MUW13 MOUNTAINS UNDER WATCH 2013
Observing climate change effects in the Alps

AOSTA VALLEY ACTIVITY

THE STUDY OF SNOW AVALANCHES FROM A CLIMATE CHANGE PERSPECTIVE

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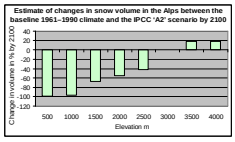
CLIMATE CHANGE AND SNOW AVALANCHES

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

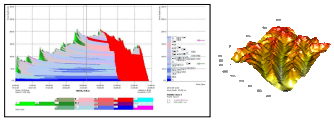
- Snowpack characteristics ?
- Avalanche types, size and frequency ?



Beniston, M. (2012), Is snow in the Alps receding or disappearing? WIREs Clim Change, 3: 349–358. doi: 10.1002/wcc.179

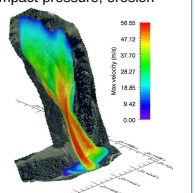
INNOVATIVE METHODOLOGIES

Snow cover evolution model:
SNOWPACK / ALPINE 3D
- Snow cover properties
- Snow cover distribution
- Climate change scenarios simulation



Lehning, M. and Fierz, C. (2008). Assessment of snow transport in avalanche terrain. Cold Regions Science and Technology, 51:240– 252.
Lehning, M., Völksch, I., Gustafsson, D., Nguyen, T. A., Stähli, M., and Zappa, M. (2006). Alpine3d: a detailed model of mountain surface processes and its application to snow hydrology. Hydrological Processes, 20:2111–2128.
Bavay, M., Lehning, M., Jonas, T., and Löwe, H. (2009). Simulations of future snow cover and discharge in alpine headwater catchments. Hydrological Processes, 23(1):95–108.

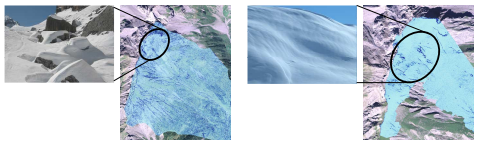
3D avalanche dynamics model:
RAMMS
- Runout distance, flow height, velocity, impact pressure, erosion



Christen, M., Kowalski, J., and Bartelt, P. (2010). RAMMS: Numerical simulation of dense snow avalanches in three-dimensional terrain, Cold Regions Science and Technology, 63, 1–14.

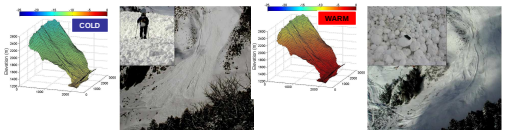
There is a LACK of models able to simulate the influence of different snowpack properties on avalanche release and runout distance.

Spatial distribution of snow cover properties are important (roughness)



Veitinger, J., B. Sovilla and R. Purves. Influence of snow depth distribution on terrain morphology: A multi-scale approach, in preparation for "The Cryosphere"

Temperature affects granulation and therefore mobility (velocity, runout)



Steinkogler W., B. Sovilla and M. Lehning, Influence of snow cover properties on avalanche dynamics Submitted to Cold Regions Science and Technology

STRADA Project:

Climate change and snow avalanches+ Innovative methodologies

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New procedures in the risk mitigation strategies on roads and ski-resorts

NEW PROCEDURES IN THE RISK MITIGATION STRATEGIES ON ROADS AND SKI-RESORTS

Roads

Ski-resorts

Railways

MANAGEMENT

Avalanche defence structures

Artificial avalanche release

PIDAV

Education

Local avalanche committee

20-21 FEBRUARY 2013 Forte di Bard Aosta Valley - Italy

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