



Assessment and application of a snowblow modelling approach for identifying enhanced snow accumulation in areas of former glaciation

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The redistribution of snow by wind can play an important role in providing additional mass to the surface of glaciers and can, therefore, have an impact on the glacier's surface mass balance. In areas of marginal glaciation, this local topo-climatic effect may be prove crucial for the initiation and survival of glaciers, whilst it can also increase heterogeneity in the distribution of snow on ice caps and ice sheets. We present a newly developed snowblow model which calculates spatial variations in relative snow accumulation that result from variations in topography. We apply this model to areas of former marginal glaciation in the Brecon Beacons, Wales and an area of former plateau icefield glaciation in the Monadhliath, Scotland. We can then determine whether redistribution by snow can help explain variations in the estimated equilibrium line altitudes (ELAs) of these former glaciers. Specifically, we compare the areas where snow is modelled as accumulating, to the reconstructed glacier surface, which is based on mapped moraines believed to be of Younger Dryas age. The model is applied to 30 m resolution DEMs and potential snow accumulation is simulated from different wind directions in order to determine the most likely contributing sector. Total snow accumulation in sub-set areas is then calculated and compared to the reconstructed glacier area. The results suggest that areas with larger amounts of snow accumulation often correspond with those where the ELA is lower than surrounding glaciers and vice versa, in both the marginal and icefield setting, suggesting that the role of snowblow in supplying additional mass to the surface of glaciers is significant.