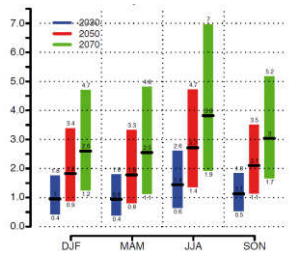
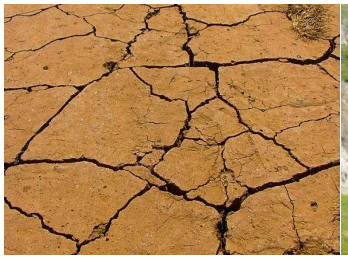
Swiss Confederation

Federal Department of the Environment,
Transport, Energy and Communications DETEC

Federal Office for the Environment FOEN
Climate Division

Adaptation to Climate Change in Alpine Regions

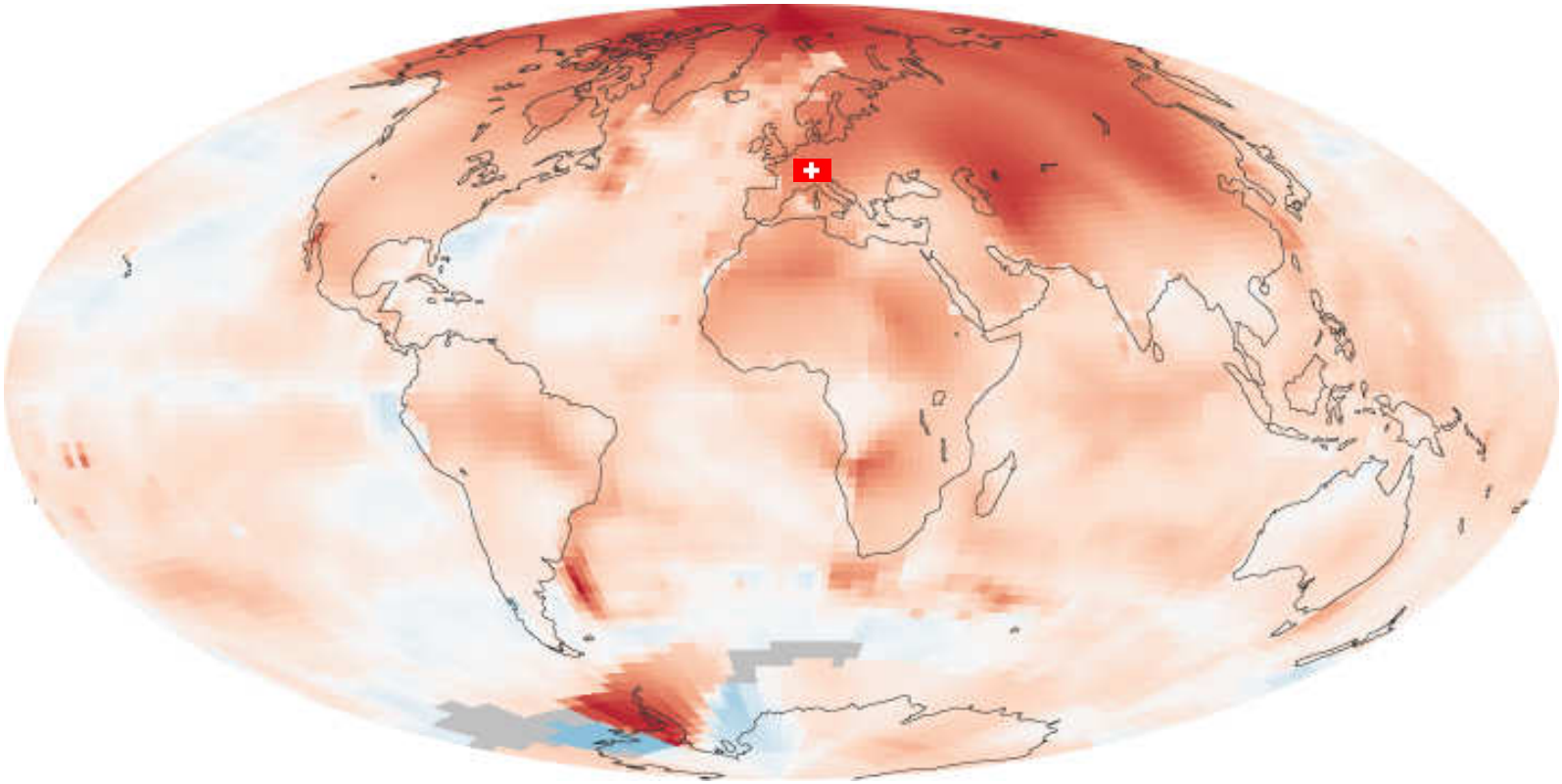



UN-ISDR Global Platform
Roundtable Mountains of Risk
May 12, 2011
Geneva

Thomas Probst, Roland Hohmann, Pamela Koellner-Heck

Swiss Federal Office for the Environment, Climate Division

Climate change in Switzerland



Global warming 2000-2009
compared to reference period 1951-1980

Source: NASA Earth Observatory 2011

Climate change in Switzerland

Risks

Sources: Hansruedi Burgener 2005 / PLANAT, Walter Welss, welt der Schweizerisches Tropeninstitut

Climate change in Switzerland

Opportunities

Sources: GCOS Schweiz, www.biel-seeland.ch

Swiss adaptation strategy
Federal Council mandate (August 2009)

Develop a strategy for adaptation to climate change

- Analyse climate change related risks
- Define objectives for coping with the consequences
- Enable coordination of adaptation actions

Swiss adaptation strategy

Objectives

1. Seize the opportunities provided by climate change
2. Minimize the risks of climate change, protect population, material assets and natural resources
3. Increase the adaptive capacity of all systems



Swiss adaptation strategy

Synthesis: biggest challenges

draft!

natural hazards

1. Increasing flood risk
2. Increasing slope instability and mass movements
3. More frequent and intense heat waves in cities
4. More frequent and intense droughts
5. Spreading vermin, invasive species and pathogens
6. Changing site conditions and productive capacities
7. Changing habitats and species distribution

