

## ***Interactive comment on “Brief Communication Co-seismic displacement on October 26 and 30, 2016 ( $M_w$ 5.9 and 6.5) – earthquakes in central Italy from the analysis of discrete GNSS network” by Giorgio De Guidi et al.***

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The authors present the results of two GNSS campaigns in central Italy, close to the epicentre area of the 2016 seismic sequence. The work is not clearly documented so I recommend major revision. Please see my comments below.

General comments:

a) The authors need to provide more details on GNSS data processing. They report that they used a commercial software but this is not enough. In addition, the results are not clearly presented. So I suggest to redo Table 1 with re-

sults: N-S displacement, E-W displacement, Up displacement, N-S uncertainty, E-W uncertainty Up uncertainty. Also, please report the sampling interval of the geodetic observations and the cut-off angle of observations. See articles such as <http://www.annalsofgeophysics.eu/index.php/annals/article/view/6418/6508> for data processing of local GNSS networks.

b) the authors neglect recent Italian literature on the 2016 seismic sequence <http://www.annalsofgeophysics.eu/index.php/annals/issue/view/515>

c) The comparison with SAR interferometry results shows notable differences in the horizontal component (compare red colour extent in fig. 4A with vectors of stations VTW3 etc.). What is the exact day/hour of the pair of Sentinel images, is it after the Oct. 26, 2016 event or before? So the dInSAR image shows the deformation of 1 or 2 events?

d) The authors report cumulative GNSS results from 2 earthquakes, October 26 and October 30, 2016. This needs to be very clear and should be included in abstract, conclusions.

e) the addition of horizontal and vertical displacements along the fault is wrong as the GNSS measurements are point measurements and are valid for the particular site only.

f) The discussion in Fig. 5 is vague. The authors should expand more on what they believe is worthy for more investigation. Also report more on the data presented in the east-west transect.

g) The manuscript figures need re-organisation so the material is clearly presented.

Fig.1: increase size of map (1A). remove empty (white space) in fig. 1B. It is uncertain to put the hypocentre of the M6.5 event on this cross-section given a) the depth - location uncertainty and b) the lack of association with surface faulting in this section. So make 1A larger and put 1b below. Also. in 1B show seismic faults with red lines. In fig. 1A show the GNSS points which you refer in this paper. In addition, the concentric

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circles indicate seismic wave propagation? I suggest that this also be left out as this is not the focus of this paper.

Fig. 2: insert a box in 2A showing the extent of 2C.

Fig. 3: indicate which GNSS station (e.g. VTE1? VTE2? etc.) is shown in the field photographs. I suggest to insert a new figure expanding the material of Fig.3 (lower right) showing better station baselines, faults, epicentres of October 26 and October 30, 2016 earthquakes and co-seismic ruptures. This will be a key figure to help readers to understand the relation between GNSS station location, earthquake effects etc.

Fig.4; there are five grey stars in this figure. Please leave only the 3 mainshocks and represent them with red colour. Clarify that InSAR scale bar is in cm.

Specific comments: line 3: replace discrete with campaign line 17: please indicate which agency provided moment magnitude estimation line 19: please indicate which agency provided moment magnitude estimation line 34: replace doy with DOY line 136: replace registrations with recordings

Athens, 7 May 2017 Athanassios Ganas

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