Calibration and Testing of Digital Zenith Camera System Components

Rasit Ulug (1), Kerem Halicioglu (2), M. Tevfik Ozludemir (1), Muge Albayrak (1), Burak Basoglu (1), and Rasim Deniz (1)

(1) Istanbul Technical University, Geomatics Engineering Department, Istanbul, Turkey, (2) Bogazici University, Kandilli Observatory and Earthquake Research Institute, Geodesy Department, Istanbul, Turkey

Starting from the beginning of the new millennium, thanks to the Charged-Coupled Device (CCD) technology, fully or partly automatic zenith camera systems are designed and used in order to determine astro-geodetic deflections of the vertical components in several countries, including Germany, Switzerland, Serbia, Latvia, Poland, Austria, China and Turkey. The Digital Zenith Camera System (DZCS) of Turkey performed successful observations yet it needs to be improved in terms of automating the system and increasing observation accuracy. In order to optimize the observation time and improve the system, some modifications have been implemented. Through the modification process that started at the beginning of 2016, some DZCS components have been replaced with the new ones and some new additional components have been installed. In this presentation, the ongoing calibration and testing process of the DZCS are summarized in general. In particular, one of the tested system components is the High Resolution Tiltmeter (HRTM), which enable orthogonal orientation of DZCS to the direction of plump line, is discussed. For the calibration of these components, two tiltmeters with different accuracies (1 nrad and 0.001 mrad) were observed nearly 30 days. The data recorded under different environmental conditions were divided into hourly, daily, and weekly subsets. In addition to the effects of temperature and humidity, interoperability of two tiltmeters were also investigated. Results show that with the integration of HRTM and the other implementations, the modified DZCS provides higher accuracy for the determination of vertical deflections.