

Monitoring glacier elevation and volume changes with digital photogrammetry and GIS at Gepatschferner glacier, Austria

A. Keutterling - GEOSYSTEMS. Riesstr. 10, 82110 Germering. Germany

A. Thomas - Institute of Geography, Johannes Gutenberg University. 55099 Mainz. Germany

International Journal of Remote Sensing, 27:19, 4371 – 4380.

<http://dx.doi.org/10.1080/01431160600851819>

Abstract

Digital elevation models of Gepatschferner in Northern Tyrol, Austria were obtained with digital photogrammetry from high altitude stereo photo pairs and by digitizing an analogue topographic glacier map, for 1990 and 1971, respectively. A difference map was calculated to identify regions of glacier elevation increases and decreases corresponding to glacier mass gain and loss. While the glacier tongue below 2,600 metres showed mainly increases in glacier surface elevation as compared to 1971, the remaining glacier thickness experienced both increases and decreases. The accumulation zone above 3,200 metres contained several extreme cases of morphological features with altitude changes $> + 30$ m.

While the increased ice thickness of the glacier tongue can be traced to a well documented period of mass accumulation in the 1970s, changes in glacier surface elevation in the higher zones may be linked either to the morphology of the glacier bed or to differences in insulation on the glacier surface. Between 1971 and 1990 the glacier experienced a net loss of 26×10^6 m³ corresponding to approximately 0.9 percent of the entire glacier volume.