



Climate change and natural hazards in the Alpine Arc: a cross country analysis

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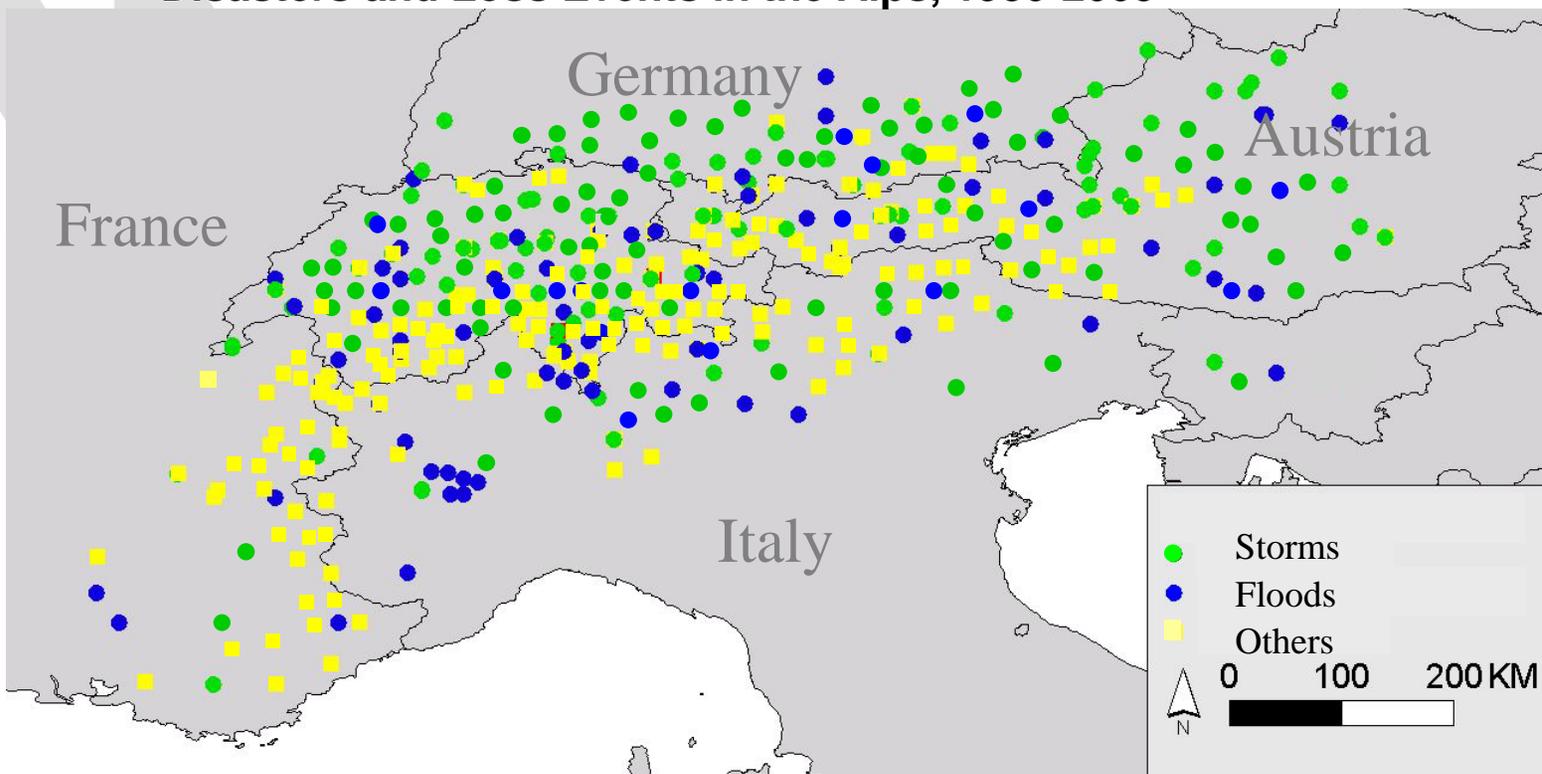
Outline

- Climate change impacts on natural hazards and key vulnerabilities
- Current signs of adaptation in Austria, France and Switzerland.
 - Policies: Hazards management, spatial planning, insurance
 - Adaptation projects

Natural Hazards in the Alps

- Floods
- Storms
- Avalanches
- Mass movements (e.g. landslides, debris flows)
- Forest fires

