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A Combined SRTM Digital Elevation Model for Zanjan State of Iran Based on the Corrective Surface Idea

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One arc-second high resolution version of the SRTM model recently published for the Iran by the US Geological Survey database. Digital Elevation Models (DEM) is widely used in different disciplines and applications by geoscientist. It is an essential data in geoid computation procedure, e.g., to determine the topographic, downward continuation (DWC) and atmospheric corrections. Also, it can be used in road location and design in civil engineering and hydrological analysis. However, a DEM is only a model of the elevation surface and it is subject to errors. The most important parts of errors could be comes from the bias in height datum. On the other hand, the accuracy of DEM is usually published in global sense and it is important to have estimation about the accuracy in the area of interest before using of it. One of the best methods to have a reasonable indication about the accuracy of DEM is obtained from the comparison of their height versus the precise national GPS/levelling data. It can be done by the determination of the Root-Mean-Square (RMS) of fitting between the DEM and leveling heights. The errors in the DEM can be approximated by different kinds of functions in order to fit the DEMs to a set of GPS/levelling data using the least squares adjustment. In the current study, several models ranging from a simple linear regression to seven parameter similarity transformation model are used in fitting procedure. However, the seven parameter model gives the best fitting with minimum standard division in all selected DEMs in the study area. Based on the 35 precise GPS/levelling data we obtain a RMS of 7 parameter fitting for SRTM DEM 5.5 m, The corrective surface model in generated based on the transformation parameters and included to the original SRTM model. The result of fitting in combined model is estimated again by independent GPS/leveling data. The result shows great improvement in absolute accuracy of the model with the standard deviation of 3.4 meter.