**Supplement material for "Geodetic location of the 2006 slow slip event in the Guerrero subduction zone (Mexico), by joint inversion of InSAR and GPS data" by *Cavalié et al.***

TABLE S1 – Acquisition dates and orbits of the of images used for generating the 8 interferogram stack. The Envisat images have been acquired along the track 255 in mode i2 at around 16h36 UTC.

| Date | Orbit |
|---|---|
| 26-11-2004 | 14337 |
| 31-12-2004 | 14838 |
| 04-02-2005 | 15339 |
| 11-03-2005 | 15840 |
| 20-05-2005 | 16842 |
| 29-07-2005 | 17844 |
| 07-10-2005 | 18846 |
| 16-12-2005 | 19848 |
| 24-02-2006 | 20850 |
| 05-01-2007 | 25359 |
| 09-02-2007 | 25860 |
| 16-03-2007 | 26361 |

TABLE S2 – Velocity model used for the Green's function calculation, where H is the upper boundary depth of the layer, $V_P$ and $V_S$ are the velocities of the P- and S-waves, respectively, and $\rho$ is the density.

| H, m | $V_P$, m.s$^{-1}$ | $V_S$, m.s$^{-1}$ | $\rho$, kg.m$^{-3}$ |
|---|---|---|---|
| 0 | 4500 | 2600 | 2700 |
| 1000 | 5300 | 3060 | 2700 |
| 5000 | 6200 | 3580 | 2700 |
| 15000 | 6850 | 3950 | 2900 |
| 30000 | 8150 | 4710 | 3200 |