---

8. Improving the knowledge base
9. Raising awareness and willingness to adapt
10. Fostering cooperation

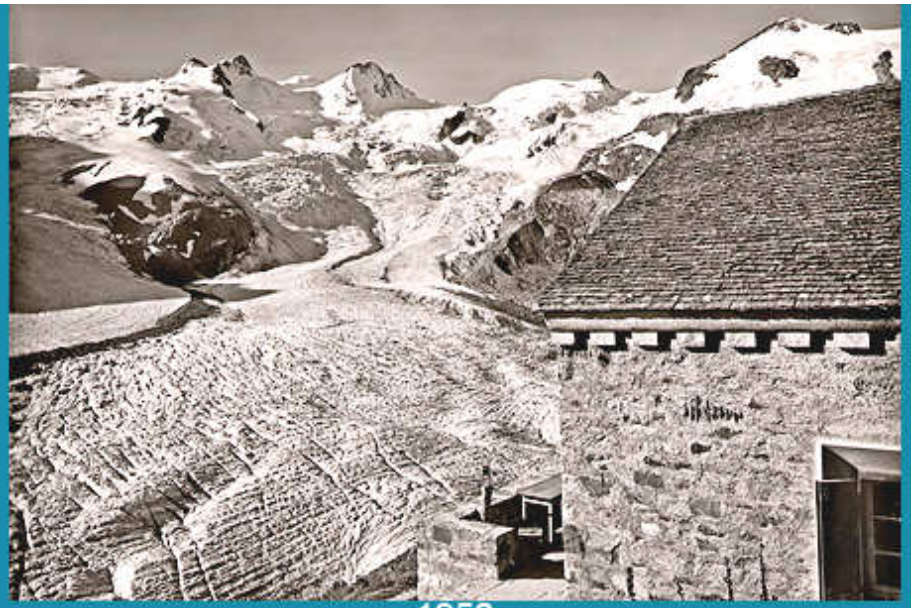
Swiss adaptation strategy

Swiss adaptation strategy

Slope instability and mass movements

Glacier retreat

Rosegg glacier



1952

2003

2006

Source: www.gletscherarchiv.de

Swiss adaptation strategy

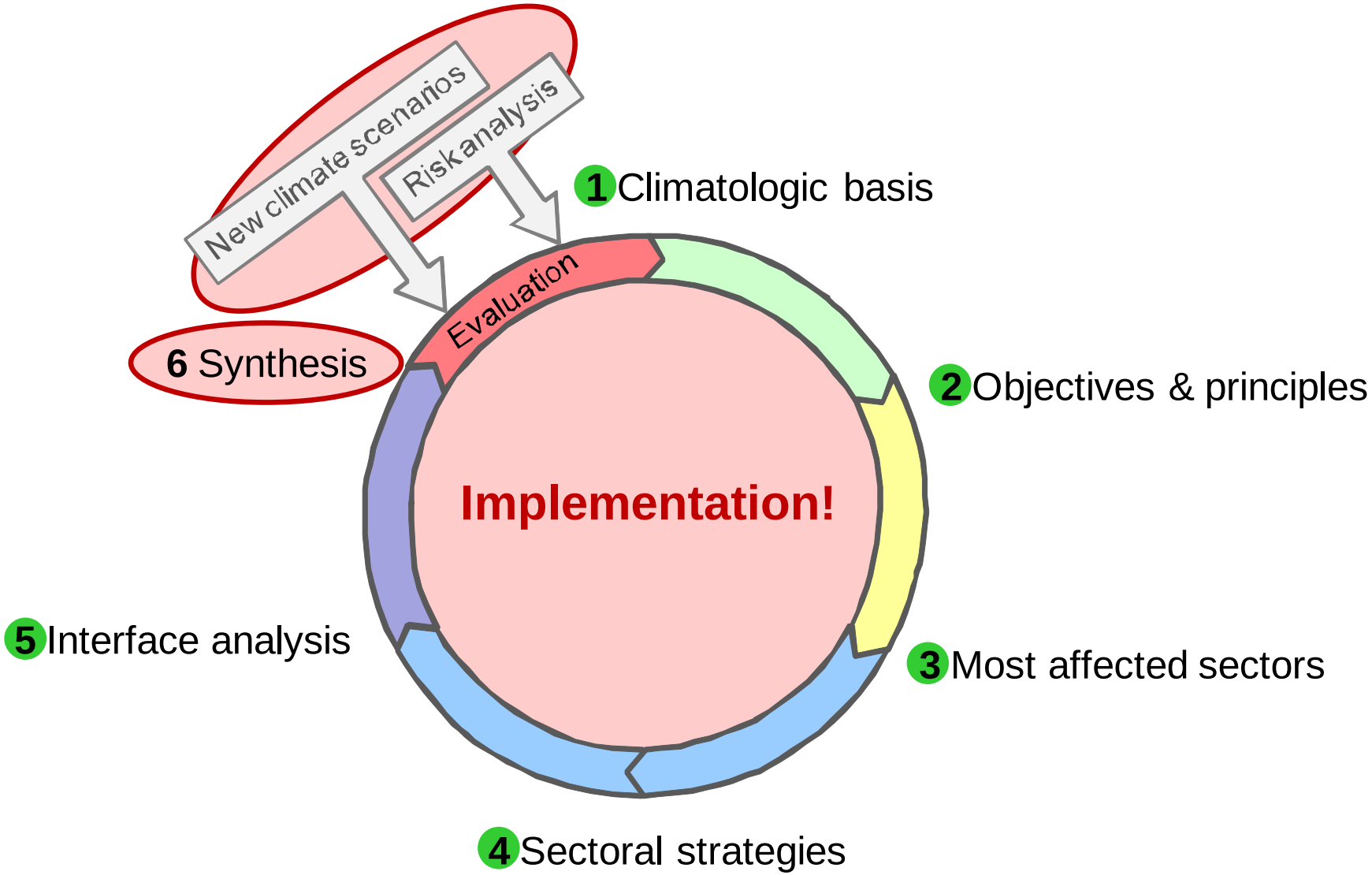
Slope instability and mass movements

Swiss adaptation strategy

