

## Rapid after slip associated with M7.4 Santa María Xadani, Mexico 23 June 2020 earthquake

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The GAGE facility would like to alert the community to the observation of an on-going rapid slip event that is occurring in the Oaxaca, Mexico section of the Cocos/North America subduction zone. The event is coincident with the 23 June 2020 M7.4 Santa María Xadani, Mexico earthquake. Details of this event, ANSS(ComCat) us6000ah9t, are given at <https://earthquake.usgs.gov/earthquakes/eventpage/us6000ah9t/executive> .

This region has shown non-volcanic tremor (NVT) and slow slips events in past (Fasola et al., 2016).

Table 1 and Figure 1 show the coseismic offsets reported by the GAGE facility based on rapid processing of GPS data in the NOTA network (<https://www.unavco.org/highlights/2020/oaxaca.html>). Figures 2-5 show time series for recent data for the 4 sites with the largest coseismic offsets, plotted directly from the GAGE time series files. The positions are given in a North America-fixed reference frame. Table 2 gives the latest velocity estimates for these sites available from the GAGE facility. On-going time series estimates of the co-seismic displacements will be affected by the large post-seismic motions.

**Table 1:** Coseismic offsets based on rapid solutions for two days before and after the event.

Longitude deg	Latitude deg	$\Delta E$ mm	$\Delta N$ mm	$\pm E$ mm	$\pm N$ mm	$\Delta U$ mm	$\pm U$ mm	Site
262.92474	15.88869	-11.45	5.04	3.36	3.08	-5.81	12.55	OXPE
263.50097	15.66225	-147.93	-80.01	2.96	2.75	41.84	13.08	OXUM
261.38837	16.71028	0.95	1.02	2.35	2.23	0.15	3.73	TNMQ
262.85811	16.12045	-9.22	2.13	2.97	2.74	3.31	11.03	TNNP
262.77610	17.40757	3.17	-4.32	2.75	2.56	-0.61	6.76	TNNX
263.51046	16.17242	-10.16	-28.11	2.94	2.71	5.29	13.10	TNSJ

**Table 2:** Velocities of sites in a North America fixed (NAM14) reference frame.

Longitude deg	Latitude deg	East Vel mm/yr	North V mm/yr	$\pm E$ mm/yr	$\pm N$ mm/yr	Up V mm/yr	$\pm U$ mm/yr	Site
262.92474	15.88869	18.63	23.10	0.23	0.61	-7.80	0.34	OXPE
263.50097	15.66225	14.57	18.47	0.26	0.70	-7.51	0.88	OXUM
262.85811	16.12045	10.34	16.62	1.23	2.09	-6.98	1.26	TNNP
263.51046	16.17242	13.63	18.86	0.54	0.53	-11.48	1.37	TNSJ

Reference

Fasola, Shannon, Michael R. Brudzinski, Noorulann Ghouse, Katharine Solada, Stefany Sit, Enrique Cabral-Cano, Alejandra Arciniega-Ceballos, Nicholas Kelly, and Kevin Jensen. 2016. "New Perspective on the Transition from Flat to Steeper Subduction in Oaxaca, Mexico, Based on Seismicity, Nonvolcanic Tremor, and Slow Slip." *Journal of Geophysical Research: Solid Earth* 121 (3): 1835–48. <https://doi.org/10.1002/2015JB012709>.

