



A comparison between three avalanche test sites in northwestern Alps as developed in the DYNAVAL-Alcotra project.

DynAval Team

Pitet, L., Segor V. per la Direzione assetto idrogeologico dei bacini montani, Regione Autonoma Valle d'Aosta, IT
Naaim-Bouvet, F., Bellot, H., Caccamo P., Naaim M., Ousset, F., Thibert, E., Ravanat, X., Faug, T. Cemagref UR
ETGR, St Martin d'Hères Cedex, FR

Maggioni, M., Bruno, E., Godone, D., Ceaglio, E., Viglietti, D., Freppaz, M. per l'Università degli Studi di Torino,
Di.Va.P.R.A. - Chimica Agraria e Pedologia - LNSA and NatRisk (Research Centre on Natural Risks in Mountain
and Hilly Environments), IT

Barbero, M., Barpi, F., Borri-Brunetto, M., Bovet, E., Chiaia, B., De Biagi, V., Frigo, B., Pallara, O. per il DISTR,
Politecnico di Torino, IT

Within the Operational programme 'Italy - France (Alps - ALCOTRA) 'Project "DynAval - Dynamique des avalanches: départ et interactions écoulement/obstacles" three test sites were built or developed in France and Italy. The goal of the paper is to present the experimental devices and typical dynamic variables related to avalanches in these 3 sites, differing mainly by their scale.

(a) Punta Seehore test site is located in the Aosta Valley, on the Monte Rosa Massif. The slope, with an altitude difference of about 300 m (from 2300 to 2570 m ASL), has a mean inclination of about 38°. Generally small size avalanches are artificially released for the security of the ski-runs; they are usually dense flow avalanches but also a powder cloud may occasionally form; the release volume is around 200-400 m³. The site is instrumented with a steel obstacle on which load cells and other devices are installed in order to measure the effects of the avalanche impact on it. The first two recorded avalanches showed an impact force on the obstacle up to 5 kN on a flow height of 60 cm. Different kind of activities are made before, during and after each artificial release: physical and mechanical properties of the snow in the release, track and deposition zones of the avalanche are recorded, front velocity, erosion and deposition mass are estimated by field surveys or by multi-pictures analysis and laser-scan measurements.

(b) Col du Lautaret test site is located near the Lautaret pass (2058 m asl) between Ceres and Ecrins ranges. Different avalanche paths are located on the south-east slope of Chaillol Mountain (2600 m asl). Small to medium avalanches occur at a sufficient frequency (up to 3 or 4 each winter). Avalanche flows are generally dense, wet or dry, with sometimes a small but fast powder cloud (or saltation layer). The dense part is usually less than one meter thick. The run-out distance is 500 to 800 m with an average gradient of 36°. Typical released volume is about 5000 m³ and front velocity can reach 30 m/s. Instrumentation includes a 3 m-high mast recording pressure and velocity each 20 cm, and a one square meter plate integrating the pressure all over the flow height. A high speed photogrammetric system measures the avalanche front velocity.

(c) The Taconnaz avalanche path is located in the Arves valley, close to Mont Blanc range in France. The Taconnaz path is 7 km long, has a mean slope of 25° and a mean width of 300-400 m. A defense structure system made of breaking mounds and dams was designed in 2009 based on a 100-year return period event of 1.6 Mm³ volume. In 2010, velocity and pressure sensors were set up on the breaking mounds in order to improve our knowledge of the interaction between avalanches and breaking dams.