



Analysis of glacier distribution, glacier changes and permafrost occurrence in the Brahmaputra river basin for water resources management

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Glacier distribution, glacier changes and permafrost occurrence are investigated for the area of the Upper Brahmaputra River Basin in order to determine the influence of melting glaciers and degrading permafrost on the long-term runoff of the Brahmaputra River. The work is embedded in the EU-project BrahmaTWinn which aims at quantifying climate change impacts on the Brahmaputra (Himalaya) and Inn (European Alps) river basins, and at investigating and comparing related water resources management strategies and policies.

Glaciers in the southern and central parts of the Himalayas are expected to be especially sensitive to present atmospheric warming due to their summer-accumulation type. In our study, current glacier distribution and glacier changes since the 1960s are mapped using multi-temporal optical remote sensing data from the Landsat series, ASTER, and CORONA. Repeat glacier outlines are then combined with the Digital Elevation Model (DEM) from the Shuttle Radar Topography Mission (SRTM) and analyzed within a GIS in order to assess spatio-temporal gradients in glacier length change and glacier area change. Very little is known about the permafrost distribution in the Himalayas. By means of models developed for the European Alps the permafrost distribution is estimated for the study region using the SRTM DEM. The results are validated using ground based station measurements and distribution patterns of periglacial landforms such as rock glaciers. The latter are mapped from high resolution satellite data such as CORONA and Quickbird.