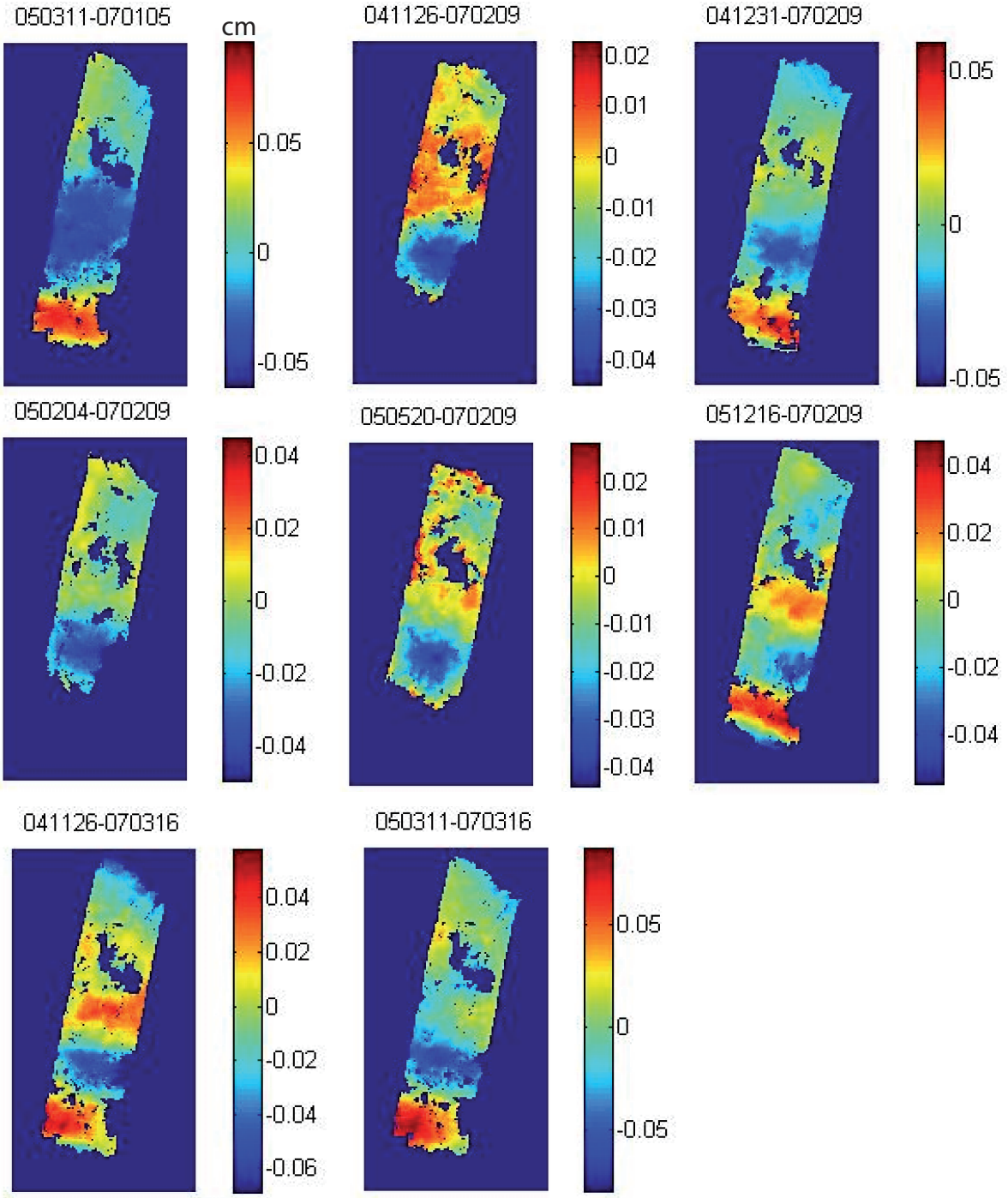


FIGURE S1 – Panel of the eight unwrapped interferograms (in cm) used for stacking (the dates of the images that form each interferogram are indicated as YYMMDD-YYMMDD). The interferograms are corrected for the interseismic and residual orbital signals.

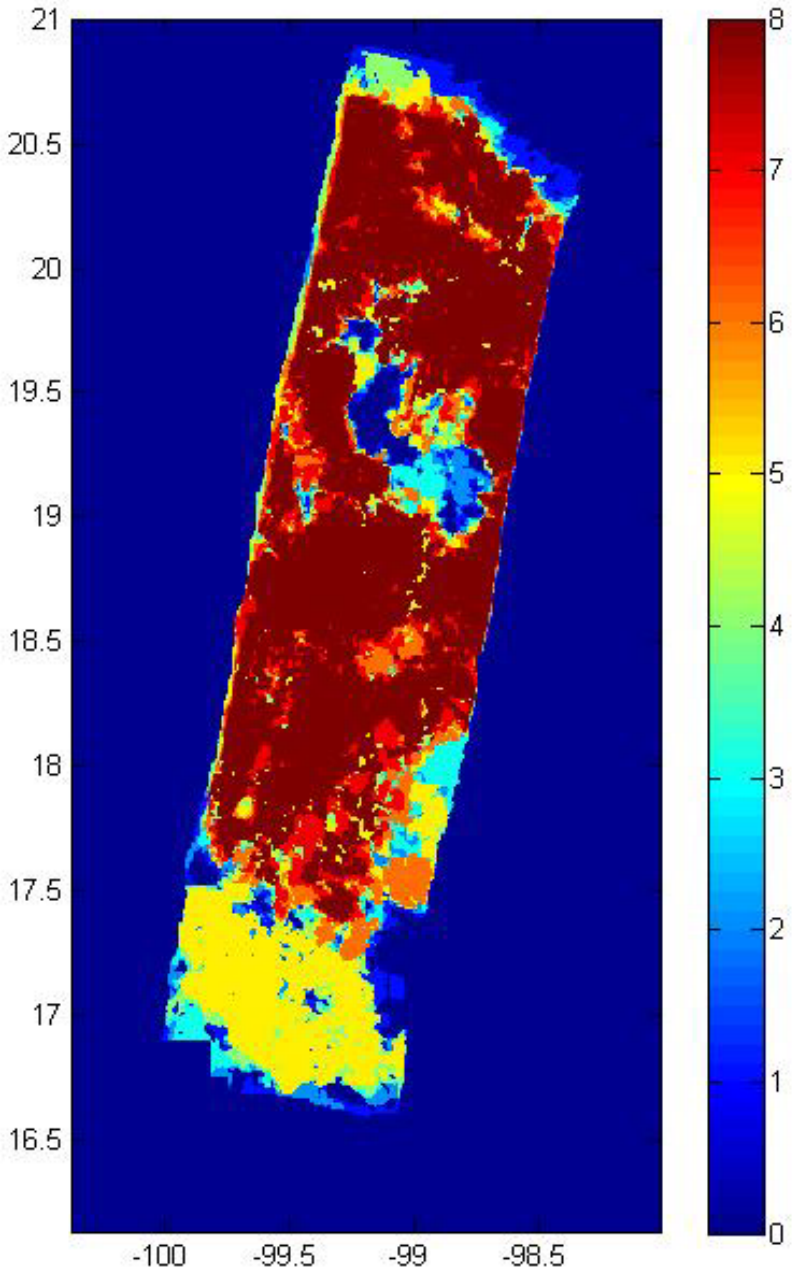


FIGURE S2 – Map showing the number of interferograms used in the stack. When averaging, only the pixels, with five or more interferograms, were taken into consideration. Heterogeneities come from unwrapping differences, due to variations of interferometric phase coherence between interferograms. Such variations are mainly functions of the spatial and temporal baseline of each interferogram (coherence decreases as temporal and spatial baseline increases). A local loss of phase coherence impedes phase unwrapping, so those pixels are not used for stacking.

