THE SPATIAL VARIABILITY OF SNOW ACCUMULATION ON VERNAGTFERNER IN WINTER 2003/2004

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Since 1964/65 the Commission for Glaciology at the Bavarian Academy of Sciences has determined the distributed glacier mass balances of Vernagtferner, resulting in measurements of winter and summer mass balances. The assessment of winter snow accumulation on a glacier by means of snow depth measurements using poles often imply inaccuracies resulting from the vague identification of the previous summer horizon. Summer 2003 with its extremely high ablation rates left a dense surface even in the upper firm basins of Vernagtferner. Thus at the end of the accumulation period in winter 2003/2004 snow height measurements profited from a well defined base layer. 540 recordings of snow height at 180 sample sites, covering most of the glaciers flanks, were taken for analyses of the spatial variability of snow depth on the Vernagtferner. Snow density was measured at five snow pits gravimetrically and averaged for the entire field. The data were investigated as a function of topographic features extracted from a 10 m resolution DEM of summer 2003. These parameters were elevation, aspect, slope and curvature. Furthermore, recordings from two meteorological stations located in the catchment were analysed for determining the main wind direction during winter season. The results show that the lower parts of Vernagtferner up to an elevation of 3150 m above sea level have a moderate increase of snow water equivalent (SWE) with elevation. In the upper regions, however, snow accumulation is mainly controlled by wind redistribution resulting in peak values at leeward sides of the mountain crest. This influence can also be seen in testing snow height against aspect. The data did not show any correlation with slope. Curvature just showed a gentle trend of increase in SWE at concave locations. Both may be due to the fact that Vernagtferner is a plateau glacier with extensive flat areas.