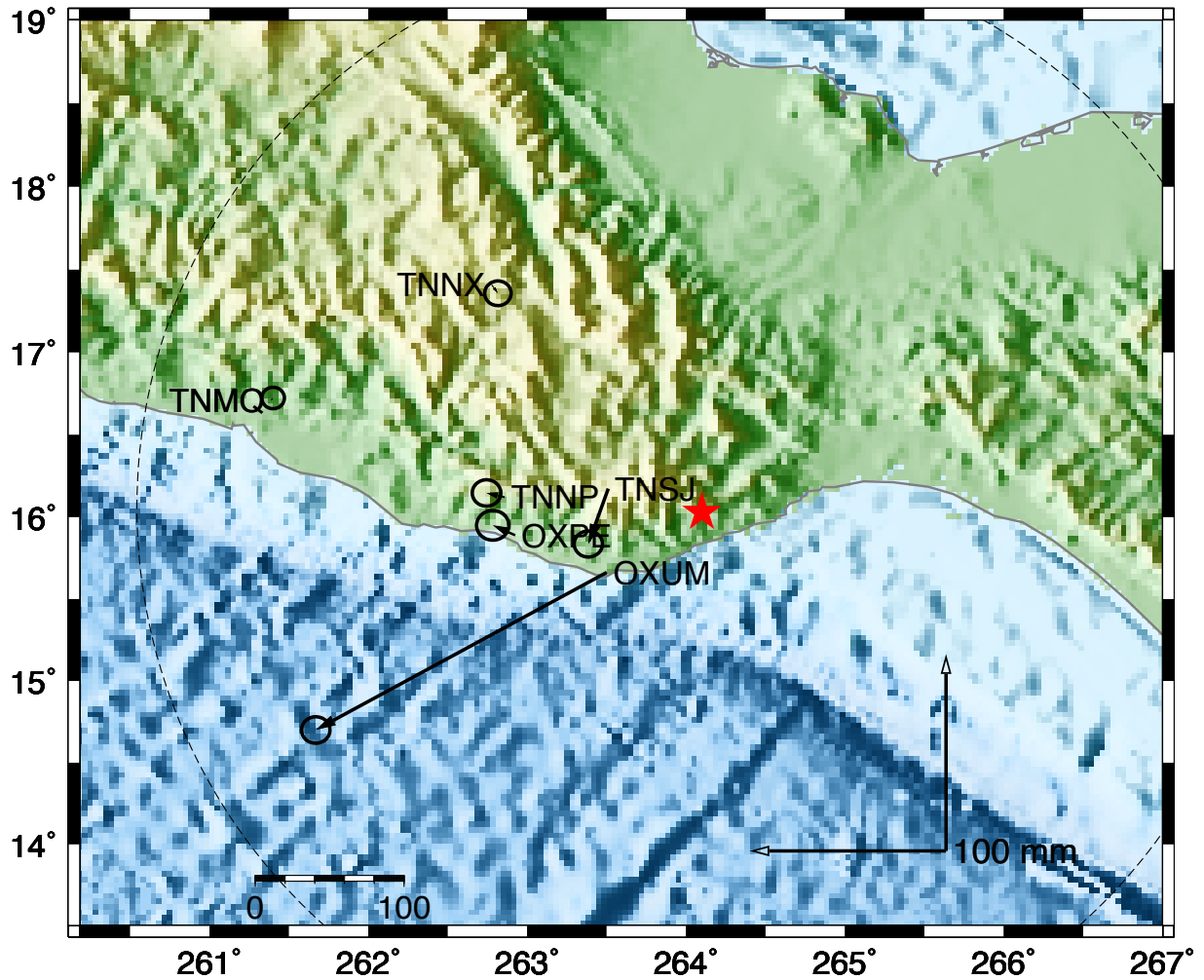
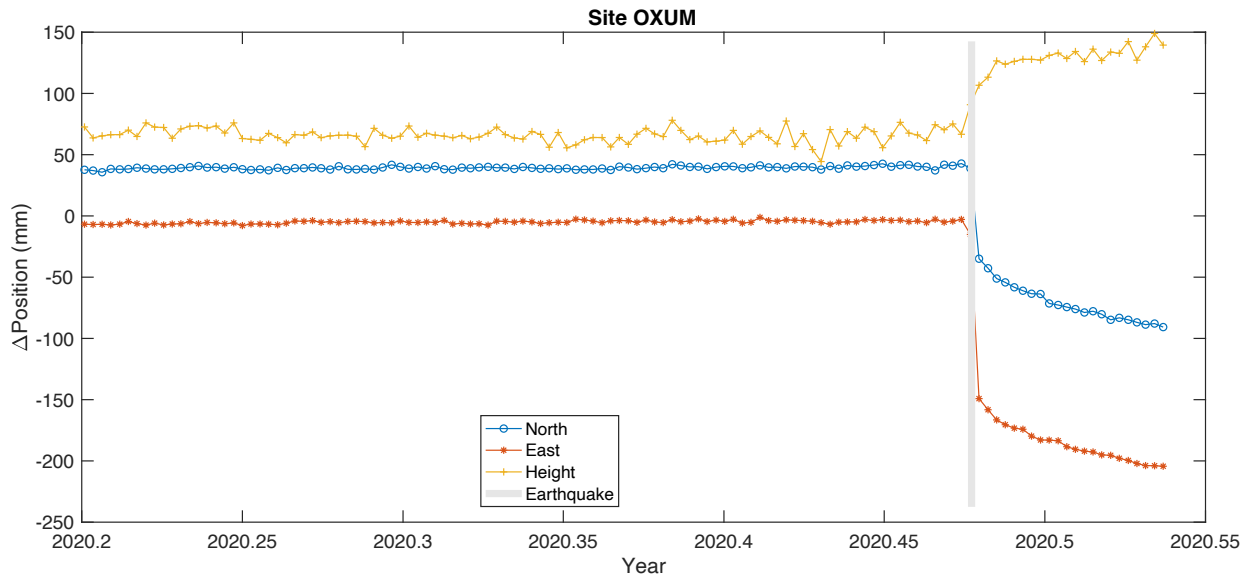
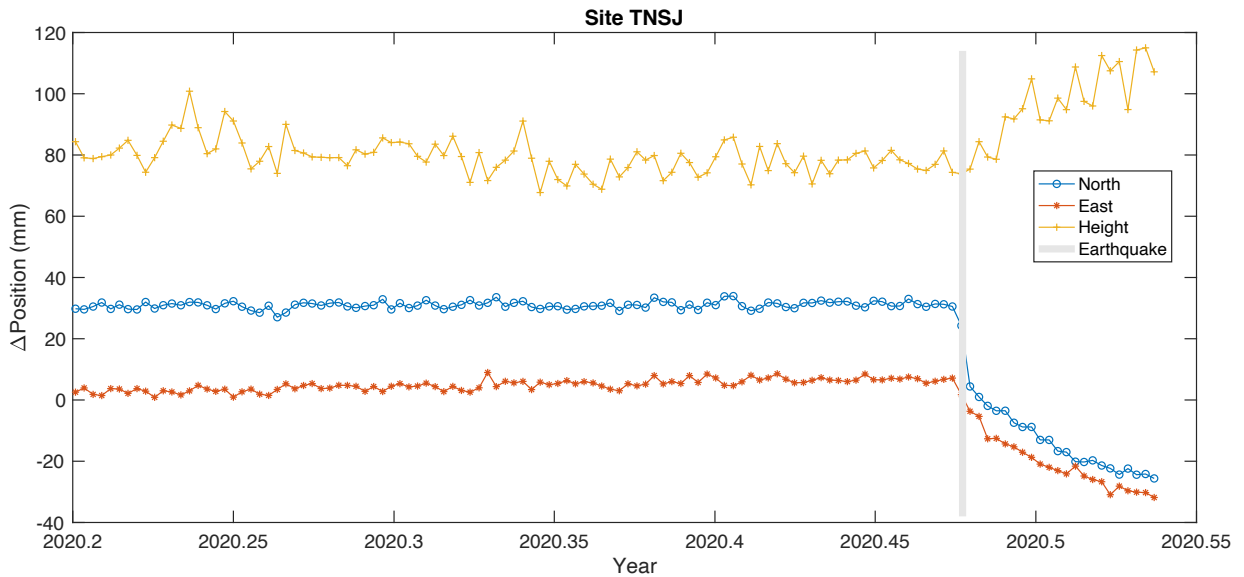