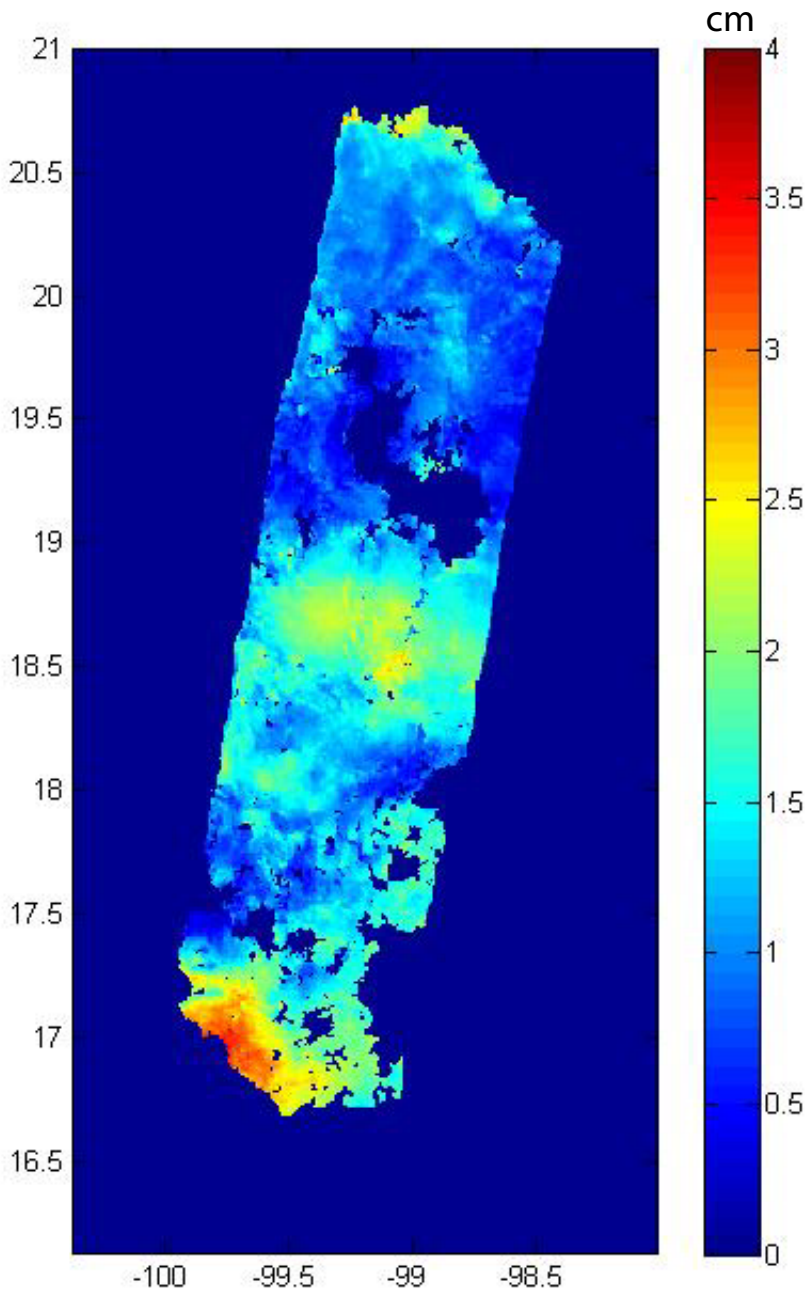


FIGURE S3 – Standard deviation map of the LOS surface displacement (in cm). Only pixels for which at least five interferograms exist are taken into consideration.