Slope instability and mass movements

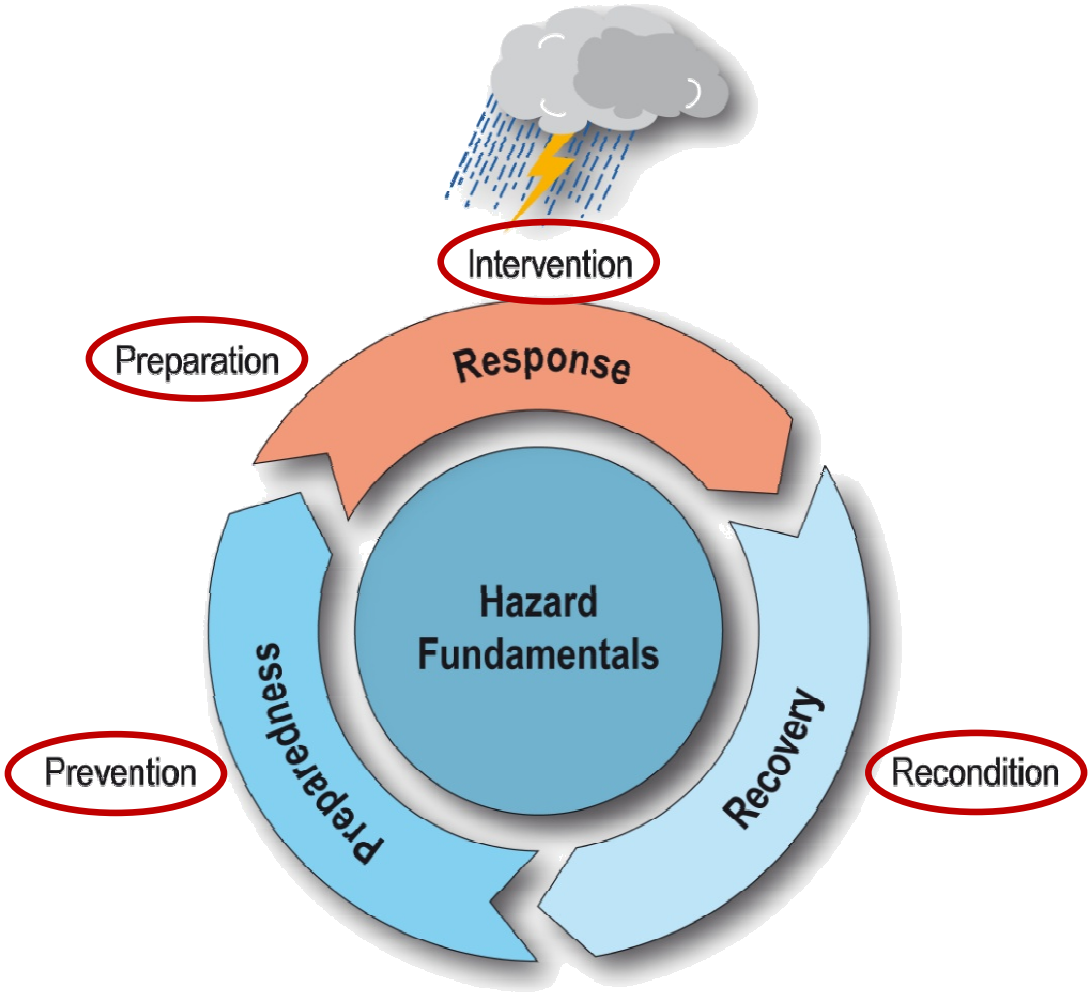
Swiss adaptation strategy

Next steps

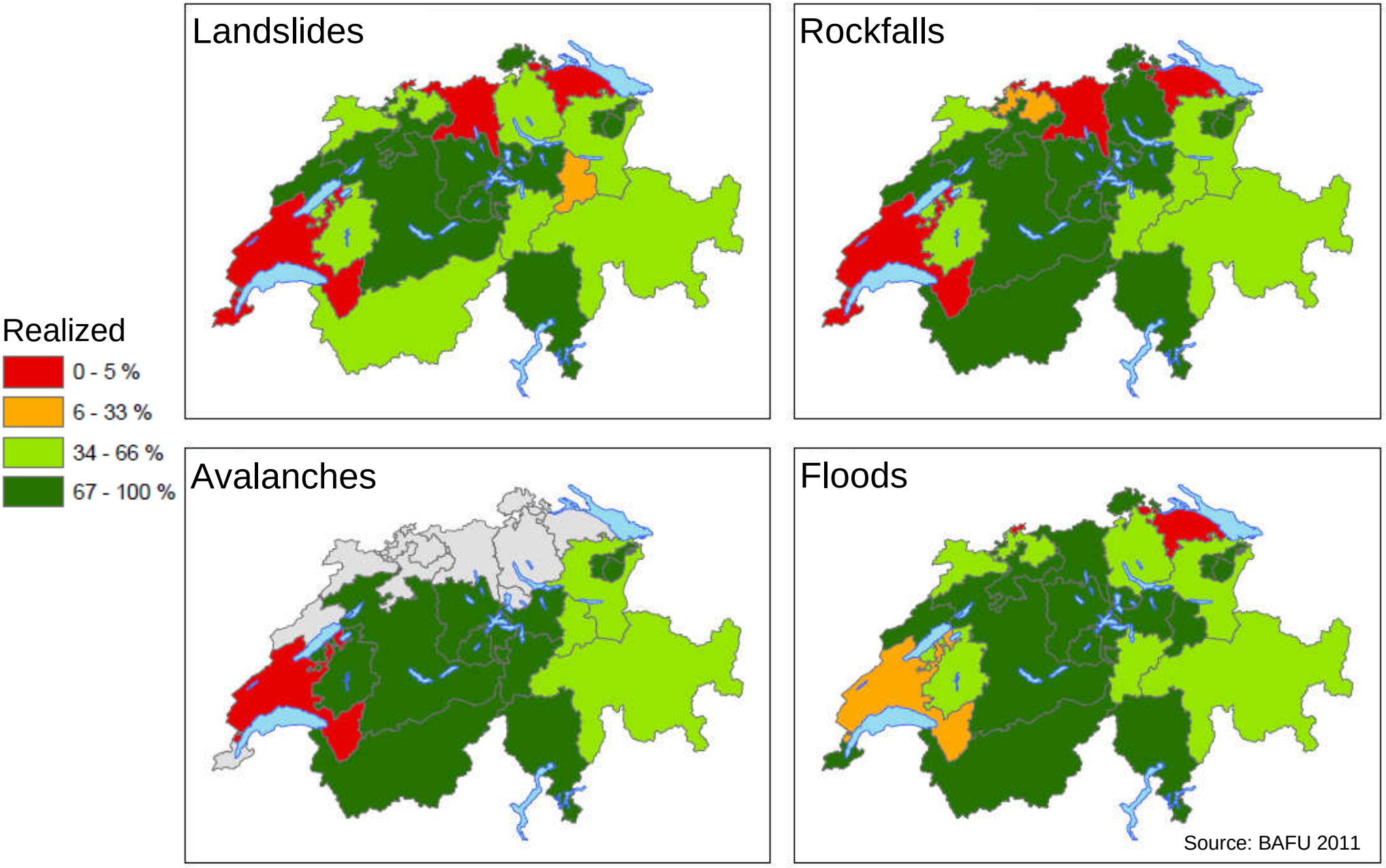


Implementation
Integrated risk management

- **Avoid risk:**
  mapping and land-use planning
- **Limit risk:**
  constructive and organisational measures
- **Manage residual risk:**
  self responsibility and insurance
- **Consider climate change:**
  in all steps of IRM



