Snow avalanche speed determination using wireless accelerometers at the Weissfluhjoch Snow Chute

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Experiments using a network of wireless accelerometers were carried out at the snow chute operated by the SLF at Weissfluhjoch (Switzerland) with an attempt to study internal dynamics of flowing snow. Several 2D and 3D wireless accelerometers placed in the starting zone prior to the experiments travelled within the flow when the avalanche was released. The characteristics of the sensors (size and density) allow the units to evolve like active particle tracers. Acceleration readings obtained at 85 Hz in 3 different experiments were analysed. The analysis methods used include Empirical Mode Decomposition and Kalman Filtering techniques to obtain reliable speed and position measurements from the single 2D and 3D acceleration measurements.

The results are in agreement with those obtained from independent speed measurements from optical sensors and Video Images.

The results although preliminary are promising. The information extracted could provide valuable information related to the internal dynamics of the avalanche. Small scale chutes are the ideal scenario for this type of experiment and new experiments using improved sensors are envisaged. Moreover, the potential of wireless technologies and wireless sensors to study natural phenomena such snow avalanches has been demonstrated.