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Monitoring of Taconnaz avalanche path: pressure and velocity measurements on breaking mounds

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The Taconnaz avalanche path is located in the Arves valley, close to Mont Blanc in France. The Taconnaz path is 7 km long, has a mean slope of 25° and a mean width of 300–400 m. In the past years (Naaim et al., A. Glaciol. 2010), we back-analyzed the available historical data using an avalanche-dynamics numerical model and we designed a 100 year return period event (volume: 1.6 106m3, Froude number: 4.29) and the required defense structure system made of breaking mounds and dams. Last autumn we equipped breaking mounds with velocity and pressure sensors in the framework of the European project DYNAVAL (Interreg Alcotra). It aims at better understanding the interaction between avalanches and breaking dams. The challenge consists in measuring pressure (until 100 tons/m^2) and velocity (until 60 m/s) in three different locations with data synchronization lower than 0.1 s, and a sampling frequency up to 100 Hz. Sensors and data loggers, which have to resist low temperatures (until -30°C), are not accessible during winter given the dangerousness of the path. Moreover, as the avalanches are not artificially released, the path must be monitored during all the winter season and an automatic detection of events, taking into account electronic noise or sensors drift, must be designed. The chosen technical solution for sensors, data logger and transmission will be presented.