Swiss Confederation

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

Federal Office for the Environment FOEN

Climate Change and Risk Management in Switzerland

Case study Grindelwald

10 October 2013, Brescia

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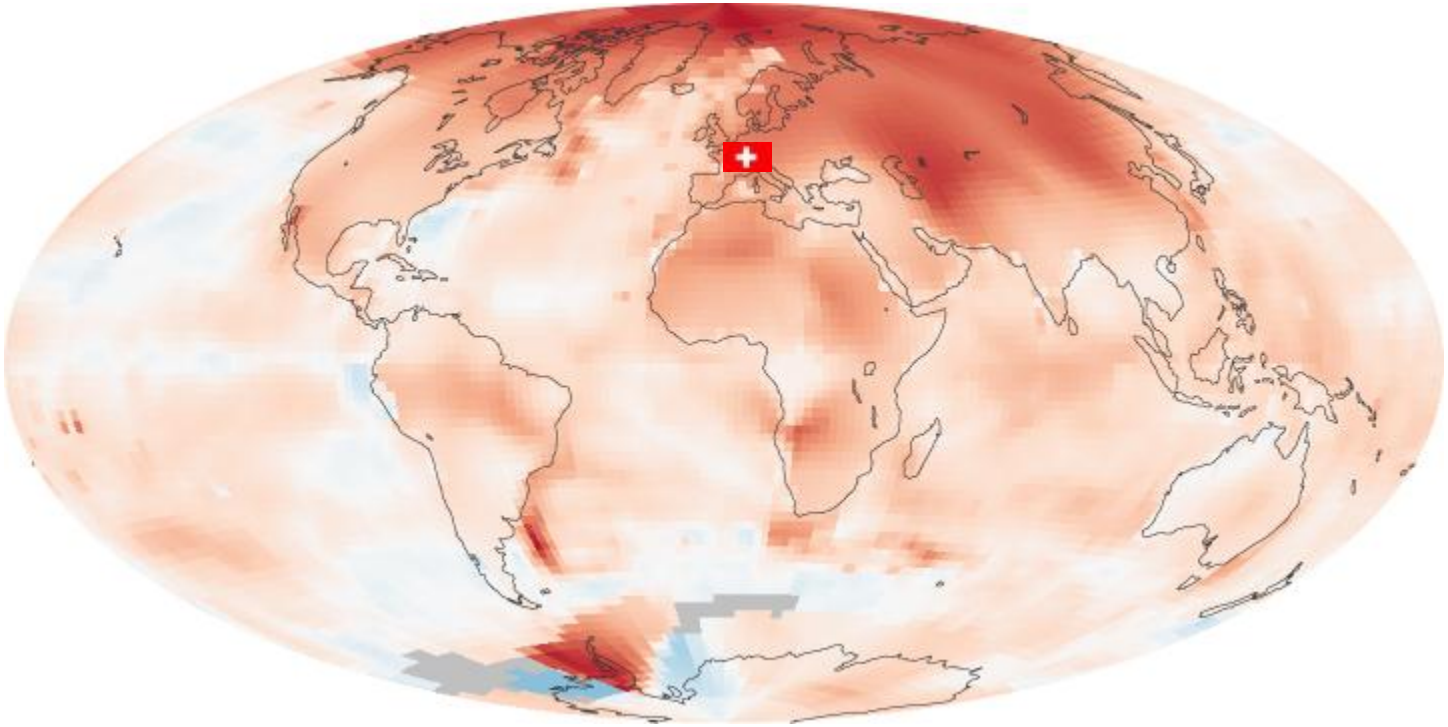
Swiss expert in natural hazards management

