



## **The use of GPS measurements to define the surface morphology of a rock glacier. The case of Foscagno Rock Glacier (Italian Central Alps)**

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Foscagno Valley is located in Upper Valtellina, Italian Central Alps. The Foscagno Rock glacier is one of the most studied rock glacier in Italy and one of the longest (more 1 km) ones. Foscagno Since many years, this rock glacier has been investigated in order to understand the mechanisms and dynamics of genesis and evolution of an Alpine rock glacier. In order to upgrade the topography of the study area and to determine the velocity distribution of the rock glacier surface, GPS measurements campaigns have been performed in summer 2005. The rock glacier has a complex structure composed of different lobes and characterised by the presence of many furrows and depressions especially in the central and the right part of the rock glacier. On the left side no particular morphologies of the surface are visible. GPS measurements performed in static mode let the set up of a coordinate reference system appropriate of the whole area. For this purpose it was necessary to link a new benchmark installed on the left lateral Late Glacial moraine with a permanent GPS station of the GPS Network of Regione Lombardia, located in Bormio. After this first step, GPS RTK in continuous kinematic surveys were planned. Four GPS rover units worked on 4 sectors of the glacier. 1 sector was covering the zone of the rock glacier considered inactive while 3 sectors were covering the active zone of the rock glacier. The collected data have been used to produce a detailed DTM model. The accuracy required for the model was not less than 0.3 m in height, and centimetre in planimetry. Goal of the DTM is to evidence even smaller furrows, lobes and depressions on the surface of the rock glacier. The DTM obtained once elaborated let the restitution of a contour map representing the updated topography of the rock glacier. In the same summer, 20 fix benchmarks

have been drilled in big boulders on the rock glacier. Future measurements of their position by L1 GPS receivers will give important information about the movement of this rock glacier. Rock glacier speed is quite low, in most of cases less than 0.5 cm a year; this is why high accuracy is also required to these kind of measurements.

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