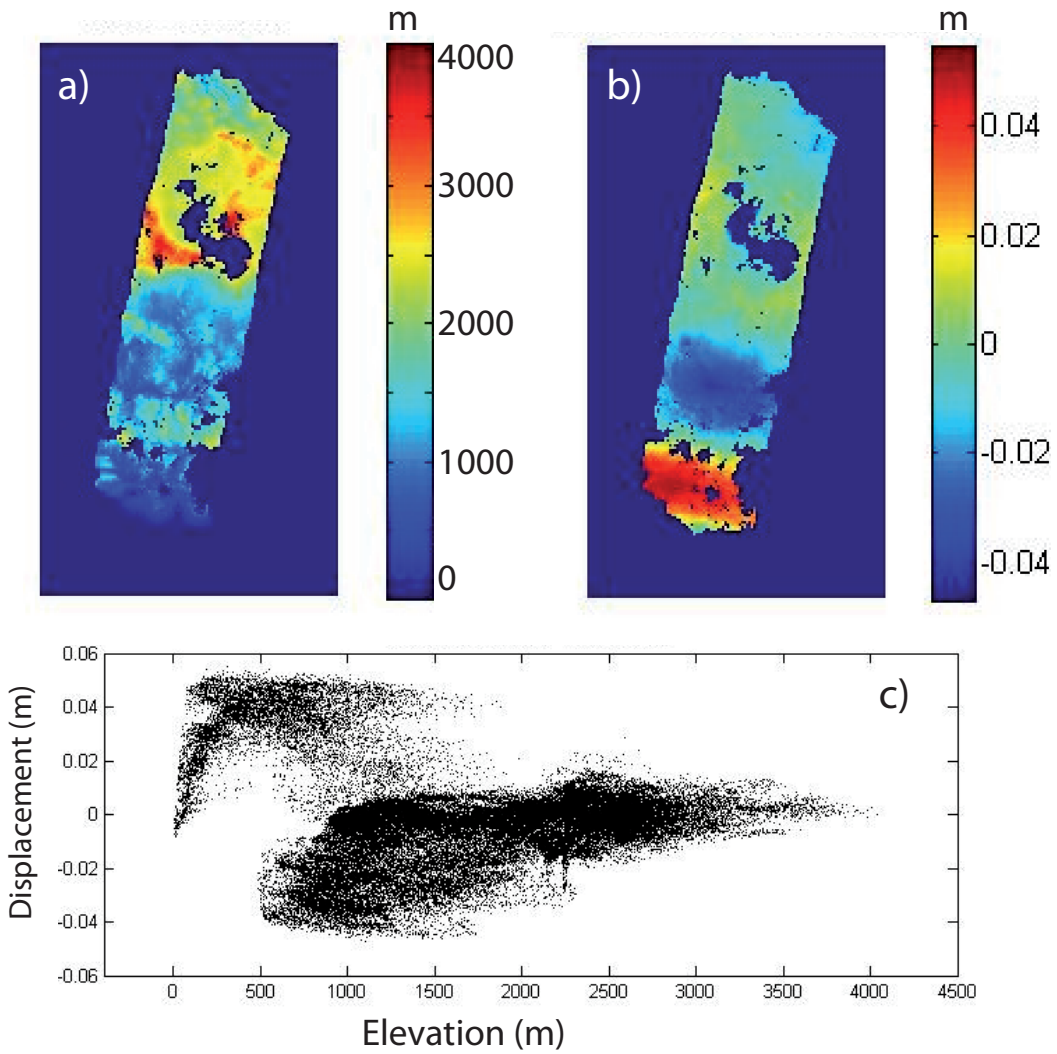


FIGURE S4 – Elevation versus LOS displacement of the 2006 SSE. a) Elevation from SRTM DEM (in m). Pixels that do not appear in the stack are masked out. b) Map of the LOS displacement (in m) as shown in Figure 3. c) LOS displacement as a function of the elevation.

