

Supplementary material

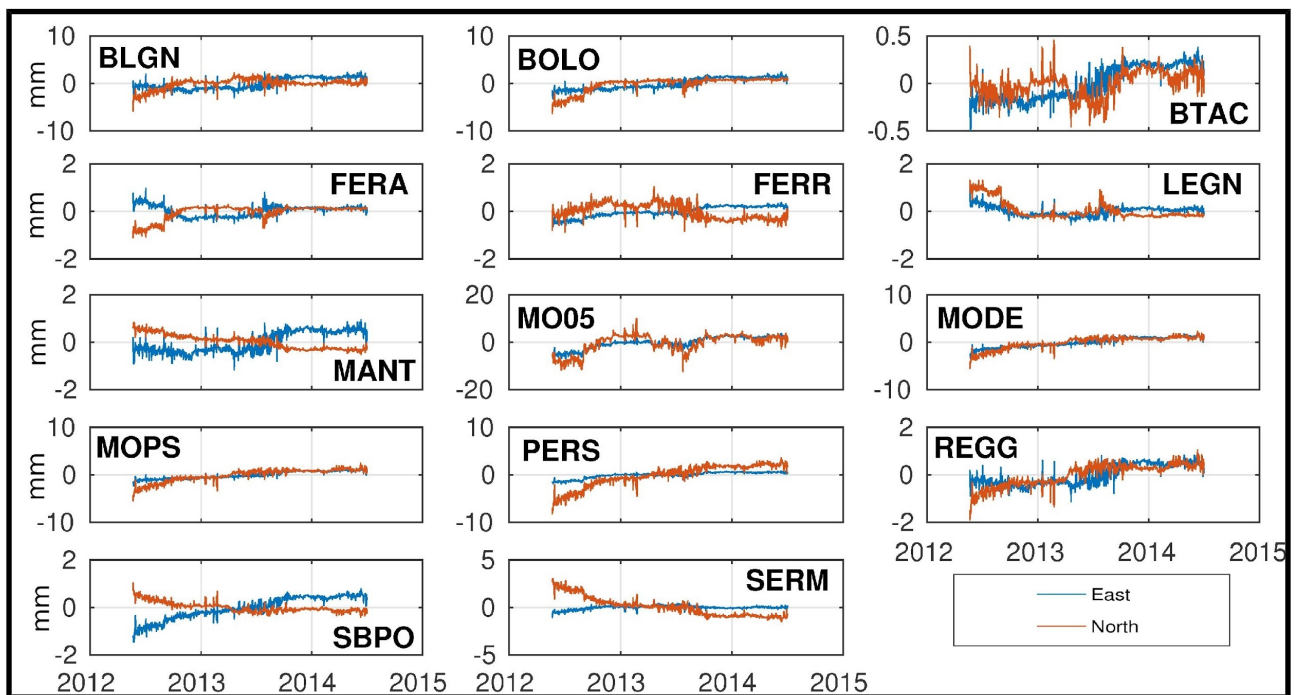


Figure s1. Post seismic GPS series (horizontal position).

