

Submitted Abstract

ID IMC22-FSAbstr- 446

First Author First Name Last Name	Frank Paul
Submitting Author First Name Last Name	Frank Paul
Correspondence	frank.paul@geo.uzh.ch
Co-Authors >> E-Mails will be not listed	Rastner, Philipp
Organisations	University of Zurich, Switzerland
Country	Switzerland
Region	Western Europe
Title	Glacier Extents In Peru And Bolivia Are Overestimated In Rgi6 By At Least 20%.
Keywords	Glacier Inventory, Landsat Tm, Peru/bolivia, Seasonal Snow, Copernicus Dem
Type	List Of Focus Session
Focus Session ID	06

Abstract

Glaciers in the tropical Andes of Peru and Bolivia are important water resources. Precise determination of their extent at a certain point in time is thus mandatory to provide realistic estimates of the water resources they contain or modelling of their future evolution. Unfortunately, creating precise glacier outlines in this tropical region is hampered all year round by either seasonal snow or cloud cover, both hiding the true glacier perimeter. Additionally, extended shadows created by the steep topography impact on the visibility of glaciers on south facing slopes during May to July. Accordingly, the outlines currently available from the widely used RGI6 have severe quality issues, i.e. they are often much larger than they should be for the dates they refer to.

In the framework of preparing version 7 of the RGI, we have remapped all glaciers in Peru and Bolivia from 17 Landsat Thematic Mapper scenes acquired in 1998, a year when seasonal snow off glaciers was largely absent in the entire region. All glaciers (clean ice) were mapped automatically with a standard band ratio (red/SWIR) and a scene specific threshold value. Wrongly classified lakes and missing debris cover was removed / appended by manual editing, using contrast enhanced false colour composites in the back-ground. We also used the very high-resolution satellite images available in the ESRI Basemap to aid in the interpretation of glacier parts being in shadow or under debris cover. The Copernicus DEM GLO-30 was used to derive new drainage divides as those in RGI6 were often found at a wrong location.

Overall we mapped 3586 glaciers larger than 0.01 km² covering an area of 1747.3 km². This is 419 km² or 20% less than the 2166 km² available from the RGI6. Glacier outlines in RGI6 refer to the period 2000 to 2009 according to the metadata in the attribute table. As most area change studies conducted so far in this region found continuous and strong glacier area decrease over this period, a 'back-calculation' of all glacier areas to the year 1998 would give an even larger glacier area for this year, and an overestimation closer to 25%. This means that also total modelled water resources are overestimated and studies presenting future glacier evolution might be wrong. The 'new' glacier inventory for 1998 might thus help in adjusting related values and create more realistic estimates of this valuable water resource.