

Segor, V.<sup>1</sup>, Pitet, L.<sup>1</sup>, Bovet E. <sup>2</sup>, Dellavedova P. <sup>2</sup>, Sovilla B.<sup>3</sup>, Steinkogler W.<sup>3</sup>, Veitinger J.<sup>3</sup>, Maggioni M.<sup>4</sup>, Chiambretti I.<sup>5</sup> and Prola M.<sup>6</sup>

<sup>1</sup> Struttura Assetto idrogeologico dei bacini montani – Ufficio Neve e Valanghe della Regione autonoma Valle d'Aosta, Quart (AO) – Italy  
<sup>2</sup> Fondazione Montagna sicura, Courmayeur (AO), Italy  
<sup>3</sup> WSL Institute for Snow and Avalanche Research SLF, Davos, Switzerland  
<sup>4</sup> DISAFA and NatRisk-LNSA, University of Turin, Grugliasco (TO), Italy  
<sup>5</sup> AINEVA, Trento, Italy  
<sup>6</sup> ARPA Piedmont



Valerio SEGOR  
v.segor@regione.vda.it

## Introduction

Small and medium avalanches, often characterised by low return periods, present notable problems for technicians and administrators who have to manage their effects on anthropized lands, especially those within ski-resorts and along roads and railway lines.  
 Actual risk management techniques also lack specific procedures and performance indicators which can be used by both technicians and administrators.

**STRADA Projet**

Climate change and snow avalanches+ innovative analysis  
 =  
 New procedures in the risk mitigation strategies on roads and ski-resorts

### Climate change and snow avalanches

- Increase in air temperature
- Increase in extreme rainfall events
- Progressive increase in snowfall limit

→

- Snowpack characteristics ?
- Avalanche types, size and frequency ?

### Innovative analysis in the test sites

Spatial distribution of snow cover properties are important (roughness)

Temperature affects granulation and therefore mobility (velocity, runoff)

### Project products

www.progettostrada.net

## Management

## Strategies

### LEVEL 1 - Strategy to monitor the avalanche site

knowledge of local snow cover conditions (new and total snow depth and snow temperatures) and avalanche activity  
 creation of an historical dataset  
 development of a criteria to establish threshold snow conditions in order that the avalanche can reach a specific location

### LEVEL 2 - Simulation of avalanche scenario

application in the area where empirical data lacked  
 simulation of different hazard scenarios with a numerical avalanche model (RAMMS), in respect to different snow cover conditions  
 preliminary calibration on avalanche test sites

### LEVEL 3 - Simulation of snow cover scenario

prediction of the snowpack conditions in extended areas with high spatial resolution  
 simulation of the snowpack conditions with a numerical models (SNOWPACK and Alpine 3D), in terms of forecast and real time scenarios

## Conclusion

The next step involves the application of these strategies on roads or ski-resorts management, in order to test them in different territorial realities and to elaborate the most plausible scenarios, in support of local governance