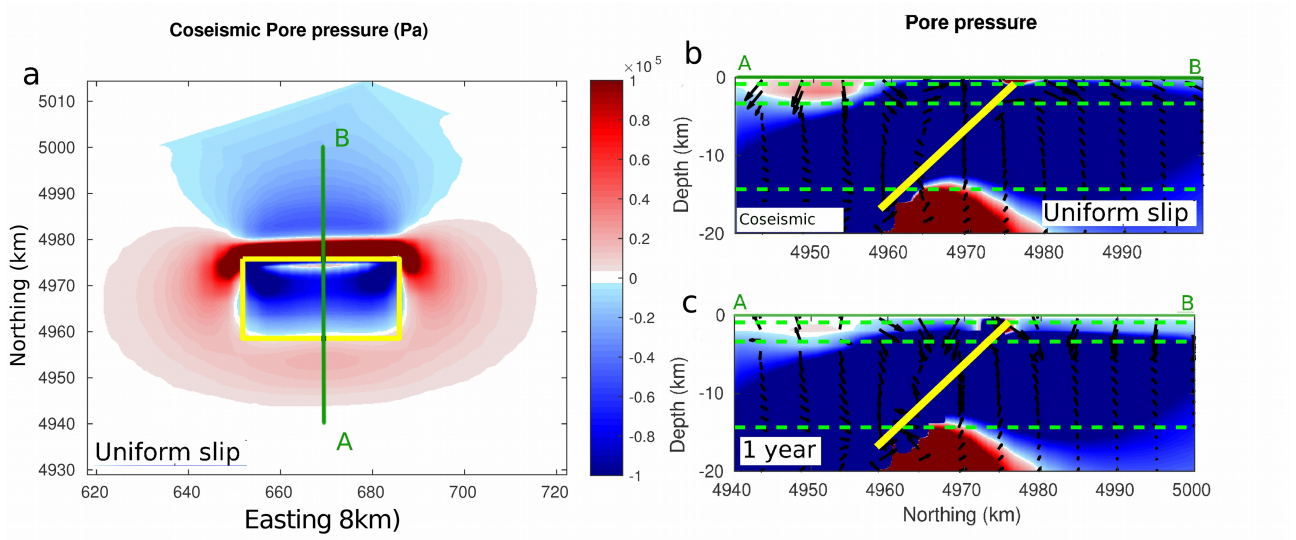


Figure s2. Pore pressure changes induced by a thrust fault (yellow line, strike=90°, dip=50° and rake=90°) which undergoes a uniform slip of 1 m at $t=0$. The poroelastic properties of the medium are the same as in Table 1. At $t=0$, panel (a) shows pore pressure changes at the surface and (b) along the vertical cross section A-B shown in (a). At $t=1$ year panel (c) shows pore pressure changes along the vertical section A-B. Black arrows represent fluid flow directions.

