An Investigation on the Use of Different Centroiding Algorithms and Star Catalogs in Astro-Geodetic Observations

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In the last decade, the importance of high-precise geoid determination at local or national level has been pointed out by Turkish National Geodesy Commission. The Commission has also put objective of modernization of national height system of Turkey to the agenda. Meanwhile several projects have been realized in recent years. In Istanbul city, a GNSS/Levelling geoid was defined in 2005 for the metropolitan area of the city with an accuracy of ±3.5cm. In order to achieve a better accuracy in this area, "Local Geoid Determination with Integration of GNSS/Levelling and Astro-Geodetic Data" project has been conducted in Istanbul Technical University and Bogazici University KOERI since January 2016. The project is funded by The Scientific and Technological Research Council of Turkey. With the scope of the project, modernization studies of Digital Zenith Camera System are being carried on in terms of hardware components and software development. Accentuated subjects are the star catalogues, and centroiding algorithm used to identify the stars on the zenithal star field. During the test observations of Digital Zenith Camera System performed between 2013-2016, final results were calculated using the PSF method for star centroiding, and the second USNO CCD Astrograph Catalogue (UCAC2) for the reference star positions. This study aims to investigate the position accuracy of the star images by comparing different centroiding algorithms and available star catalogs used in astro-geodetic observations conducted with the digital zenith camera system.