Implementation
Hazard maps



Implementation
Climate-proof measures

Implementation
Climate-proof measures

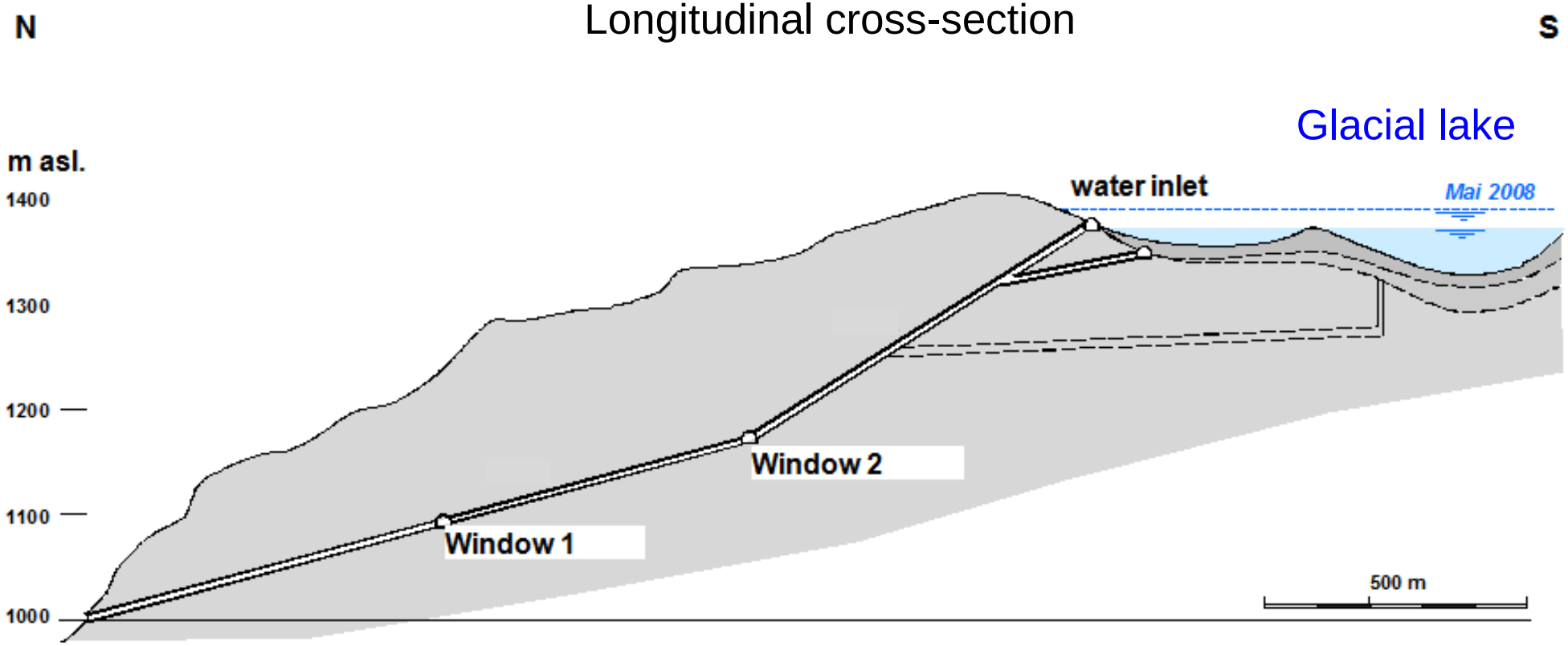
- Permanent monitoring of lake level and glacier
- Early warning system: glacier avalanches, glacial lake outburst, flooding
- Warning of population via local radio