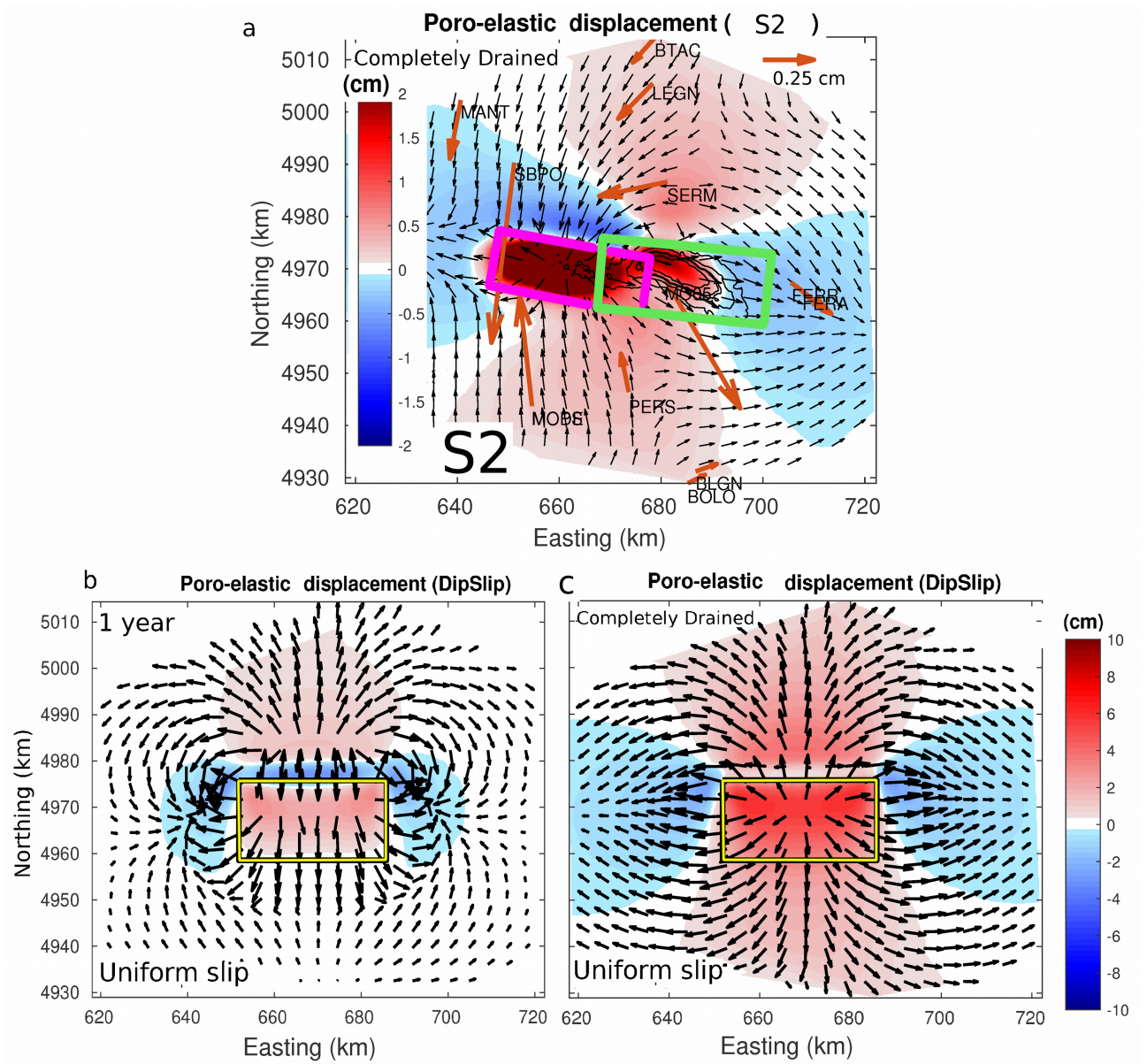


Figure s3. a) For scenario S2, poro-elastic induced displacement at the surface for the completely drained layered half-space described in Table 1. Black and orange arrows represent horizontal poro-elastic displacement in logarithmic and linear scale, respectively. Vertical displacement is represented in color scale. Green and purple rectangles represent the Ferrara and the Mirandola faults, respectively. Following 1 m uniform slip at $t=0$ on a thrust fault (yellow line, strike= 90° , dip= 50° , rake= 90°), poro-elastic induced displacement at the surface after 1 year (b) and for the completely drained layered half-space (c).

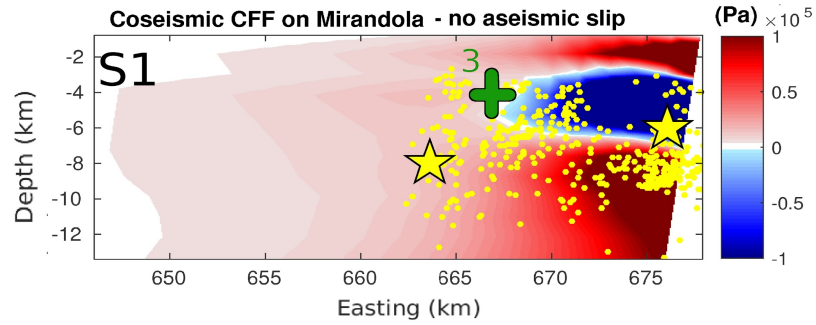


Figure s4. Coseismic CFF variation on the Mirandola fault plane under scenario S1. Green cross: Point 3, selected near the tail shaped slip distribution. Yellow dots represent the seismicity before May 29. Yellow stars represents the location of the two mainshocks.

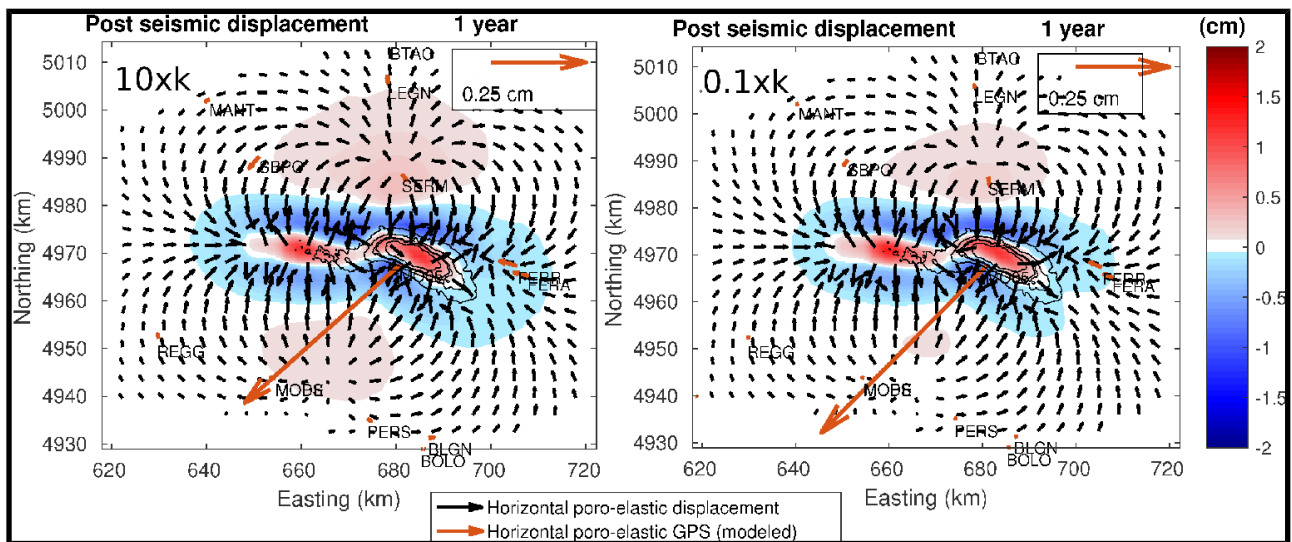


Figure s5. Post seismic poro-elastic displacement obtained using a permeability profiles one order of magnitude greater (left) and one order of magnitude lower (right) than the one used in S2. Vertical displacement is represented in color scale.

