Geophysical Research Abstracts
Vol. 21, EGU2019-17207, 2019
EGU General Assembly 2019

Characterizing Deformation of Istanbul Wall by Geodetic Terrestrial Laser Scanning

Maryna Batur, Asli Dogru, Fatih Bulut, Asli Sabuncu, and Haluk Ozener

Department of Geodesy, Kandilli Observatory and Earthquake Research Institute, Bogazici University, Istanbul, Turkey (maryna.batur@boun.edu.tr)

Historical buildings are an integral element of human civilization. They carry a long history and it is an important issue that concerns the protection of these cultural heritages for our descendants. In Turkey, ancient buildings are thought to be threatened by the earthquakes On the other hand, during their long life, historical structures are exposed to many man made actions (e.g. urbanization, traffic vibration effects, underground constructions) and external natural factors (e.g. strong winds, extreme temperature variations, settlements of soil, ground water erosion). It is important to understand the reason of this structural deformation, if exists, to consider its structural health before any possible damage. Geodetic monitoring is a key approach in this context to assess and predict behavior of the structure for safety reasons. The case of Istanbul Walls has been chosen as the test ground due to its $\sim$1600 years of historical value. Terrestrial Laser Scanner technology has found extensive use in this industry, providing a high accuracy of measurements. In principle, it is built on the approach of acquiring a high-density point clouds, which are used to create a 3D model of the object. Each of the millions of such cloud points represents X,Y,Z coordinates of the reflective surface. The deformation monitoring process is conducted from the geodetic points of special network that have been created around the investigated structure. We divide the monitoring session into three-time epochs with the time interval of four months. This time period covers winter and summer periods. The aim is to detect a deformation by comparing 3D models at different epochs constructed from point clouds.