Nat. Hazards Earth Syst. Sci. Discuss., 1, C9–C12, 2013
www.nat-hazards-earth-syst-sci-discuss.net/1/C9/2013/

Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Automated classification of Persistent Scatterers Interferometry time-series" *by* M. Berti et al.

F. Cigna

fcigna@bgs.ac.uk

Received and published: 23 February 2013

I am writing to comment the manuscript "Automated classification of Persistent Scatterers Interferometry time-series" (nhessd-1-207-2013) published in NHESS Discussion by Berti et al.

My main comment concerns the evident unawareness of the authors of the paper "Semi-automated extraction of Deviation Indexes (DI) from satellite Persistent Scatterers time series: tests on sedimentary volcanism and tectonically-induced motions" (doi:10.5194/npg-19-643-2012) published in 2012 in Nonlinear Processes in Geophysics by Cigna et al.

In particular, as Berti et al. state clearly in their manuscript (pg.209-210), in our for-

mer paper (Cigna et al. 2011) we manually classified the time series of several radar targets to identify trend changes caused by a event of known date of occurrence, and demonstrated that even the analysis of a few relevant time series may provide useful information on ground motion patterns and evolution (cf. also Chen et al. 2011; Tapete et al., 2012).

However, Berti et al. do not mention the paper which followed last year, and presents the development of the first semi-automated method to detect trend deviations within PS time series. In the new paper (Cigna et al. 2012), we developed two indexes (namely the DI, Deviation Indexes) which are capable to reproduce the visual process of identification of trend variations that is usually performed manually by the radar-interpreter, and to identify the deviation of a target within its motion history from a deformation model defined a priori. The level and quality of information brought by these DI add onto those of other PS parameters, such as yearly motion velocity, standard deviation and coherence. The latter is extensively analyzed and discussed in Cigna et al. (2012) via the tests and respective results for two events of known date of occurrence investigated with RADARSAT-1 PS data, i.e. (i) the same test area of Cigna et al. (2011) to validate the manual classification, and (ii) the eruption of a mud-volcano in southern Sicily.

Although our approach with the DI is based on simple mathematic concepts and formulas (which can be easily employed by a wide spectrum of radar-interpreters, also including non-expert users), it represents the first automated classification of PS temporal series and, as such, a landmark in this context and field.

Clearly, with the development of PS-Time, Berti et al. go a significant step further with respect to our indexes, but I believe that the concepts, evidences and results achieved in Cigna et al. (2012) by using the DI indexes need to be properly accounted for and cited within the new manuscript by Berti et al., and to be compared with the new PS-Time approach and results correctly. For instance, the typologies 0 to 5 of motion time series discussed by Berti et al. in section 2.1 (and shown in Fig.1) reproduce motion

behaviours which: (i) were already classified in Cigna et al. 2011 as “affected” (type 4-5) and “unaffected” (type 0-1) by an event of known date of occurrence (the authors only mention it in the figure caption); and (ii) were investigated and modelled via the indexes DI1 and DI2 in Cigna et al. 2012. There is no mention of this in section 2.1.

To a further note, at pg.209, lines 20-22: the authors incorrectly attribute the cause of the structural deformation discussed in our paper (Cigna et al. 2011) to a “slope instability” event, while it is clearly stated in our paper that the causative relationship of motions was attributed to tectonics. This undoubtedly has to be amended in the manuscript by Berti et al.

Pg.209, lines 22-24: although I agree with the authors that the visual analysis and supervised manual classification of time series is time-consuming over large areas and, possibly, influenced by subjectivity, I think that the term “tedious” improperly qualifies this process and the sentence at lines 22-24 has to be toned down. Indeed, not only such a manual classification is a prerequisite for the development, calibration and validation of any automated classification, but also is essential for any kind of local scale and object-oriented analysis. In other words, although there is no doubt that the automated procedures can definitely help the radar-interpretation of the data at the regional scale or over very large datasets, for applications and monitoring of structural instability and damages on single-buildings and confined areas the visual inspection cannot be eluded.

References

Chen F., Lin H., Zhang Y., Lu Z.: Ground subsidence geo-hazards induced by rapid urbanization: implications from InSAR observation and geological analysis, Nat. Hazards Earth Syst. Sci., 12, 935-942, doi:10.5194/nhess-12-935-2012, 2012

Cigna F., Tapete D., Casagli N.: Semi-automated extraction of Deviation Indexes (DI) from satellite Persistent Scatterers time series: tests on sedimentary volcanism and tectonically-induced motions, Nonlin. Processes Geophys., 19, 643-655,

doi:10.5194/npg-19-643-2012, 2012

Tapete D., Fanti R., Cecchi R., Petrangeli P., Casagli N.: Satellite radar interferometry for monitoring and early-stage warning of structural instability in archaeological sites. Journal of Geophysics and Engineering, 9, S10-S25, doi:10.1088/1742-2132/9/4/S10, 2012

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 207, 2013.