



Recent glacier changes in the Alps observed from satellite: Consequences for future monitoring strategies

F. Paul (1), A. Kaeab (1) and W. Haeberli (1)

(1) Department of Geography, University of Zurich, Switzerland (fpaul@geo.unizh.ch)

During the past two decades Alpine glaciers experienced accelerated decline. This signal has been confirmed by direct measurements of mass balance and annual length variations as well as area changes determined from multispectral satellite data. It indicates increasing glacier down-wasting and partial collapse rather than an active dynamic response (tongue retreat) to a changed climate. The extraordinary hot and dry summer of 2003 has not only caused record breaking negative mass balances, but also stimulated several positive feedbacks like albedo lowering of the bare ice surface, newly emerged rock outcrops, disintegration into smaller glacier parts and melting of the remaining firn/snow reserves. In consequence, a number of glaciers have disappeared in 2003 and others will continue to shrink in the near future.

In this contribution we visualize latest observations on glacier decay by means of multitemporal Landsat Thematic Mapper (TM) and Terra ASTER images from 1985 to 2004. In particular data from August 2003 and September 2004 show the bad overall condition of most glaciers at first glance. Animated false colour images of two dates are used as an efficient tool for rapid change detection analysis, such as the formation of pro-glacial lakes or the detachment of glacier tongues. Some changes are so severe that they can be detected even by comparison of 2003 with 2004 satellite imagery.

The observed rapid changes result in a number of consequences for future glacier monitoring strategies as implemented in the GHOST of GCOS; in particular for mass balance determination from space or in the field, the representativity of length change measurements, and the required update period for repeated glacier inventories.