Sources: Christoph Haemmig / GEOTEST, OIK

Implementation
Climate-proof measures

Artificial draining gallery

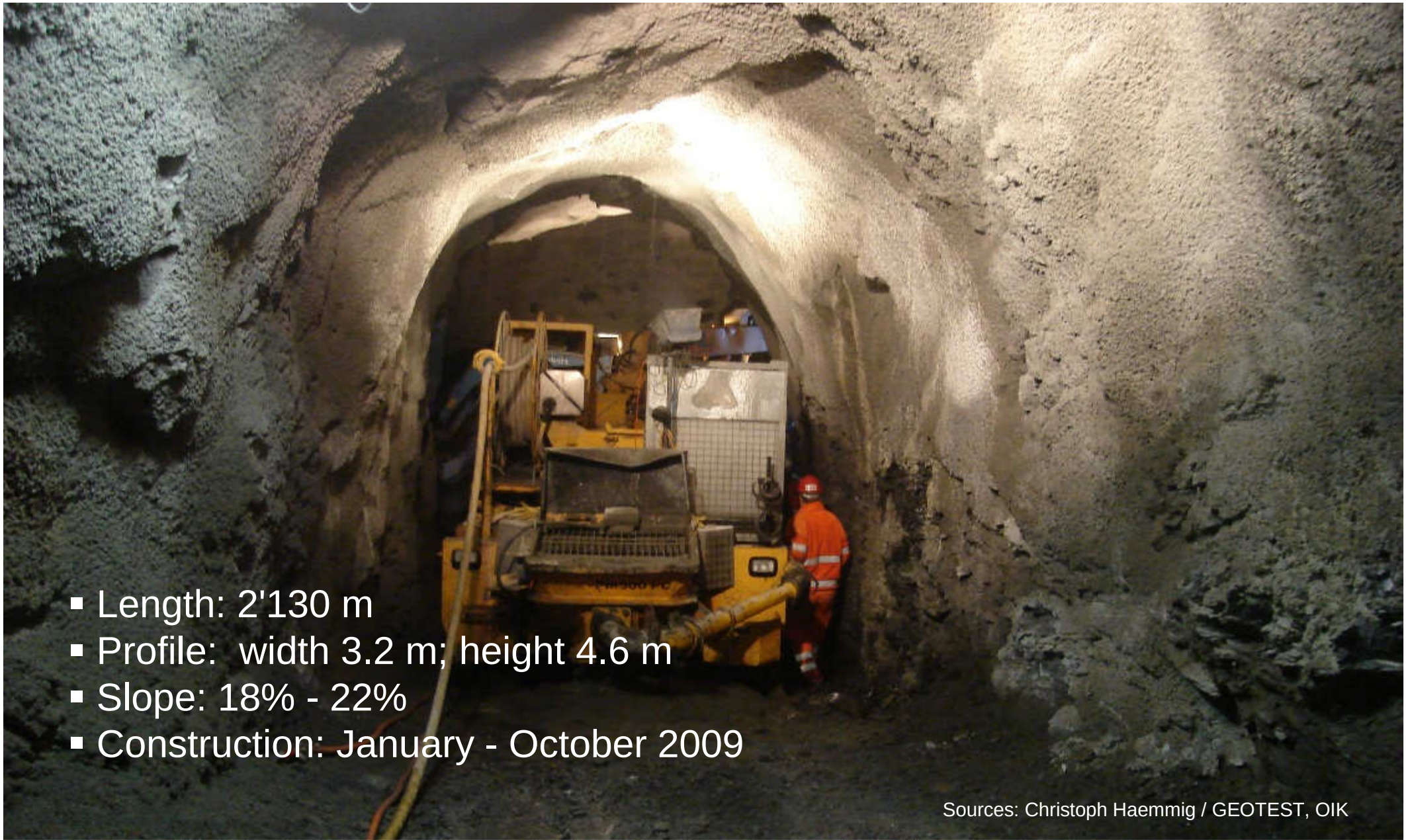
Longitudinal cross-section



Grindelwald village

Source: Christoph Haemmig / GEOTEST

Implementation
Climate-proof measures



- Length: 2'130 m
- Profile: width 3.2 m; height 4.6 m
- Slope: 18% - 22%
- Construction: January - October 2009

Sources: Christoph Haemmig / GEOTEST, OIK

Cooperation in the Alpine Space

Transnational projects

Sources: Alpine Space Programme, ASP projects, www.wikipedia.de

Cooperation in the Alpine Space
PLANALP

Alpine Convention (since 1995)

Framework for sustainable development of the Alpine region

Platform on natural hazards PLANALP (since 2005)

High-level experts from international, national, regional institutions

- Discuss concepts for integrated natural hazards reduction
- Identify best practices
- Implement corresponding measures
- Intensify cross-border exchange

Thank you!

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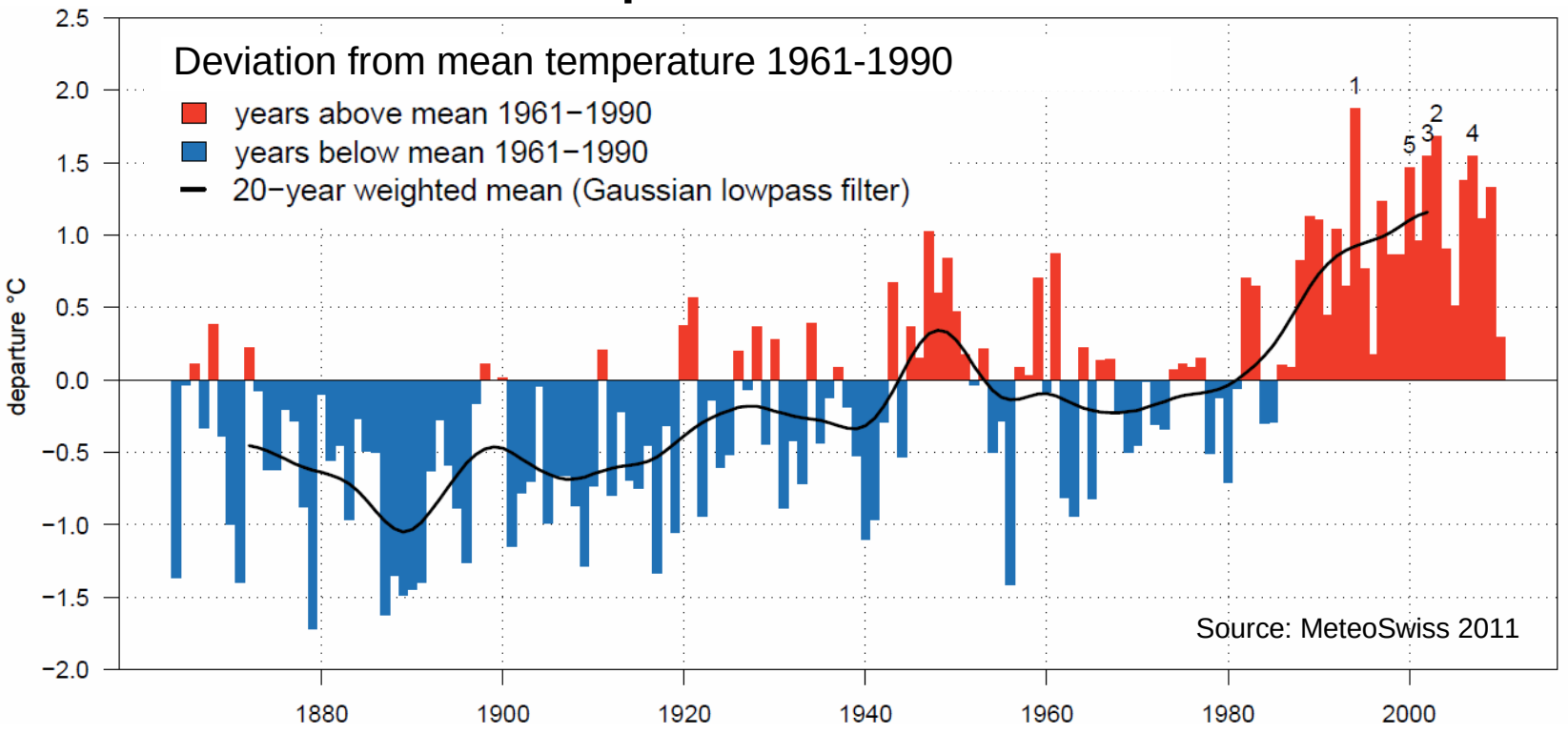
Climate change in Switzerland

