



Local scale validation of the final TanDEM-X DEM in the Lowveld Savanna, South Africa, using highly accurate differential GNSS ground measurements

Jussi Baade (1) and Christiane Schmullius (2)

(1) Friedrich Schiller University Jena, Physical Geography, Department of Geography, Jena, Germany (cub@uni-jena.de), (2) Friedrich Schiller University Jena, Earth Observation, Department of Geography, Jena, Germany (c.schmullius@uni-jena.de)

Digital Elevation Models (DEM) represent fundamental data for a range of applications including Earth surface process studies in the field of ecology, geology, geomorphology and hydrology, among others. For some countries, high resolution Digital Terrain Models (DTM) representing the solid Earth surface derived from topographic maps or aerial surveys (photogrammetry, LiDAR) are available. But for vast regions of the Earth this fundamental data is missing at a high geometric resolution. From January 2010 to December 2015 the German Space Agency (DLR) TanDEM-X mission acquired data for a new and truly global Digital Elevation Model (DEM). Since October 2016, the final DEM is available in three resolution editions (0.4, 1 and 3 arc sec or 12 m, 30 m and 90 m, respectively). First validation results suggest an accuracy of about 1 m; an order of magnitude higher than the initially targeted benchmark for the linear error (LE90 < 10 m). Due to the lack of other high resolution DEMs in many parts of the World, it is foreseeable, that this DEM will be used as fundamental data not only for global scale, but as well for regional and local scale studies in the near future.

Here we present results of a local scale accuracy assessment of the TanDEM-X DEM based on more than 10,000 highly accurate ground measurements ($\sigma < 0.05$ m) acquired in a differential Global Navigation Satellite System (dGNSS) survey of fourteen sites across the Kruger National Park, South Africa. The study sites are characterized by moderate terrain and open savanna vegetation providing the opportunity to investigate the accuracy of the new DEM in open terrain. However, the results demonstrate at the same time the sensitivity of the new DEM to canopy cover. A property, geomorphologists need to be aware of.