Climate Change



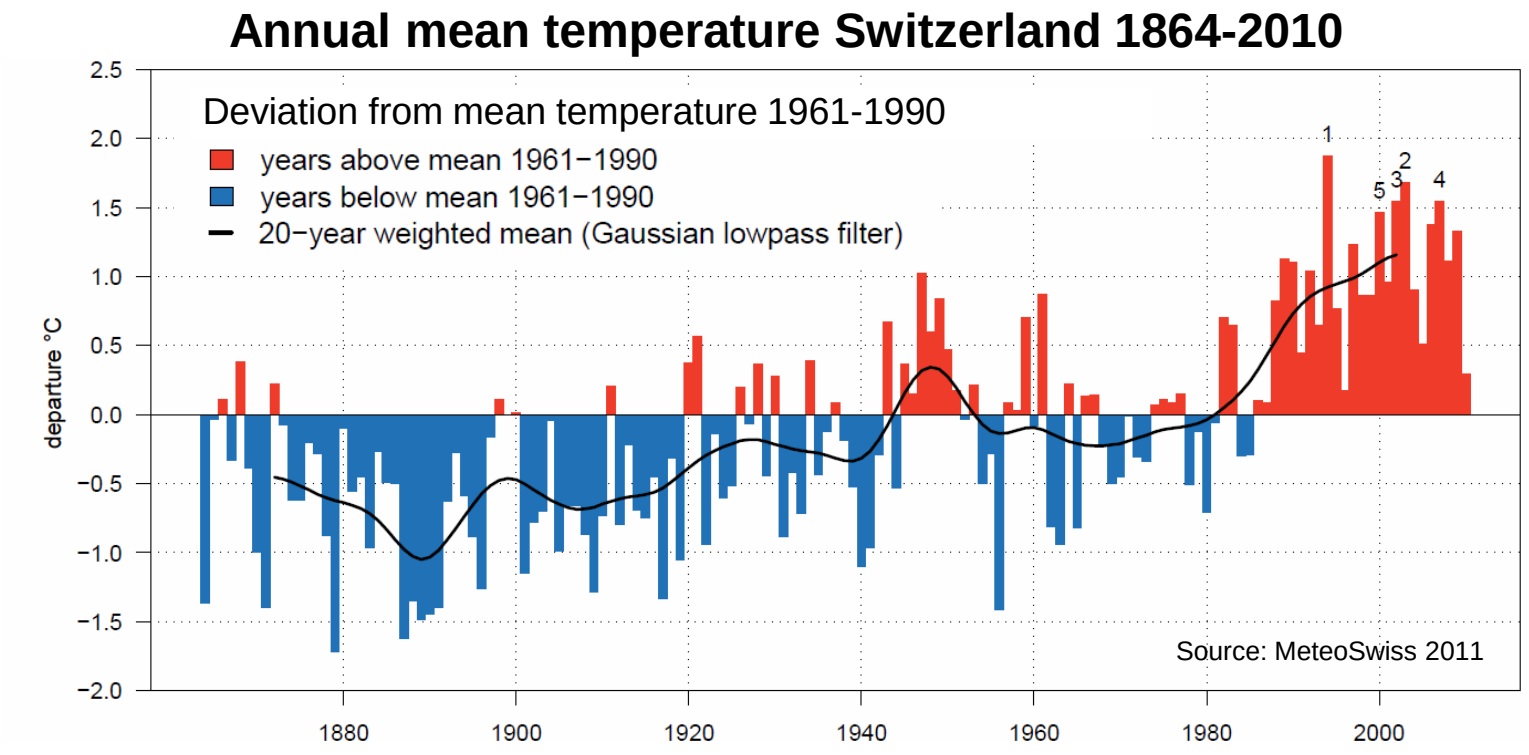
Global warming 2000-2009
compared to reference period 1951-1980

