
Mountain Mapping and DSM Generation Using High Resolution Satellite Image Data

Kirsten Wolff, Armin Gruen
Institute of Geodesy and Photogrammetry, ETH Zurich, Switzerland

Abstract

The accurate 3D image processing of stereo satellite images constitutes a potentially powerful method to produce the primary data for a high quality mountain modeling, mapping and visualization. The efficiency of such satellite image data with stereo capabilities was already shown for georeferencing and DSM generation using image data from different satellites like IKONOS, SPOT-5, EROS and Quickbird, and by applying SAT-PP, our in-house developed software package for high resolution satellite image processing. Also, the first results of the evaluation of the recently launched satellites like ALOS and Cartosat-1, both with a GSD of 2.5m, give good results for both purposes. All results show, that subpixel accuracy is realistically achievable for georeferencing and for DSM generation we get an accuracy of one to five pixels, depending on the land-use, topography, image texture and image quality.

Especially with the low cost satellites, the prices for high-resolution image data have been considerably lowered, such that this technology is becoming available for more and more users, applications and research fields. This opens also new opportunities for innovative applications in mountainous areas, be it with respect to DSM generation, topographic and thematic mapping, glacier monitoring or the tracking of other dynamic processes over time and space.

With this paper we want to show the latest results of our investigations of 3D image processing of stereo satellite images with a special focus on DSM generation and with a new focus on the task of 3D mapping in mountain areas. We will give a detailed analysis of the potential of different high-resolution satellite imagers for DSM generation and 3D mapping.