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Glacier Inventory of the Cordillera Real - Bolivia using high resolution satellite images ALOS and CBERS-2B

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The Andes represent approximately 99% of tropical glaciers worldwide. In Bolivia (South America) the glacier coverage represents 20% of the Andean glaciers. During the last 30 years a dramatic reduction of glacier surfaces in the Bolivian Andes were observed (Ramirez et al. 2001), leading to fears about the disappearance of several small glaciers in the next three decades. The first glacier inventory in this region was made based on aerial photographs for the 70's and 80's using geodetic methods (Jordan 1991). However, the realization of new photogrammetric flights over the Andes is expensive, which made it impossible to update the glacier inventory. Most Bolivian glaciers are less than 1 km2 making it difficult to use conventional satellite imagery with average resolutions (15 m or 30m). The development of new high resolution sensors mounted on observational satellites with stereoscopic capabilities permits the application of photogrammetric techniques for the precise delimitation of glacier boundaries.
A new glacier inventory of the Cordillera Real in Bolivia was performed using high-resolution images (2.5 m) from ALOS (Japan) and CBERS-2B (China-Brazil) satellites within the framework of the Andean Regional Project on Climate Change Adaptation (PRAA) supported by the World Bank. The PRISM sensor of ALOS satellite (Panchromatic Remote-sensing Instrument for Stereo Mapping) and HRC of CBERS-2B satellite (High Resolution Panchromatic Camera) were used in this study.
57 ground control points (GCP) were measured along the Cordillera Real through dual-frequency DGPS's. The boundaries of 476 glaciers were identified and digitized by a digital photogrammetric station. The current glacier surface of the Cordillera Real is 185.5 km2. Compared with the previous inventory of the 80's it represent a loss of 43% of the glacier area.

References

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