Disasters and Loss Events in the Alps, 1980-2005

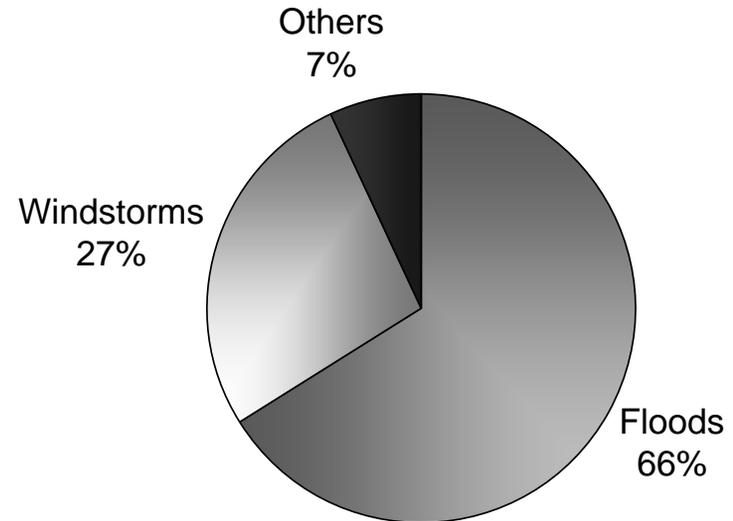


Source: MunichRe

Impacts of Natural Hazards in the Alps

- Important human impacts: 339 casualties over 1980-2005 (only for significant disasters)
- Important economic impacts, affecting various sector of the economy:
 - Infrastructures
 - Properties
 - Tourism

Economic Losses of **€57billion** due to Natural Hazards in the Alps, 1980-2005



Source: MunichRe

Climate Change in the Alps

- Warming more pronounced than global average
- Projected changes include:
 - Warmer temperature
 - More pronounced in summer, in high altitude
 - Less precipitation in summer
 - More important and intense precipitation in winter

Natural Hazards and Climate Change Impacts

Changes in Natural Hazards	Confidence in projected changes	Most affected regions	Economic importance
<u>Winter Floods:</u> Greater intensity and frequency	Medium	Lowlands, densely populated areas	<u>Very high</u>
<u>Avalanches:</u> Increasing incidence at high altitudes	Low	High mountain range, tourism areas	Medium
<u>Mass movements:</u> Increasing frequency/ magnitude	Medium	Northern/Western Alps	Medium
<u>GLOFs and other related mass movements:</u> increasing incidence	<u>High</u>	High mountain range, tourism areas	Low
<u>Permafrost related mass movements:</u> Increasing incidence	<u>High</u>	High mountain range, tourism areas	Low
<u>Forest fires:</u> Increase in number of events in Southern Alps	Medium	Lower mountain range of Southern Alps	Low
<u>Winter Storms:</u> Greater intensity and frequency	Medium	Alpine arc, densely populated areas	<u>Very high</u>



Adaptation

- Ability of current frameworks to manage natural hazards damages
- Responses to observed changes and trends
- Mainstreaming climate change risk into decision making: adopting a prospective approach

Adaptation – current efficiency of NHM

- Hazard mapping:
 - 30-100% in Austria
 - Around 50% in Switzerland
 - France at least 30% approved hazards maps...
- Insurance:
 - Most hazards and regions covered
 - Deficiencies (coverage, moral hazards)
 - Limited use of economic incentives
- Spatial planning :
 - Some deficiencies in terms of prevention incentives
 - Strengthening of spatial planning laws in some regions
 - Linking prevention and insurance costs

Adaptation - Increasing efficiency of NHM

- Integrated management of hazards
 - Improve cooperation, raise awareness, increase efficiency
- Signs of adaptation
 - National level
 - PLANAT in Switzerland
 - Austria's reaction to 2002 floods
 - New Law of 2003 in France

Adaptation to glacial and permafrost hazards

- Cross Border level: Information, knowledge and Decision Aids
 - Glaciorisk
 - Provide information on hazards and inventory
 - Decision aids based on cost-effectiveness
 - PACE
 - Provide information on hazards and inventory
 - Monitoring

Adaptation Projects

● Monte Rosa



Source: Kaab et al. 2005

Adaptation Projects

● Pontresina



Source: C. Wilhelm , Forestry Services, Grabsauden, CH

Mainstreaming climate change risk

- Building additional safety margin :
 - Included more extreme events (HQ 300) in hazard maps, an emergency planning (HQ 1000)
- Adopting a prospective approach:
 - Some early signs but still in its infancy
 - Potential constraints:
 - Uncertainty
 - Individuals may not welcome price increases or restriction based on uncertain projections

In the end...

- Various initiatives...
- Room to improve efficiency of NHM (no-regret),
 - Ensure and maintain insurance coverage,
 - Improve awareness and reduce moral hazards
 - Strengthen spatial planning regulation
 - Use economic incentive (insurance conditions)
- Response to observed trends, limited...
- Need to address risk by implementing a prospective approach...



Thank you!