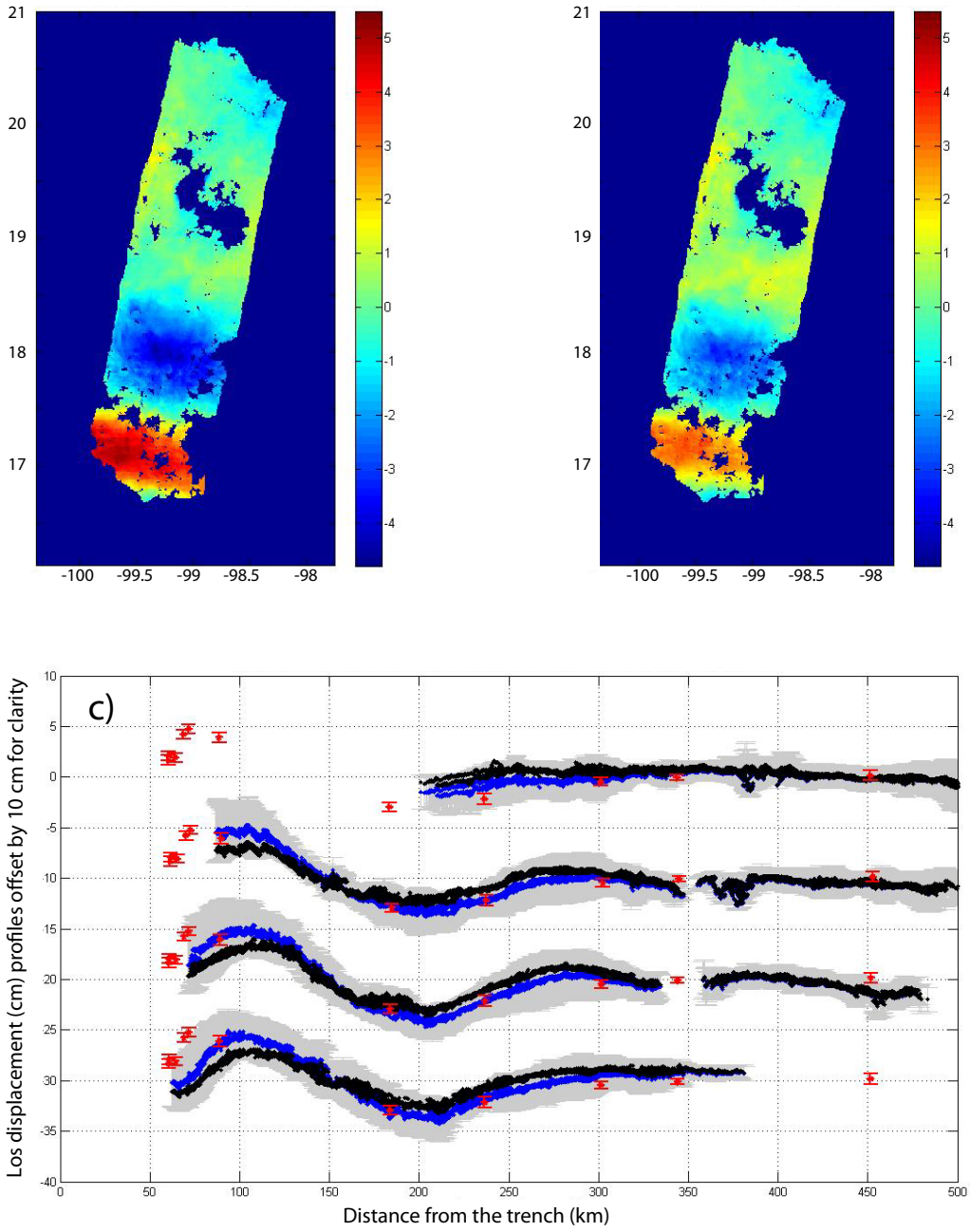


FIGURE S5 – a) Stack of corrected interferograms (in cm) as shown in Figure 3. b) Stack of the same interferograms but without the inter-SSE signal correction. c) Comparison between the stack shown in a) (blue dots) and b) (black dots) along the 4 profiles displayed in Figure 3. Red dots represent the GPS measurement of the SSE displacement projected in LOS.

