



The help of Advanced Satellite Interferometry in assessing the effect of human-induced surface deformation in naturally subsiding areas. Methodological approach and applications

Andrea Tamburini (1), Chiara Giannico (1), Sara Del Conte (1), and Pietro Teatini (2)

(1) Tele-Rilevamento Europa - T.R.E. Srl, Milano, Italy, (2) Mathematical Methods and Models for Engineering - M3E Srl, Padova, Italy

Underground water extraction, natural gas storage either in depleted hydrocarbon reservoirs or in aquifers, and excavations for civil works (e.g. underground passageways, car parks, etc.) in flat areas are responsible for surface deformation that can damage pre-existing structures and modify drainage pathways.

Deformation patterns associated to different underground show in many cases typical patterns. Their recognition can help in disentangling different processes when occurring in areas already affected by natural subsidence, such as coastal areas and inner sedimentary plains. Moreover, assessing the extent of human-induced deformation can help in identifying causes, modelling phenomena, predicting their evolution and adopting proper remedial measures.

Advanced Satellite Interferometry provides a synoptic view of surface displacements over large areas and long time-spans and has become a standard in several Italian regions where underground fluid injection and withdrawal is going on. The integration of interferometric measurements with ground (leveling, GPS) and underground (bore-hole extensometers, piezometers, micro-seismic) monitoring networks can provide an exhaustive framework of the effect induced at surface level by underground human activities at local and regional scale. Documented case studies demonstrating the effectiveness of the above approach will be presented.