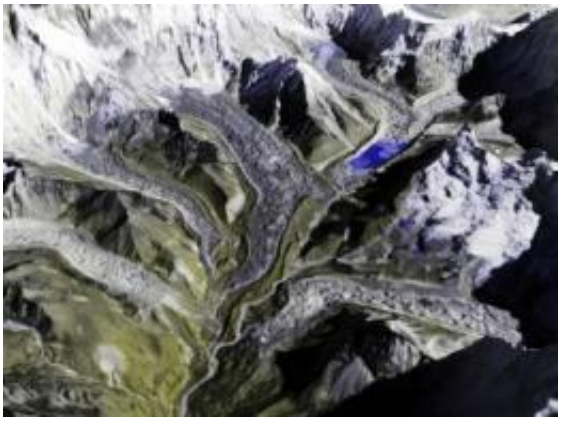
State of Himalayan glaciers less alarming than feared

April 19 2012



The large glacial lake Imja Thso in the Imja Valley south of Mt. Everest/Nepal formed in the 1960s and has grown continuously ever since. The 3-D view was generated from an ASTER satellite image. Credit: T. Bolch, Universität Zürich/TU Dresden

Ever since the false prognoses of the Intergovernmental Panel on Climate Change (IPCC), the Himalayan glaciers have been a focus of public and scientific debate. The gaps in our knowledge of glaciers in the Himalayan region have hindered accurate statements and prognoses. An international team of researchers headed by glaciologists from the University of Zurich and with the involvement of scientists from Geneva now outlines the current state of knowledge of glaciers in the Himalayas in a study published in *Science*. The scientists confirm that the shrinkage scenarios for Himalayan glaciers published in the last IPCC report were

exaggerated.

Glacier area 20 percent smaller than assumed

The most up-to-date mappings so far based on satellite data revealed that glaciers in the Himalayas and Karakoram cover a total area of approximately 40,800 km^2. While this is around twenty times larger than all glaciers of the European Alps put together, it is as much as twenty percent smaller than was previously assumed. Lead scientist Tobias Bolch, who researches at the University of Zurich and Dresden University of Technology, mainly puts this down to erroneous mappings in earlier studies.

This is an aerial view of the Imja glacier and Lake Imja, Nepal, the Himalayas. The lake appeared in the 1960s and has grown continuously ever since. The sinking of the surface of the debris-covered glacier tongue is also clearly discernible. Credit: J. Kargel, University of Arizona

Less shrinkage than predicted

The scientists took all the existing measurements of length, area and volume changes and mass budgets into account for their study. While

some of the measurement series on length changes date back to 1840, measurements of glacier mass budget that instantaneously reflect the climate signal are rare. In addition, continuous measurement series do not stretch back any further than ten years. The researchers recorded average length decreases of 15 to 20 metres and area decreases of 0.1 to 0.6 percent per year in recent decades. Furthermore, the glacier surfaces lowered by around 40 centimetres a year. "The detected length changes and area and volume losses correspond to the global average," explains Bolch, summarizing the new results. "The majority of the Himalayan glaciers are shrinking, but much less rapidly than predicted earlier."

For the regions in the northwestern Himalayas and especially in the Karakoram Range, the researchers noted very heterogeneous behaviour in the glaciers. Many of them are dynamically unstable and prone to rapid advances (so called "surges") that largely occur independently of the climatic conditions. For the last decade on average, even a slight volume increase was detected. Based on their analyses, the researchers assume that glacier shrinkage will not have a major impact on the water drainage of large rivers like the Indus, Ganges and Brahmaputra in the coming decades.

Greater variability and menacing flooding of glacial lakes

Despite the partial all-clear for the Himalayan glaciers, however, Bolch advises caution: "Due to the expected shrinkage of the glaciers, in the medium term we can expect a greater variability in the seasonal water drainage. Individual valleys could dry up seasonally."

Bolch and his colleagues also see a very serious threat to the local population in newly formed or rapidly growing glacial lakes. The deluge of water and debris from potential outbursts of these lakes could have

devastating consequences for low-lying regions. According to the scientists, increased efforts are urgently needed to monitor the lakes as well as changes in the glaciers and the climate in the Himalayas.

More information: *Science*. April 20, 2012. doi: 10.1126/science.1215828

Provided by University of Zurich