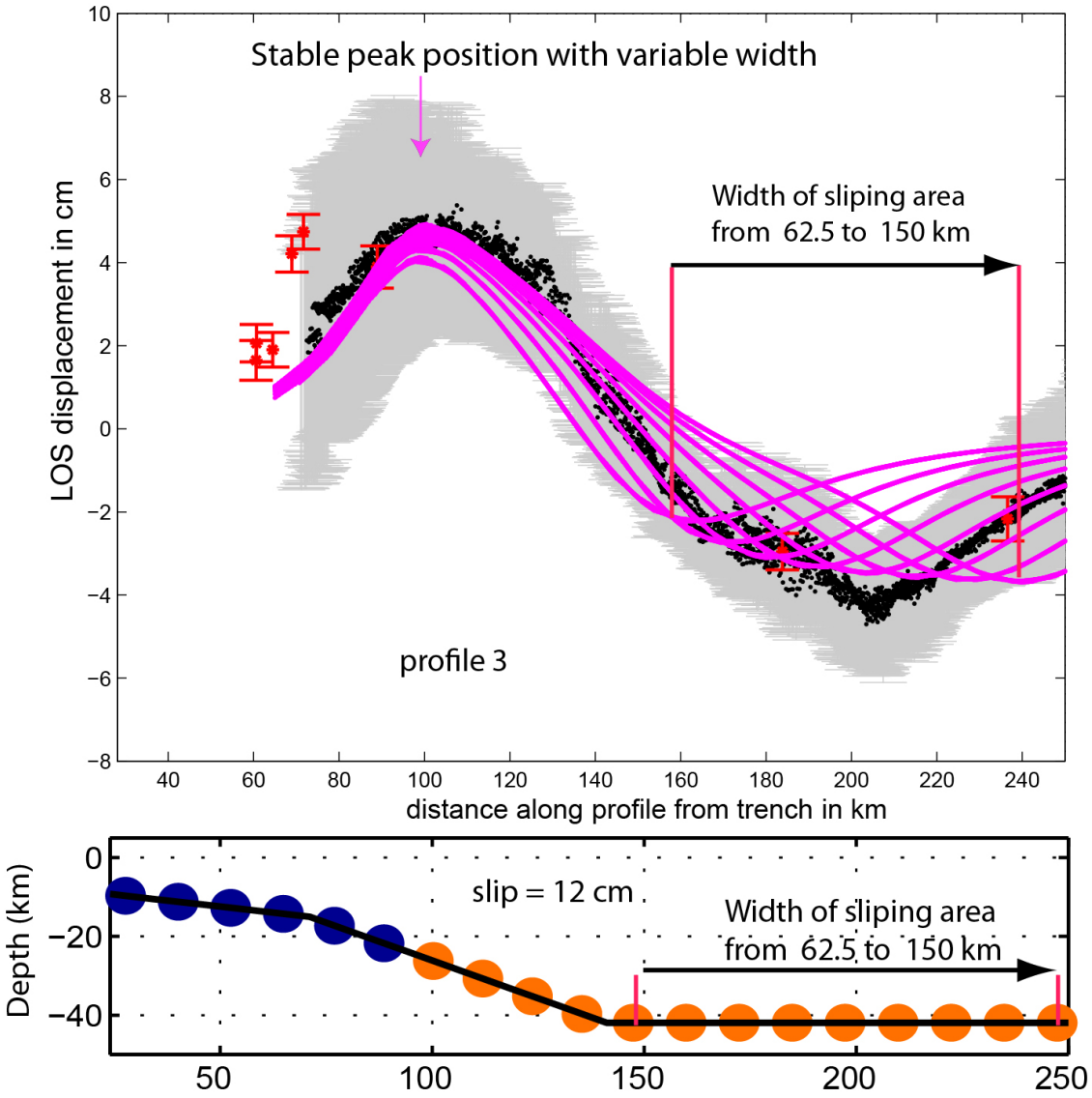


FIGURE S6 – Effect of variation of the width of the slipping area for a fixed depth of the updip slip limit (24 km) and a fixed amount of slip (12 cm). **Top :** Magenta lines represent the surface LOS displacement predicted by different models with a width varying from 62.5 km to 150 km in steps of 12.5 km. Black dots are the surface LOS displacements measured by InSAR with its standard deviation (grey envelope). Note that the position of the peak of LOS displacements with respect to the trench remains stable. **Bottom :** Profile of the slip distribution used in the models.

