EVALUATION OF GDEM WITH SPECIAL EMPHASIS ON VOID DETECTION AND VOID FILLING

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1. INTRODUCTION

The Global DEM (GDEM) product is being generated from Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) data by Japan's Ministry of Economy, Trade, and Industry (METI) and the National Aeronautics and Space Administration (NASA). It is a snapshoot of the reflective surface of the earth during the time period of the mission, and is about 100 times more detailed than existing global elevation data, such as GTOPO 30[1] and GLOBE [2] and nine times more detailed than the existing SRTM[3] [4].

2. METHOD

Up to now, only limited evaluation has been performed as the GDEM dataset is not available for public distribution. It is expected that the Aster GDEM contains significant number of holes - and other anomalies - that prevents immediate use for a wide range of applications. These voids can be filled using a range of interpolation algorithms in conjunction with other sources of elevation data, but there is little guidance on the most appropriate void filling method. This paper describes; (i) a methodology to fill voids using a variety of methods, (ii) a methodology to determine the most appropriate void filling algorithms using a classification of the voids based on their size and a typology of their surrounding terrain. The terrain typology is based on the SRTM30 data[5][6]. A half degree resolution, 15 class terrain typology was derived from this DEM based on a combination of the average SRTM30 elevation within each half degree cell and the relief roughness of the SRTM30 data within the cell, defined as the range of SRTM30 elevation values in the cell divided by half the cell length connecting the center of each grid cell[7]. For simplification, we aggregated these 15 classes into 6 major terrain units (TU), which show similar land surface characteristics. Landuse will be provided by CORINE data or the global land cover product from ESA.

3. RESULTS AND DISCUSSION

The authors of this paper will evaluate up to five different tiles (1 by 1) across a range of terrain and land use conditions. The Northern most tile will be from the Alps which contains difficult conditions between land and water, followed by three more investigation areas under tropical/African conditions, where Forest and Cloud cover influence the accuracy of the results. Validation will be performed for horizontal and vertical direction by using in-house developed routines. Accuracy for each single tile can be influenced by a complex patterns of errors due to Terrain Units or Land use in interaction with the number of images used in the aggregation process. Displacement Vectors will be correlated with different land use and terrain units. Results of accuracy of the new global dem will be presented especially under consideration with the expected voids (e.g No-Data areas) filling methods.

4. REFERENCES

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