



## **Gravity and Height Variations at Medicina, Italy**

Sara Bruni (1), Susanna Zerbini (1), Maddalena Errico (1), Efsio Santi (1), and Hartmut Wziontek (2)

(1) Department of Physics and Astronomy (DIFA), University of Bologna, Italy (sara.bruni4@unibo.it), (2) Federal Agency for Cartography and Geodesy (BKG), Leipzig, Germany

Since 1996, at the Medicina station, height and gravity variations are monitored continuously by means of GPS, VLBI and superconducting gravimeter (SG) data. Additionally, absolute gravity observations are performed twice a year and environmental parameters, among others water table levels, are regularly acquired. Levelling between the different monuments at the site area is also carried out repeatedly to constrain local ties in the vertical position. Two GPS systems are located very close to each other, and both are in close proximity to the VLBI antenna. Twenty years of data are now available, which allow investigating both long- and short-period height and gravity signals together with their relevant correlations. Natural land subsidence, which is well known to occur in the area, is a major component of the observed long-term behavior; however, non-linear long-period signatures are also present in the time series. On a shorter time scale, fingerprints of the water table seasonal oscillations can be recognized in the data. The Medicina site is characterized by clayey soil subjected to consolidation effects when the water table lowers during summer periods. The pillar on which the SG is installed is especially affected because of its shallow foundation, causing height decreases in the order of 2.5-3 cm for water table lowering of 2 m. This study presents a comparative analysis of the different data sets with the aim of separating mass and deformation contributions in the SG gravity record.