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Glacial erosion and landscape evolution

David Sugden
School of GeoSciences,University of Edinburgh

In the 1960s W.S.B. Paterson famously questioned the relative value of field observation as opposed to theory when understanding glacier behaviour. Since then there have been major advances in dating, remote sensing, the analysis of ice cores and the study of complex systems, that have transformed the role of field observation. But it has been difficult for studies of glacial erosion to contribute their potential to the understanding of glacier behaviour because it has been difficult to gain access beneath glaciers or to date glacially-eroded bedrock surfaces. Thus the stress has been on description, classification and the tendency to see the glacier bed as passively responding to processes of glacial erosion. The arrival of new techniques of thermochronology and cosmogenic isotope analysis represent a stepped change in the field. It is now possible to measure rates of glacial erosion over appropriate time scales, to date rock surfaces, to identify pre-existing fluvial topography, and even to discover when and for how long a surface has been buried by ice. The exposed bedrock around existing ice sheets and the extensive beds of former ice sheets hold a rich archive of data. Studies of such areas reveal the role of topographic feedback on ice sheet evolution, the link between basal thermal regime and erosion, topographic conditions at the onset of glaciation, the remarkable spatial variability of glacial erosion, and the effect of such variability on the location and timing of marine deposition