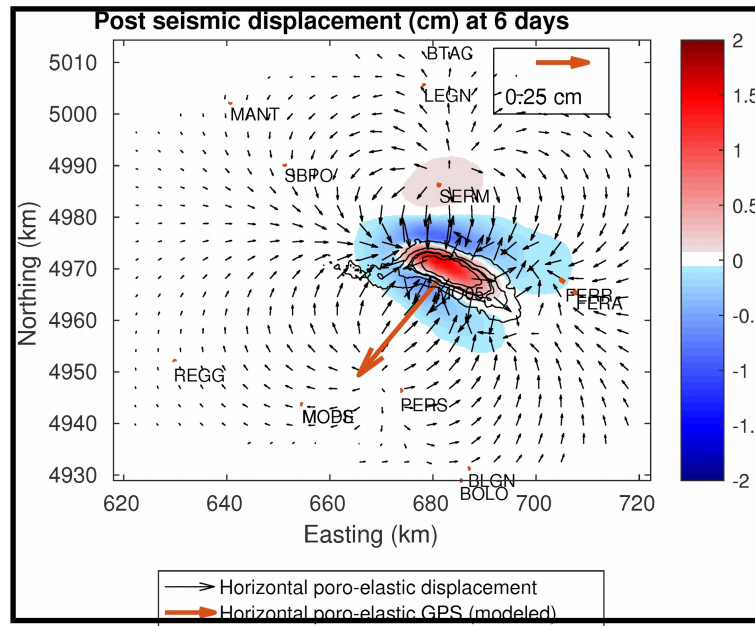


Figure s6. Post seismic poro-elastic displacement obtained with S1 at 6 days, *i.e.* not accounting for the May 20 aseismic slip on the Mirandola fault. Vertical displacement is represented in color scale.

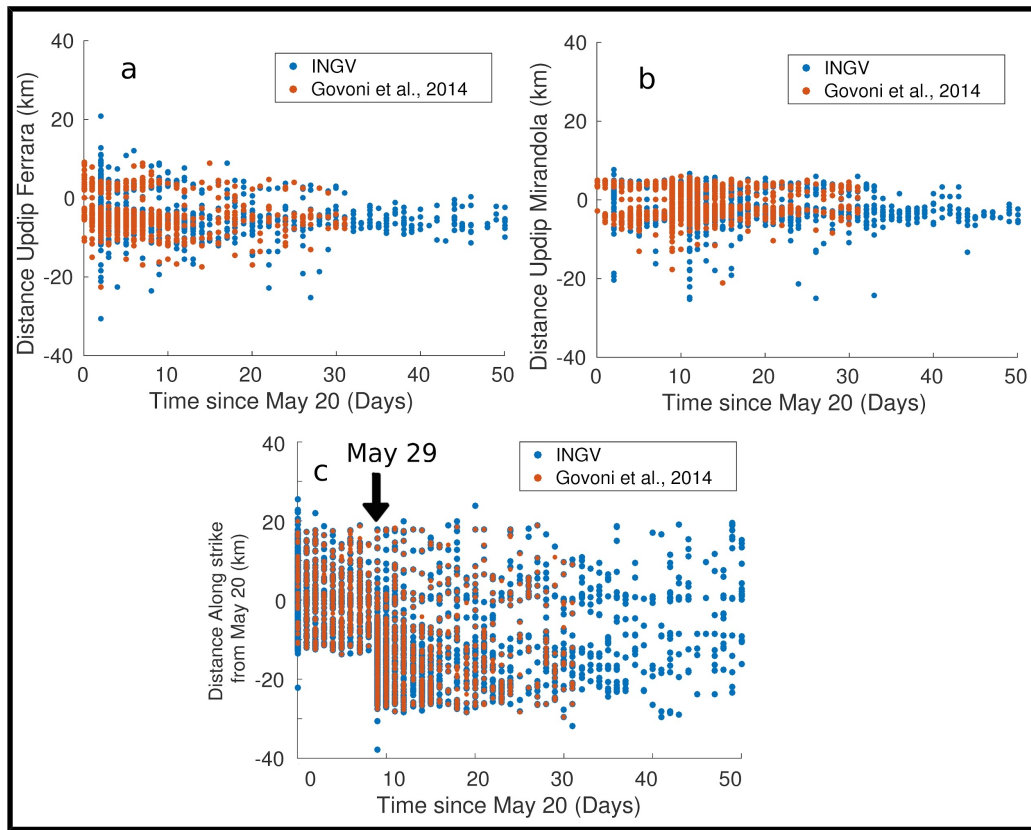


Figure s7. Temporal distribution of seismicity distance from the May 20 hypocenter along the dip direction of the Ferrara (a) and Mirandola (b) faults. (c) Temporal distribution of seismicity distance from the May 20 hypocenter along the strike direction of the Ferrara fault. Orange dots represent the seismicity of Govoni et al., 2014 (that lasts 30 days), while blue dots represent the seismicity catalog of INGV up to 50 days (<http://cnt.rm.ingv.it/>).