

The New Global Digital Elevation Model : TanDEM-X DEM and its Final Performance

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Abstract

Digital elevation models (DEMs) have become widely used in many scientific and commercial applications and there are several local products have been developed in the last years. They provide a representation of the topographic features of the landscape. The importance of them is known and valued in every geoscience field, but they have also vast use in navigation and in other commercial areas. The main goal of the TanDEM-X (TerraSARX add-on for Digital Elevation Measurements) mission is the generation of a global DEM, homogeneous in quality with unprecedented global accuracy and resolution, which has been completed in mid-2016.

For over four years, the almost identical satellites TerraSAR-X and TanDEM-X acquired single-pass interferometric SAR image pairs, from which is it possible to derive the topographic height by unwrapping the interferometric phase, unaffected by temporal decorrelation. Both satellites have been flying in close formation with a flexible geometric configuration. An optimized acquisition strategy aimed at achieving an absolute vertical accuracy much better than 10 meters and a relative vertical accuracy of 2 m and 4 m for flat and steep terrain, respectively, within a horizontal raster of 12 m x 12 m, which slightly varies depending on the geographic latitude.

In this paper, we assess the performance of the global Tandem-X DEM, characterized in terms of relative and absolute vertical accuracy. The coverage statistics are also discussed in comparison to the previous almost global but with lower resolution DEM provided by the Shuttle Radar Topography Mission (SRTM).

The exceptional quality of the global DEM is confirmed by the obtained results and the global TanDEM-X DEM is now ready to be distributed to the scientific and commercial community.