20th century

- Global mean temperature: +0.6℃
- Europe: +0.9℃
- Switzerland: +1.0℃ (south) / +1.3℃ (east) / +1.6° C (west)

Annual mean temperature Switzerland 1864-2010



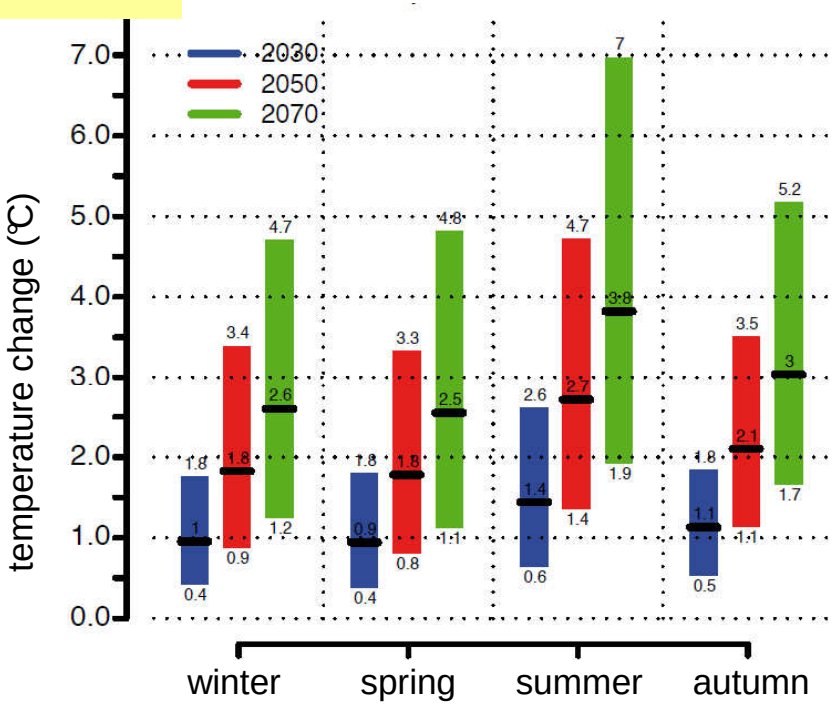
Climate change in Switzerland

Future

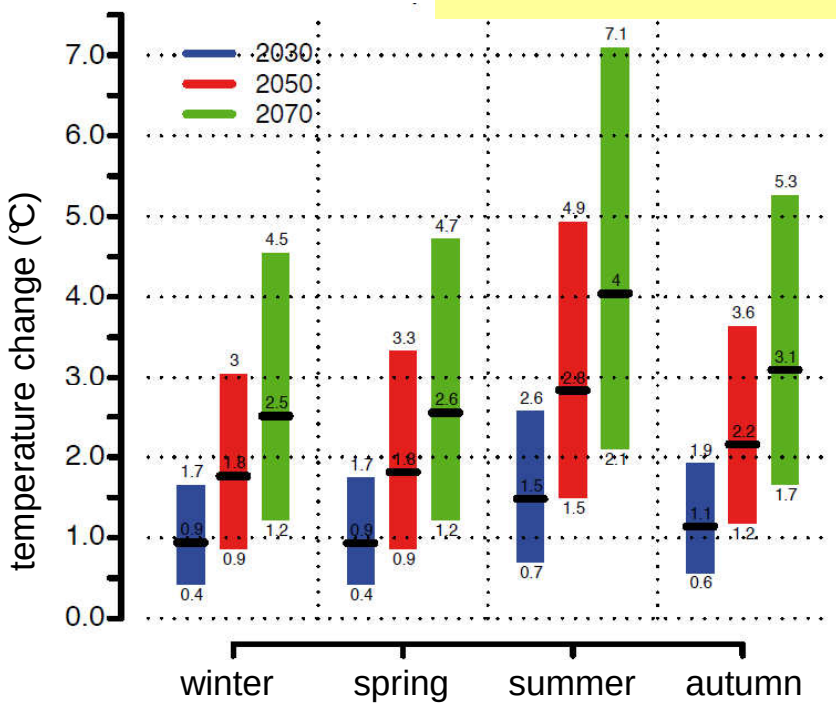
Temperature (changes compared to 1990)