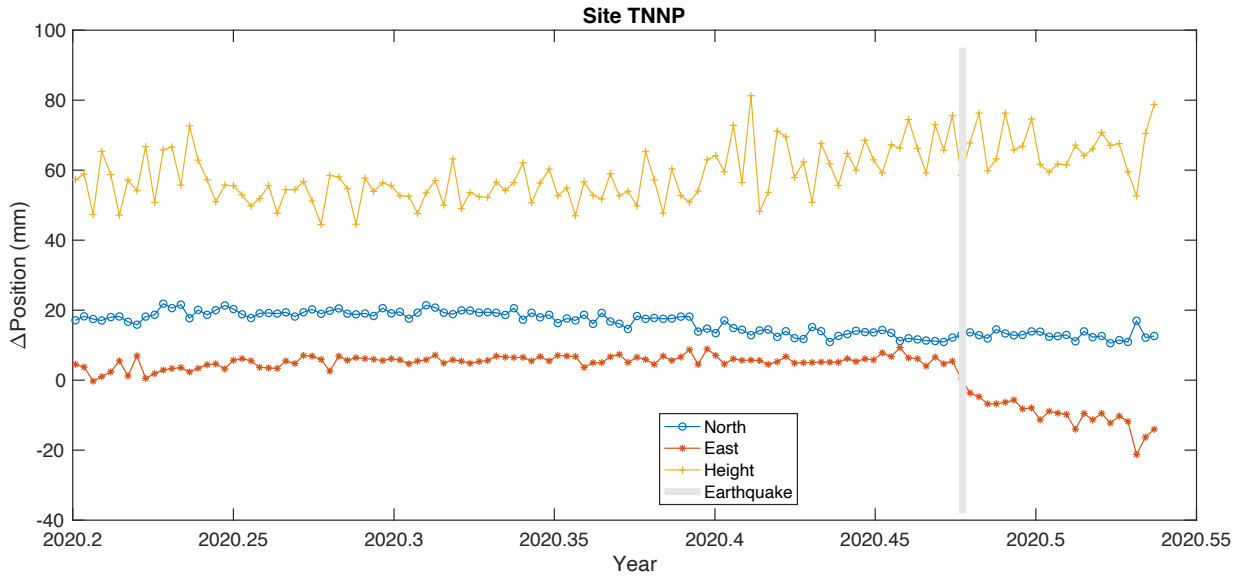
Figure 1: Coseismic offsets estimated from the differences in positions two days before and two days after the 23 June 2020 M7.4 Santa María Xadani, Mexico, earthquake. The red star shows the epicenter of the earthquake.