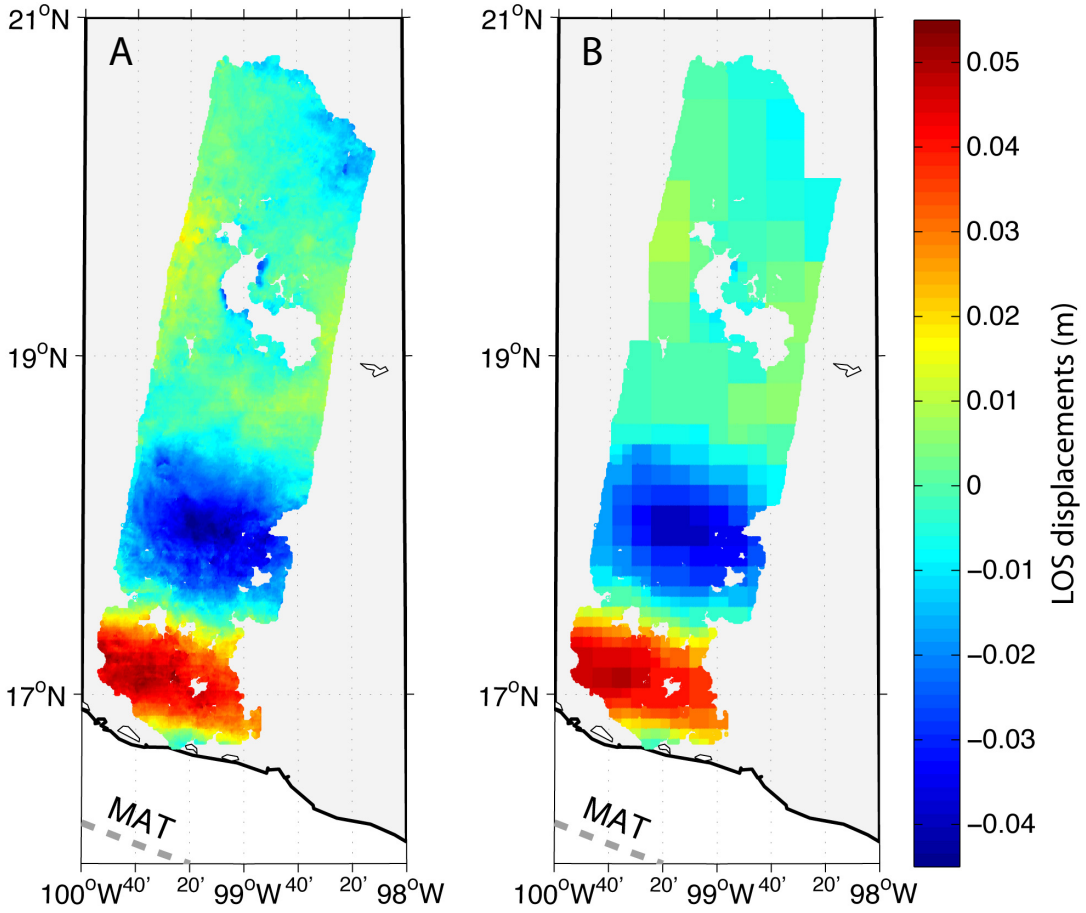


FIGURE S7 – A) LOS displacement map as shown in figure 3. B) Downsampled LOS displacement map using a quadtree algorithm.

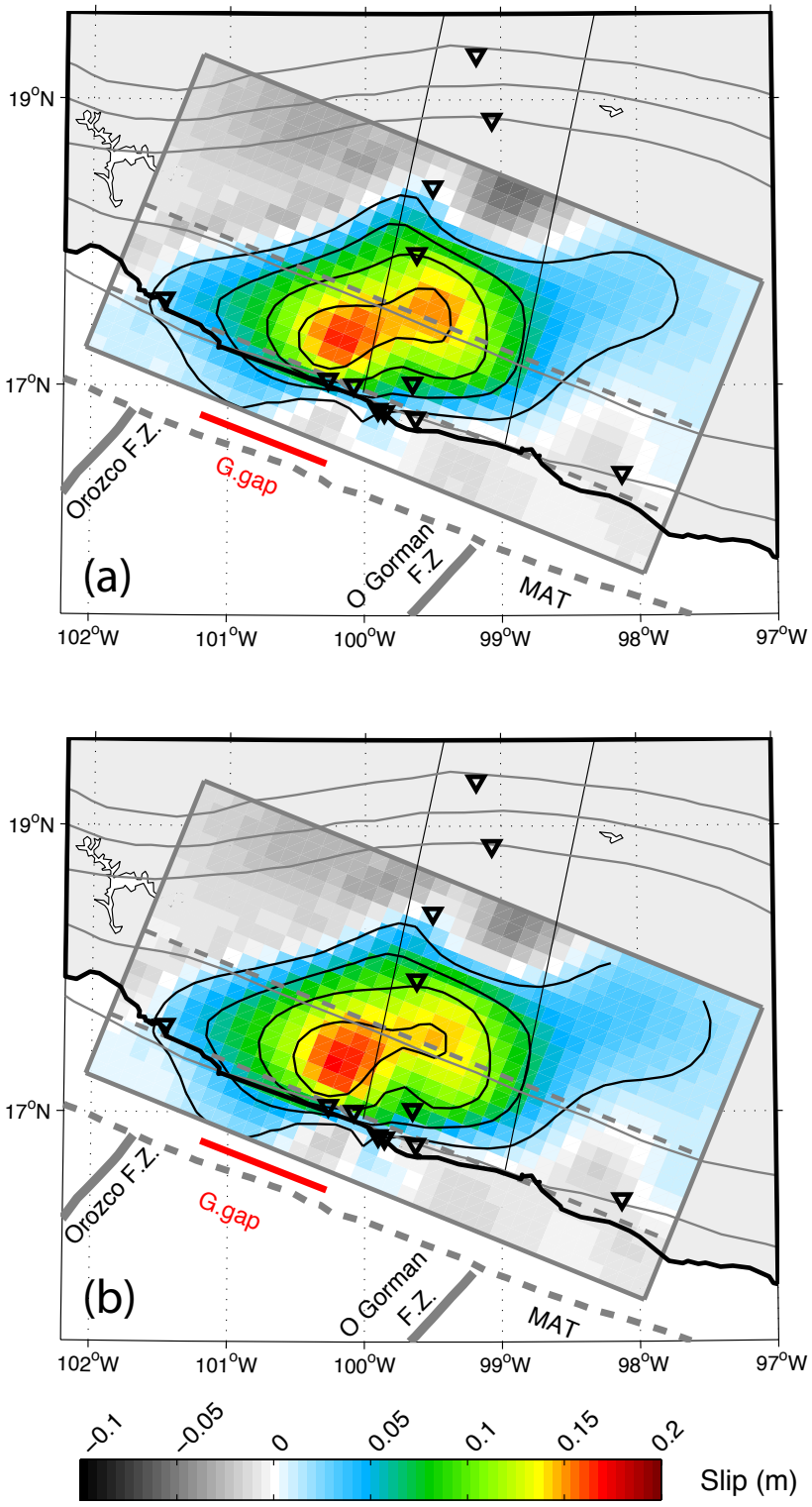


FIGURE S8 – Slip distribution on the subduction plane for (a) $w = 5$ or for (b) $w = 2$. GPS stations are represented by open black triangles and InSAR track by black box. Dashed thin gray lines indicates the changes in the dip of the model subduction plane (at 15 and 42 km). Dashed thick gray line represents the Middle American Trench (MAT)and thick continuous gray lines correspond to fracture zones. The location of the Guerrero gap (G.Gap) is shown in red.