median 2050
summer: +2.7℃
winter: +1.8℃

CH north



CH south



median 2050
summer: +2.8℃
winter: +1.8℃

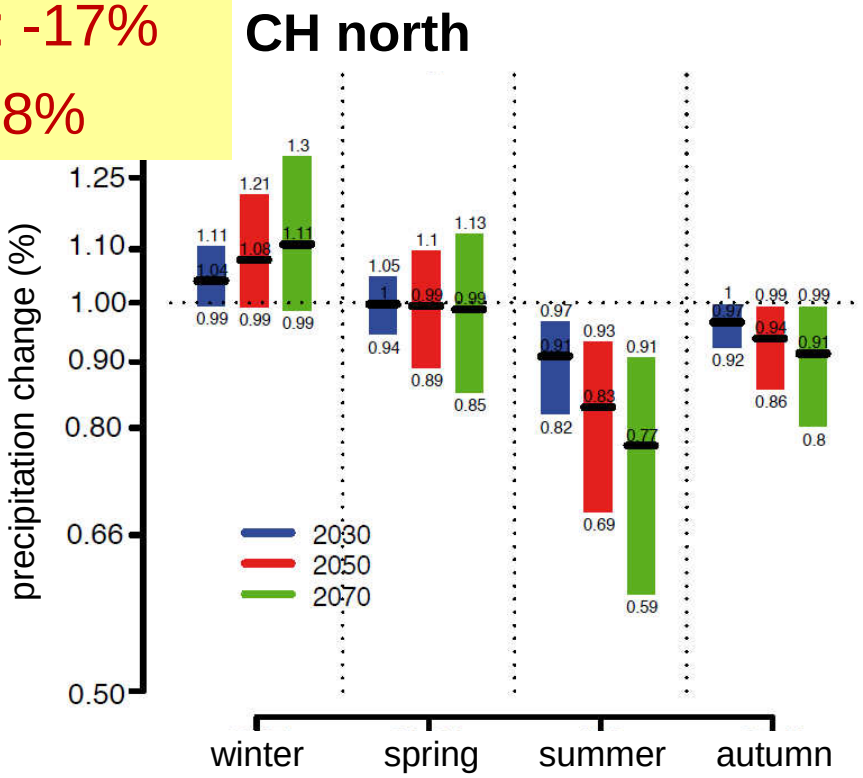
Source: OcCC 2007

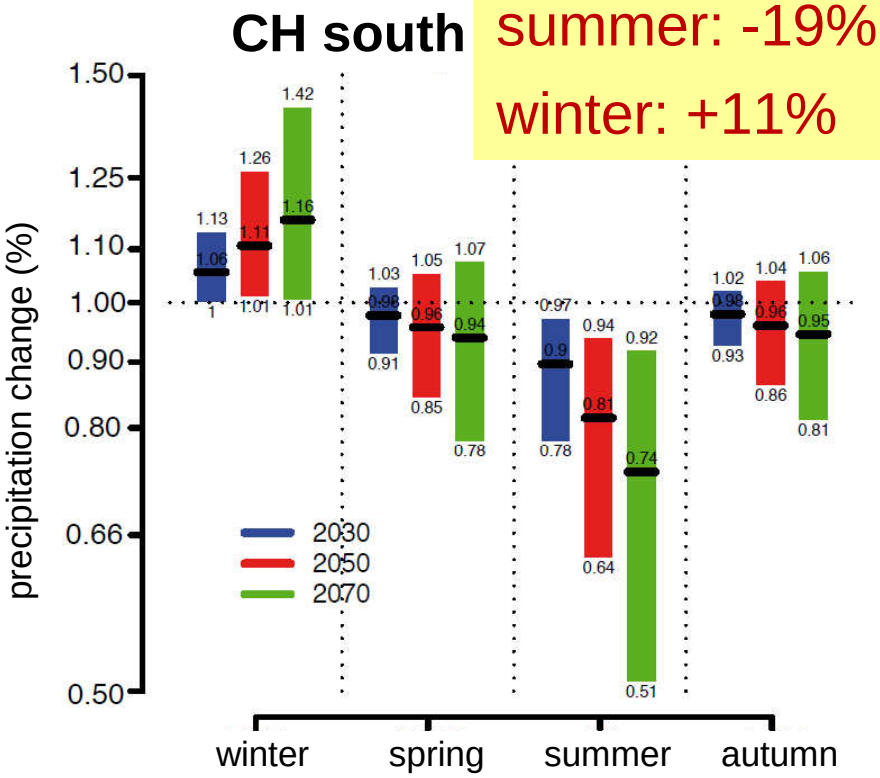
Climate change in Switzerland

Future

Precipitation (changes compared to 1990)

median 2050
summer: -17%
winter: +8%

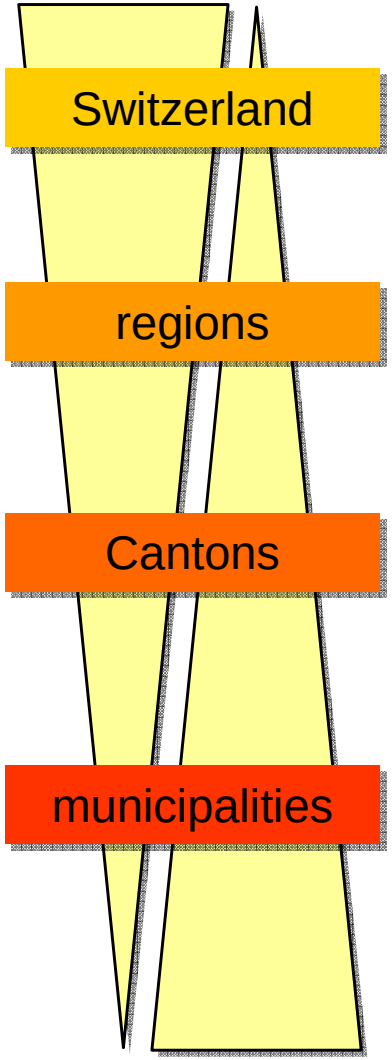




median 2050
summer: -19%
winter: +11%

Source: OcCC 2007

Climate change in Switzerland
Impacts



Adaptation measures: Sectors	**Climate Change** (temperature, precipitation, pressure)	**Water** - surface run off - ground water - water quality - snow - ice	**Soil** - C-storage - fertility - erosion	**Air** - ozone - aerosols - particulate matter	**Biology** - phenology - migration - neobiota
Agriculture	●	●	●	●	●
Forest management	●	●	●	●	●
Energy	●	●			●
Water management	●	●	●	●	●
Tourism	●	●		●	●
Biodiversity management	●	●	●	●	●
Spatial development	●	●	●	●	●
Health	●	●		●	●
Natural hazards	●	●	●		●

● (Mutual) Interaction between climate change impact and adaptation measure

Climate change in Switzerland
Economic effects

… on Swiss national economy until 2100:

- 0.5%-1.6% of GDP/y climate change damages
- 2005-2100: 1 Bio. CHF/y (median)

… on Swiss exports until 2050:

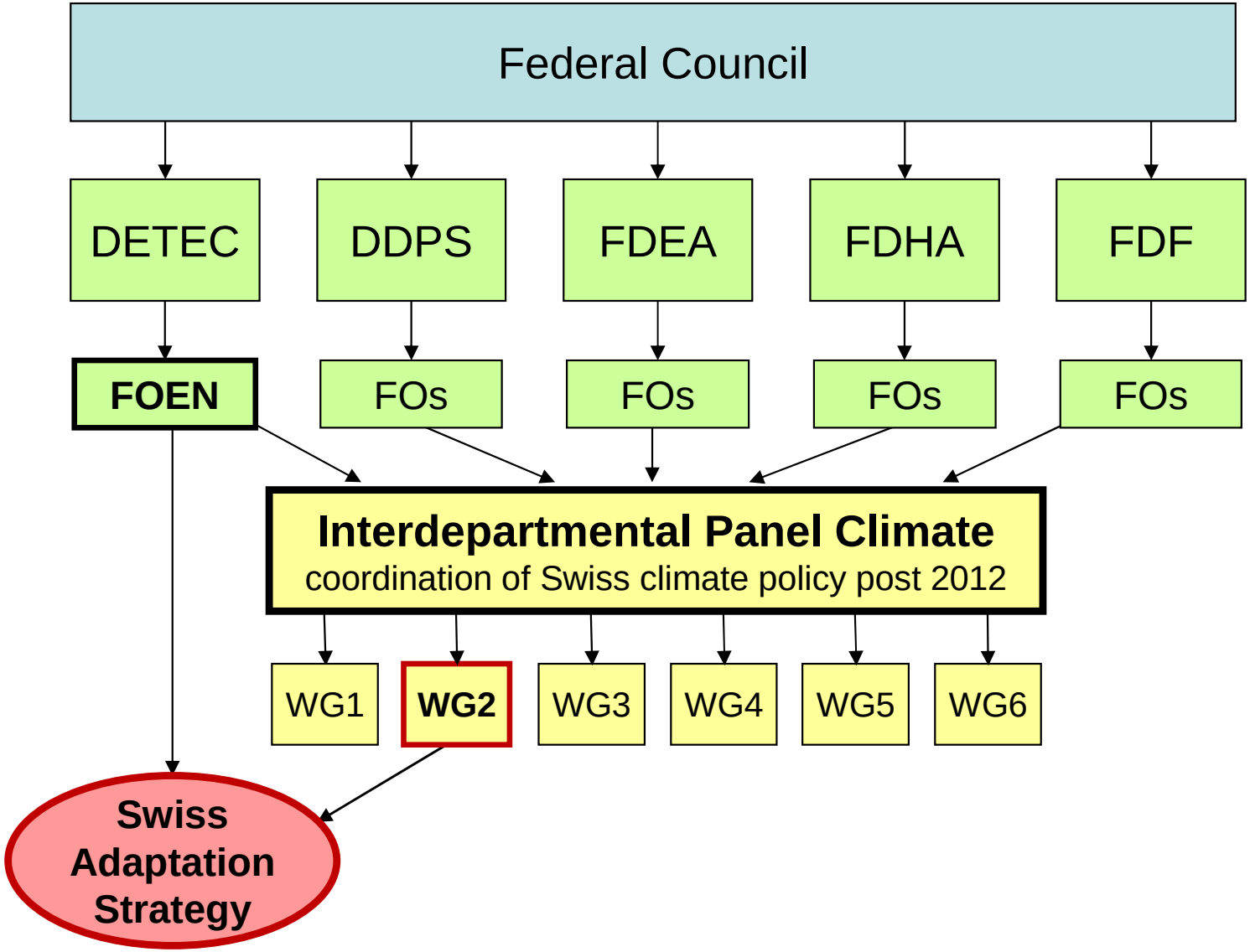
- 1.4%-3.1% of exports endangered = 0.5%-1.1% GDP

… on tourism in the Bernese Alps until 2030:

- Winter revenues: -200 Mio. CHF/y (-30%)
- Summer revenues: +80 Mio. CHF/y (+7%)

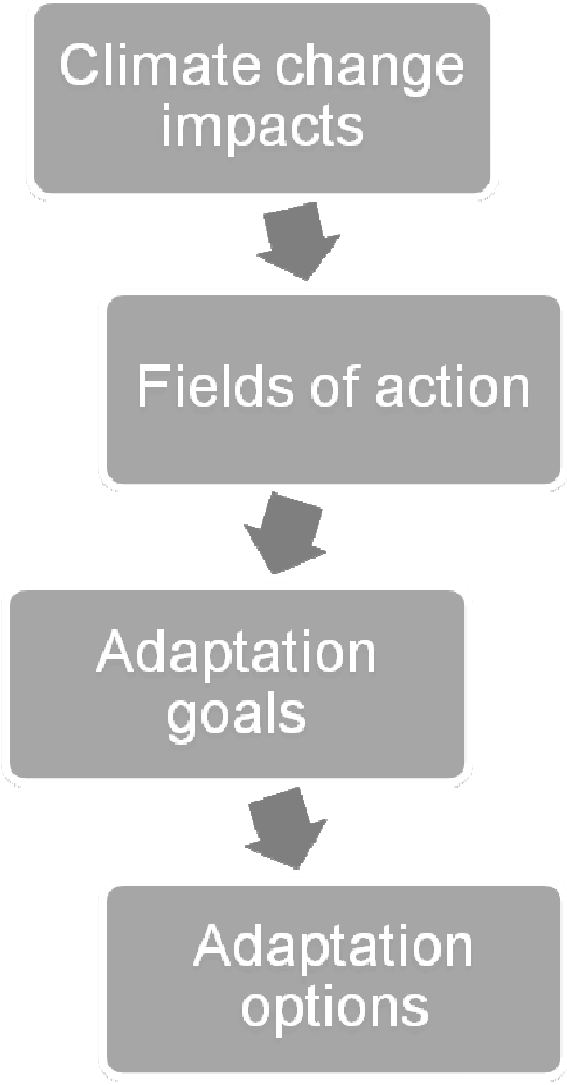
Sources: Ecoplan, Sigmaplan 2007, INFRAS, Ecologic, Ruetter+Partner 2007, Universitaet Bern / FIF 2007

Swiss adaptation strategy
Interdepartmental Panel Climate



Swiss adaptation strategy
Sectoral strategies

WATER	Water management
NATHAZ	Natural hazards prevention
AGRIC	Agriculture
FOREST	Forest management
ENERGY	Energy
SPACE	Spatial development
HEALTH	Health
BIODIV	Biodiversity management



Swiss adaptation strategy
Content

PART A: THE ADAPTATION STRATEGY

1. Background
2. Objectives and principles
3. The biggest common challenges for adaptation
4. Outlook: steps of implementation

PART B: ANNEXES

5. Methodology
6. Climate scenarios
7. Sectoral adaptation strategies
8. Interfaces between the sectoral strategies

Swiss adaptation strategy

Flood risk

draft!

	problems	options
NATHAZ	increasing damage potential to –settlements and buildings –road and train infrastructure –supply and disposal infrastructure –population	– finalize/update hazard maps – climate-proof technical prevention – monitoring and early warning
SPACE		– implement hazard map restrictions – keep endangered areas undeveloped – preserve space for rivers – create flood retention areas
WATER		– multi purpose reservoirs – lake regulation and management

Swiss adaptation strategy

Slope instability and mass movements

draft!

	problems	options
NATHAZ	increasing damage potential to –settlements and buildings –road and train infrastructure –energy supply infrastructure –dams	– glacier/permafrost/slope monitoring – review current protection concepts – finalize hazard maps – climate-proof technical prevention
SPACE		– implement hazard map restrictions – keep endangered areas undeveloped
FOREST		– adjust/transform protection forests – new technical protection measures
ENERGY		– sensitize for new risks
WATER		– sensitize for new risks