

Variation of Khumbu Glacier revealed by GPS survey and ASTER-DEM in Nepal Himalayas since 1978.

Takayuki Nuimura[1]; Kotaro Fukui[2]; katsuhiko Asahi[3]; Koji Fujita[1]; Yutaka Ageta[1]

[1] Nagoya Univ.; [2] NIPR; [3] Environ. Earth Sci., Hokkaido Univ.

<http://snowman.ihas.nagoya-u.ac.jp>

Glacier surface elevation have been surveyed in the debris-covered ablation zone of Khumbu Glacier, Nepal Himalayas since 1978. We carried out ground survey by differential GPS (DGPS) in 2004 to clarify changes in surface elevation and flow speeds of the glacier. Surface lowerings are obtained by comparison of digital elevation model (DEM, 60 m grid size), which are generated from the survey data in 1978, 1995, 1999 and 2004. Since it was too dangerous to access to the other two areas, middle parts of the ablation zone, due to surface roughness we use ASTER DEM, which was verified by the ground survey. Flow speeds are also obtained in comparison with position of ice pinnacles at the upper area. We clarify the lowerings of the glacier surface. The surface lowering was not significant at the lower area (4900 - 5000 m.a.s.l.). Remarkable acceleration of surface lowering was found at the middle area (about 5100 m.a.s.l.), where, glacier surface is undulating in comparison to other areas. The topographic feature might affect to the surface lowering. In the most upper area (about 5300 m.a.s.l.), surface lowering is continued. Surface flow speeds have been decreasing gradually since 1956. Furthermore, ablation rate calculated by surface elevational change and flow speed change at upper of ablation zone suggest the recent decrease of ice flux from the accumulation zone might enhance the surface lowering at Khumbu Glacier in last decade.