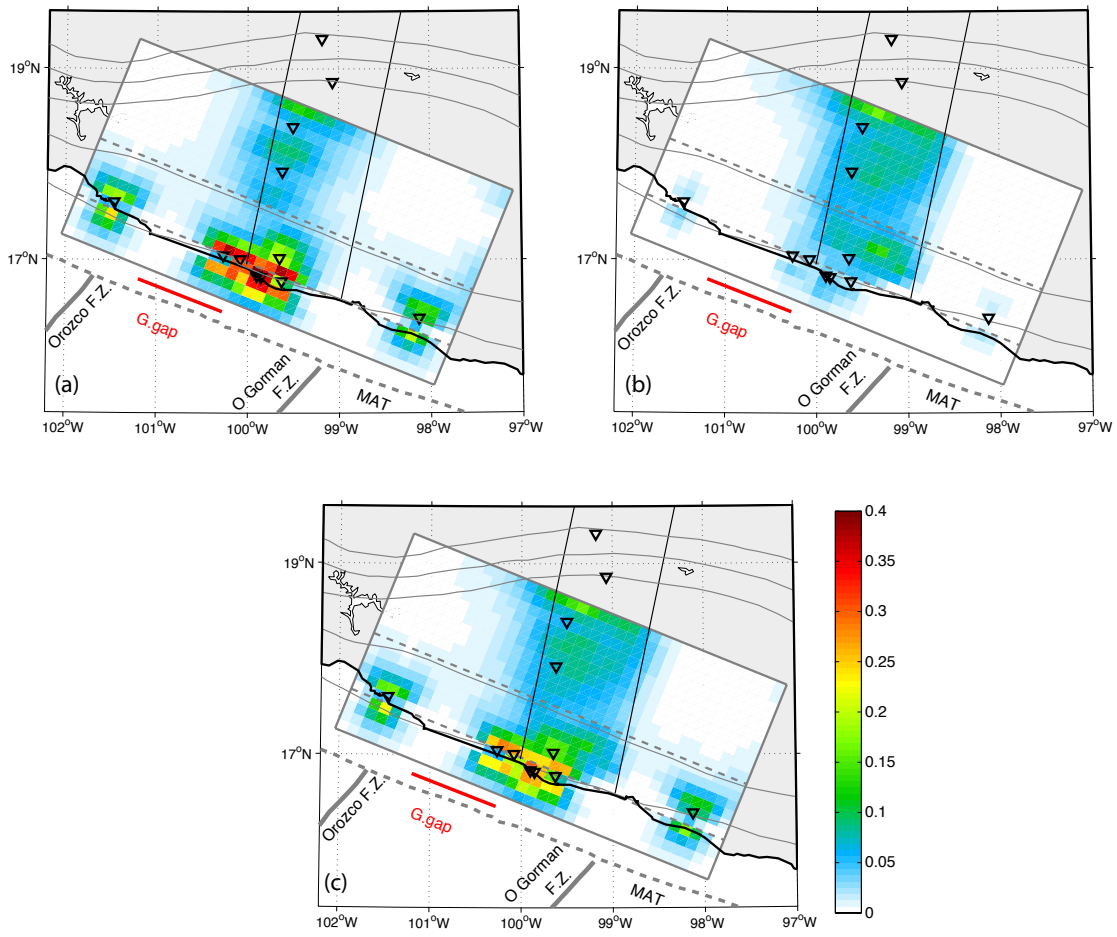


FIGURE S9 – Resolution of the inversion with (a) $w = 0.001$ (GPS), or with (b) $w = 1000$ (InSAR), or (c) $w = 3$ (GPS and InSAR). The map represents the diagonal elements of the resolution matrix, which indicates whether the slip on a subfault is well retrieved by the inversion on that subfault. Values are notably smaller than 1 (slip completly retrieved by the inversion), because the smoothing in the inversion will spread the slip over the adjacent subfaults of the modelled subduction plane. The comparison of the inversion maps for different weighting shows the areas of the subduction interface that are best resolved in each case.