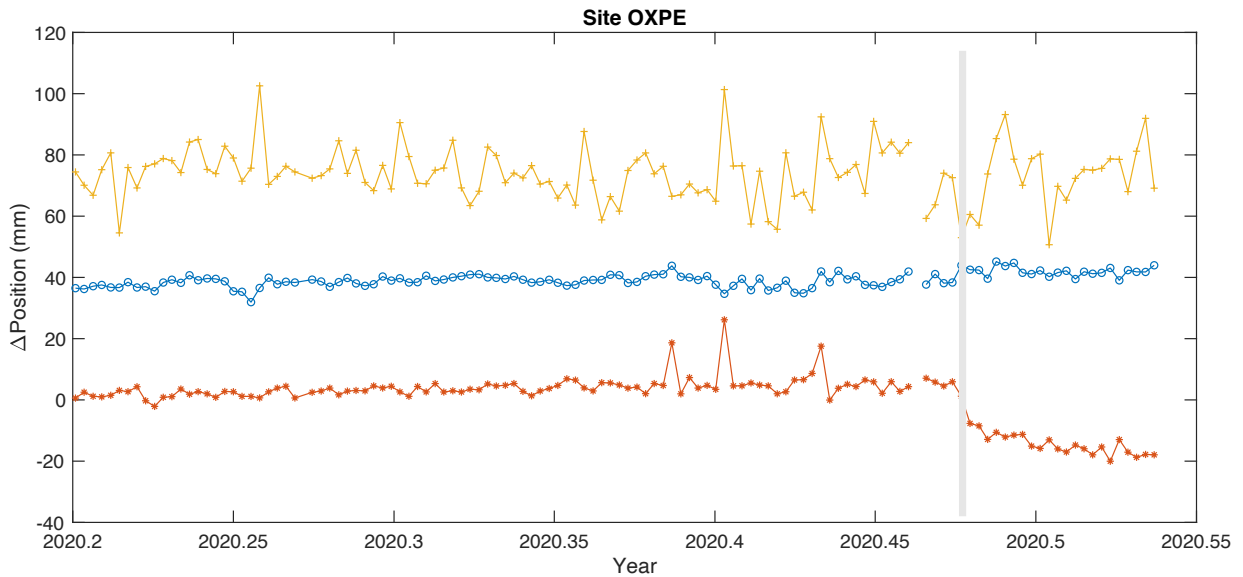
**Figure 2:** OXUM time series from the NOTA CWU final and rapid GPS processing. The timeseries with means removed for the different components have been offset for clarity. The grey line shows the date of the June 23, 2020 earthquake. Each data point is a 24-hour average position. The daily position estimates have standard deviations in the North and East components of  $\sim 3$  mm and in the height of  $\sim 13$  mm. The time series are in a North America fixed reference frame.



**Figure 3:** TNSJ time series from the NOTA CWU final and rapid GPS processing. See Figure 2 for details.



**Figure 4:** TNNP time series from the NOTA CWU final and rapid GPS processing. See Figure 2 for details.



**Figure 5:** OXPE time series from the NOTA CWU final and rapid GPS processing. See Figure 2 for details. One outlier 5 days before the earthquake (gap in the time series) has been removed from the raw data.