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Internal structure of Reichenkar rock glacier

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Reichenkar rock glacier is situated in a small, northeast-facing side-valley of the Sulztal, in the western Stubai Alps (Tyrol, Austria). It is a typical tongue-shaped, ice cored rock glacier, 1400 m long, up to 260 m wide in the upper part and 170 – 190 m wide in the lower part. The rock glacier covers an area of 0.27 km^2. The highest point lies at an altitude of 2750 m, the rock glacier terminates at an altitude of 2310 m. The active front has a steep gradient of 40 – 41˚.

The surface layer is coarse-grained containing blocks up to several meters, mostly in the range of several dm. The surface topography is characterized by well developed longitudinal and transverse ridges and furrows. At the foot of the steep front a spring is present. Bedrock is composed of polymetamorphic paragneisses, schists, orthogneisses, amphibolites and eclogites. The rock glacier is composed of debris derived mostly from amphibolites and eclogites.

Near the front high surface flow velocities of up to 2.5 m/a were measured since 1997, during the last 7 years the rock glacier advanced for about 15 m.

During summer and autumn 2004 seismics, gravimetry and GPR investigations were carried out on the lower part by the rock glacier working group.

At three profiles GPR measurements were done. One profile is in the direction of the central flow line and two are perpendicular to it. Very good results were achieved by using the 35 MHz antenna. The interpretation of all three sections clearly indicated a reflector in a depth of approximately 30m.

Refraction seismics was performed using 30 geophones and 40 shots with detonating fuse. In the exploration area one profile along and a cross-sectional profile was arranged. The spacing was 15m, measured on the rock glacier surface. We also

used some geophones and shots outside the rock glacier to get information about the bedrock layer. The analysis of the travel times shows that the rock glacier Reichenkar consists of three layers with average seismic velocities of $v_{boulder}$=1250m/s, v_{ice}=3250m/s and $v_{bedrock}$=4100 m/s. The value for the debris mantle seems to be high and the low value for the ice layer is notable. The evaluation of the travel times that were derived from rock glacier to rock glacier observations results in an average thickness of the debris mantle according to 8 m. The intercept times from rock glacier to none rock glacier observations correlate with the impulse radar observation and confirm the depth of the bedrock layer in an average depth of 30 m.

To achieve a model of density distribution a gravimetric investigation was done. We used the gravity meter SCINTREX CG-3 which has an accuracy of 10μGal. 128 points were measured on the lower part of the rock glacier and 25 beside the rock glacier to estimate the regional trend. The current analysis shows a significant Bouguer anomaly with an average value of 0,8mGal. With thickness values derived from the GPR and seismic investigations, the density distribution has been calculated.