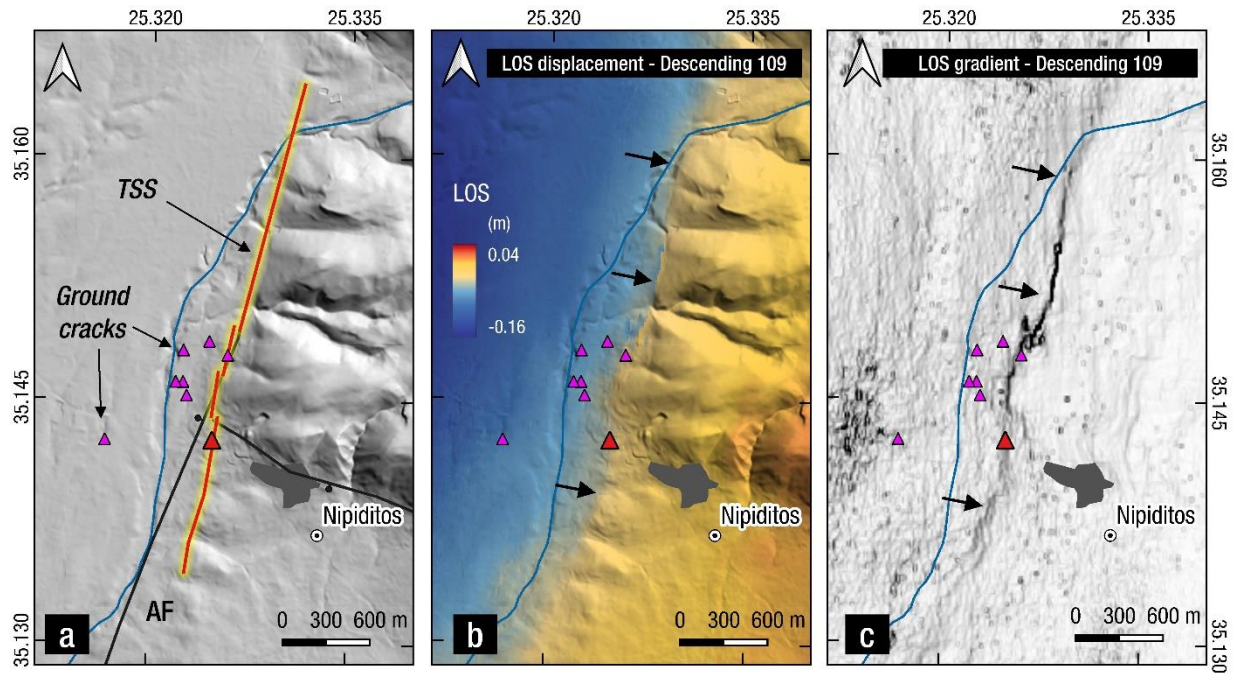


**Figure S5.** Position time series (reference frame ITRF2014) of the GNSS ARKL station (offset on the Y-axis for clarity). A small post-seismic motion is visible on the vertical (Up) component. The time series are detrended of the secular velocity of the station.

