

Kinematics and thermal conditions in the permafrost-affected rockwalls of the Aiguille du Midi (3842 m a.s.l., Mont Blanc massif, France)

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Processes that control climate-dependent rockfall from permafrost-affected rock slopes are still poorly understood. In this study, we present the results of a Wireless Sensor Network, integrated within the Swiss project PermaSense and developed in 2012, to measure rock temperature and geotechnical parameters in the steep rockwalls of the Aiguille du Midi (AdM, 3842 m a.s.l., Mont Blanc massif, France). Accessible year round by cable car, the AdM comprises two main peaks: (i) the Piton Nord with the cable car arrival station, where 4 crack-meters are placed on four major fractures, and (ii) the Piton Central with many touristic infrastructure, equipped with three 10-m-deep boreholes with 15 temperatures sensors since 2009, and where 2 crack-meters are installed along a major fracture. Three major kinematic regimes are observed: (i) opening of clefts when the rock temperature becomes positive, followed by closing during the cold period, (ii) summer opening continued by a winter opening, and (iii) closing during the warm period followed by opening in winter.