



Holocene glacier fluctuations and prehistoric trans-alpine routes: new evidence from the western Swiss Alps

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The recent massive glacier retreat in the Alps exposes spectacular new archaeological finds from the high alpine environments and sheds new light (1) on the Neolithic presence in the high elevation Alpine areas, (2) on Bronze and Roman Age trans-alpine traffic and transportation routes, and (3) the mid- and late Holocene glacier fluctuations and their interpretation in the light of the current glacier retreat. During the extremely warm summer 2003, a small ice field in the western Swiss Alps (2760 m) uncovered spectacular archaeological material from three distinct windows of time: (1) Neolithic hunting gear, fur and leather cloth (4900 to 4450 cal yr B.P.), an early Bronze Age needle and wooden belts indicative for the use of pack animals (4000 - 3750 cal yr B.P.), and Roman Age shoe nails from the 1st - 3rd century AC. Evidence of a direct trans-alpine route connecting the Valais and the northern Alps during these distinct windows of time is very much in line with the periods of late Holocene maximum glacier retreats as revealed by fossil trees and peat recently exposed in the forefields of melting Alpine glaciers tongues. However, the fact that Neolithic leader cloth (which requires permanent embedding in ice in order to stay preserved) dated between 4900 and 4600 cal yr B.P. has not been decomposed implies that the ice extent at that site was smaller in 2003 than at any time during the last 5000 years. This conclusion is highly significant with regard to the interpretation of the recent warming and the general loss of ice volume and retreat of glaciers.