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Implementation of a new suspension model and calibration of the powder snow layer in SamosAT

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In 2004 the Forest Technical Service for Avalanche and Torrent Control has initiated the development of the new powder snow avalanche model SamosAT. The model describes the dense flow layer (DFL) and the powder snow layer (PSL) of an avalanche, as well as the interaction between them. The DFL is modelled as shallow flow in two dimensions on the digital terrain surface. The PSL is modelled as three-dimensional flow coupled with the DFL, including the air mass up to a few hundred meters above ground. The main emphasis in the development of SamosAT was the proper modelling of the dense flow part and the improvement of the run-out behaviour for the powder part. Major changes have been made in the calculation of the dense flow part, in the modification of the simulation environment of the powder part and finally in optimising the resuspension layer model, which describes the transition of the dense snow into the powder layer. In the end of 2007 SamosAT was calibrated based on 22 observed avalanche events. Subsequently the model was integrated in the daily work of avalanche danger assessment and hazard mapping. A revised suspension model was developed in December 2008, yielding a more continuous generation of powder snow mass. The 3D grid generation for the PSL was improved to be applicable to more complex terrain. These major changes necessitate a recalibration of the model, to find a suitable setup of the PSL model parameters. In the last year numerous simulations have been carried out, including also recalculations of recent avalanche events in February 2009. On the basis of 20 well documented reference avalanches revised input values for the powder snow model were determined.