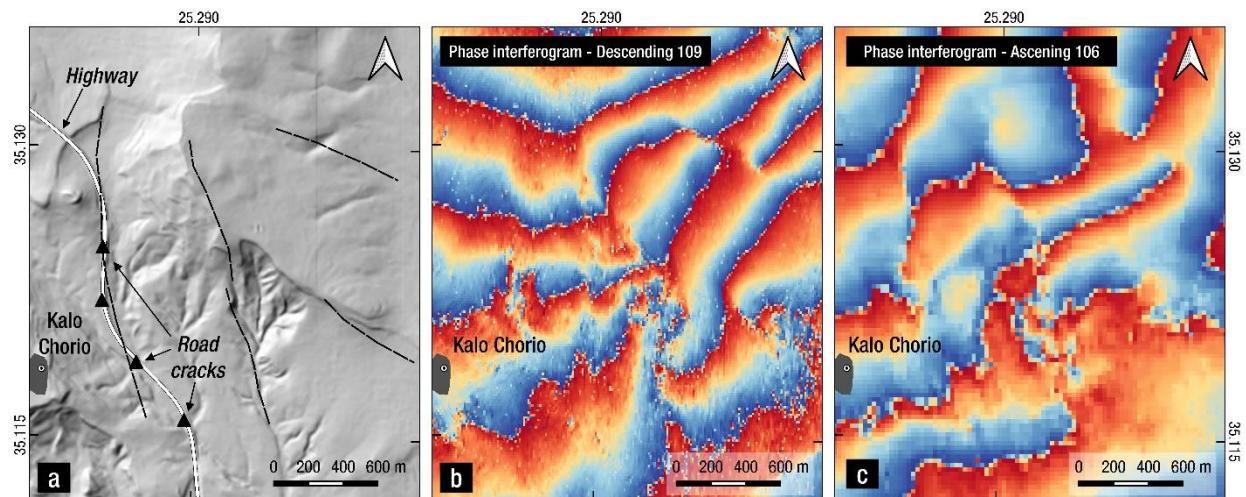


**Figure S6.** InSAR data from 1-13 October 2021 showing no clear evidence for surface deformation 3-16 days after the earthquake.

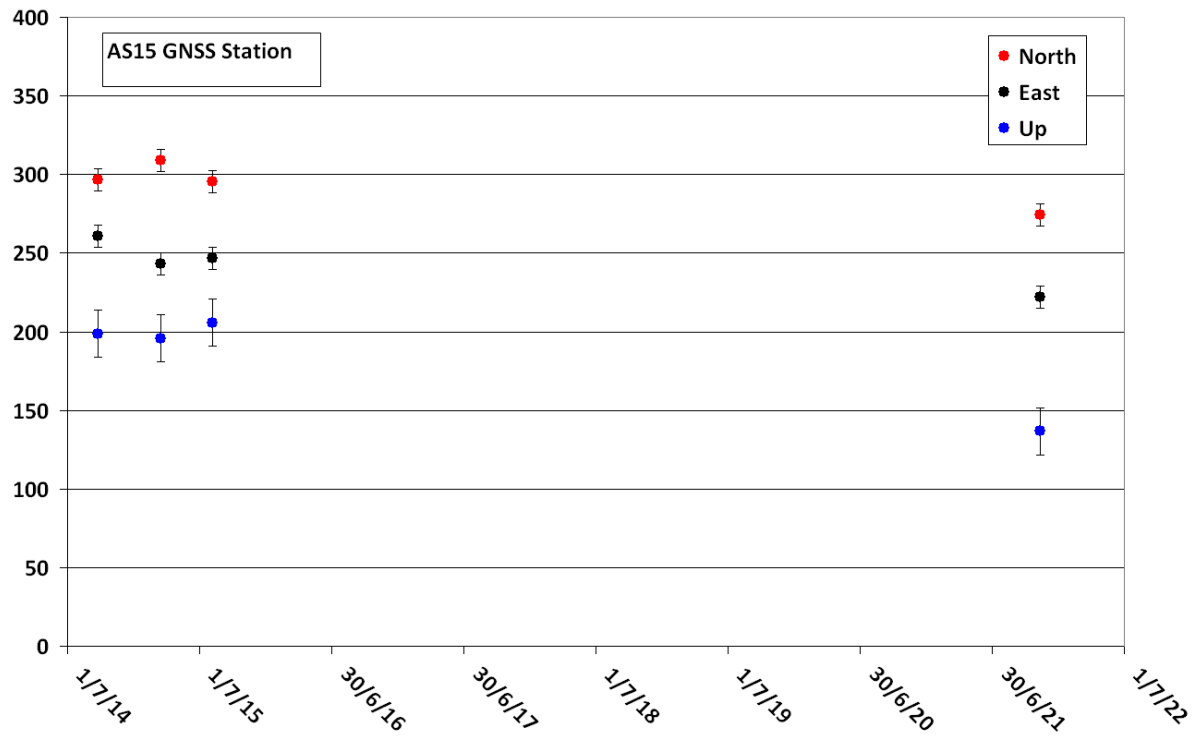




**Figure S7a.** Linear displacement feature (triggered shallow slip, TSS) observed along the Avli (Lagouta) segment. Ground cracks observed in the field (triangles) and shallow displacement feature (red line) traced from the LOS displacement (b and c).



**Figure S7b.** Triggered shallow slip features (TSS) southeast from Arkalochori. Road cracks observed in the field along Heraklion-Arkalochori motorway (triangles in a). TSS traces (black dashed lines in a) are visible as discontinuities in both descending and ascending track phase interferograms (b & c).



**Figure S8.** Time series plot of the coordinates of AS15. The plot is detrended of the secular velocity (we used the velocity of the nearby station ARKL, i.e;  $v_E=8.4$  and  $v_N=-13.7$  mm/yr).

The co-seismic displacement is  $dE = -28 \pm 6$  mm,  $dN = -25 \pm 6$  mm,  $dU = -63 \pm 15$  mm