Source: NASA Earth Observatory 2011

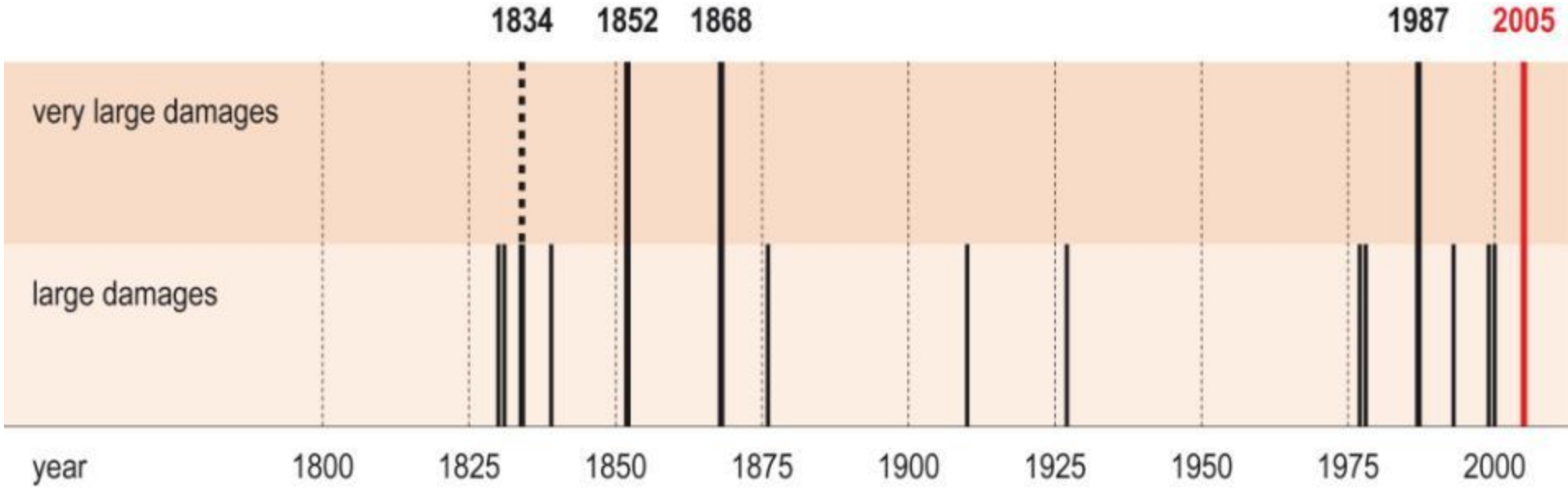
Climate Change

20th Century

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



Regional flood events since 1800



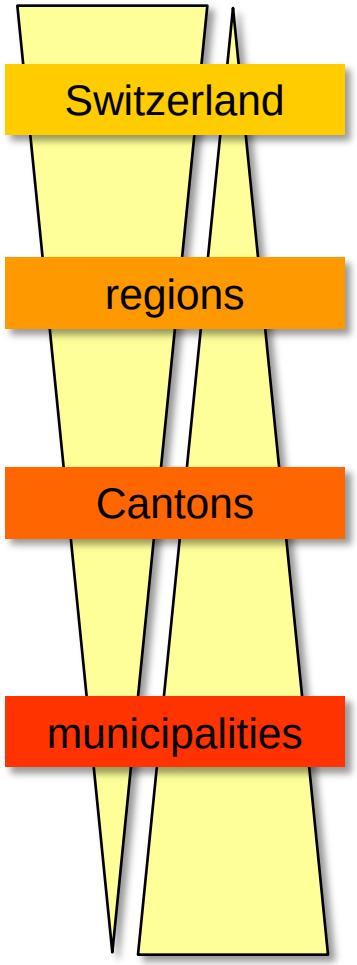
Climate Change

- Not a new phenomenon
- New: speed of change, land use intensity, damage potential
- Action needed: mitigation and adaptation
- Importance of adaptation is growing



Adaptation to Climate Change

National Strategy



Climate Change (temperature, precipitation, pressure)

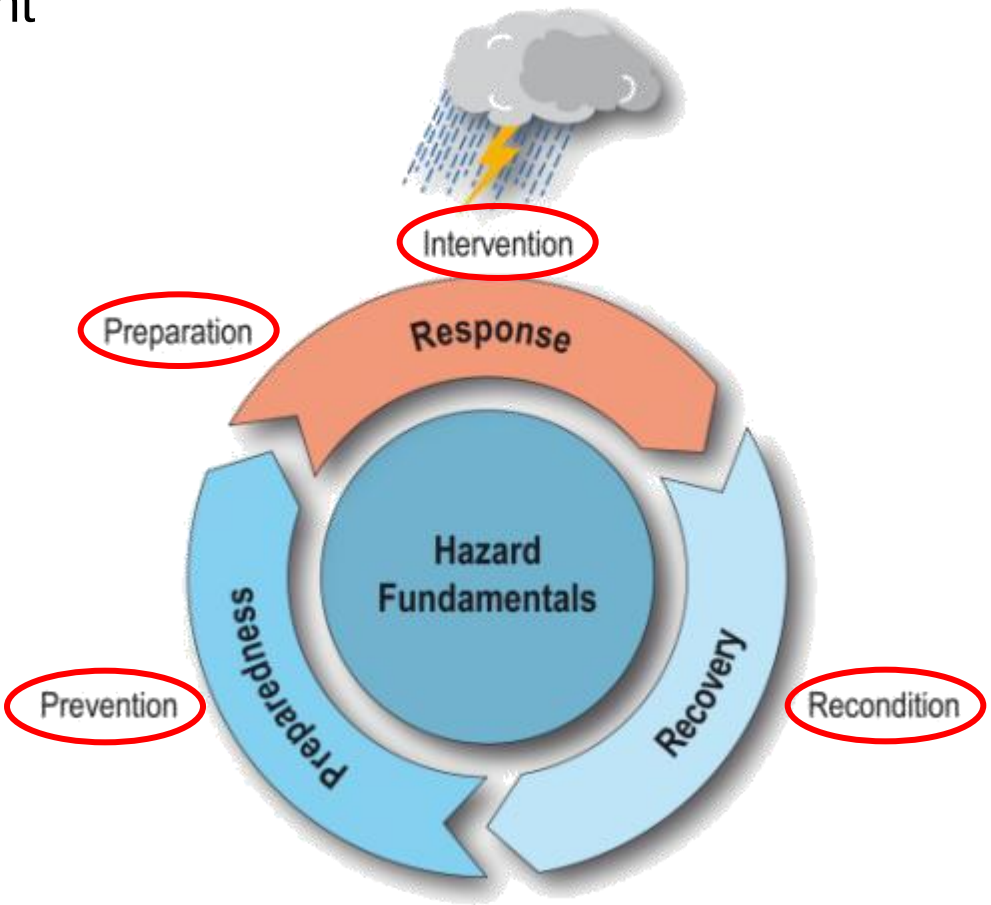
Adaptation measures: Sectors	**Water** - surface run off - ground water - water quality - snow - ice	**Soil** - C-storage - fertility - erosion	**Air** - ozone - aerosols - particulate matter	**Biology** - phenology - migration - neobiota
Agriculture	●	●	●	●
Forest management	●	●	●	●
Energy	●	●		●
Water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

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

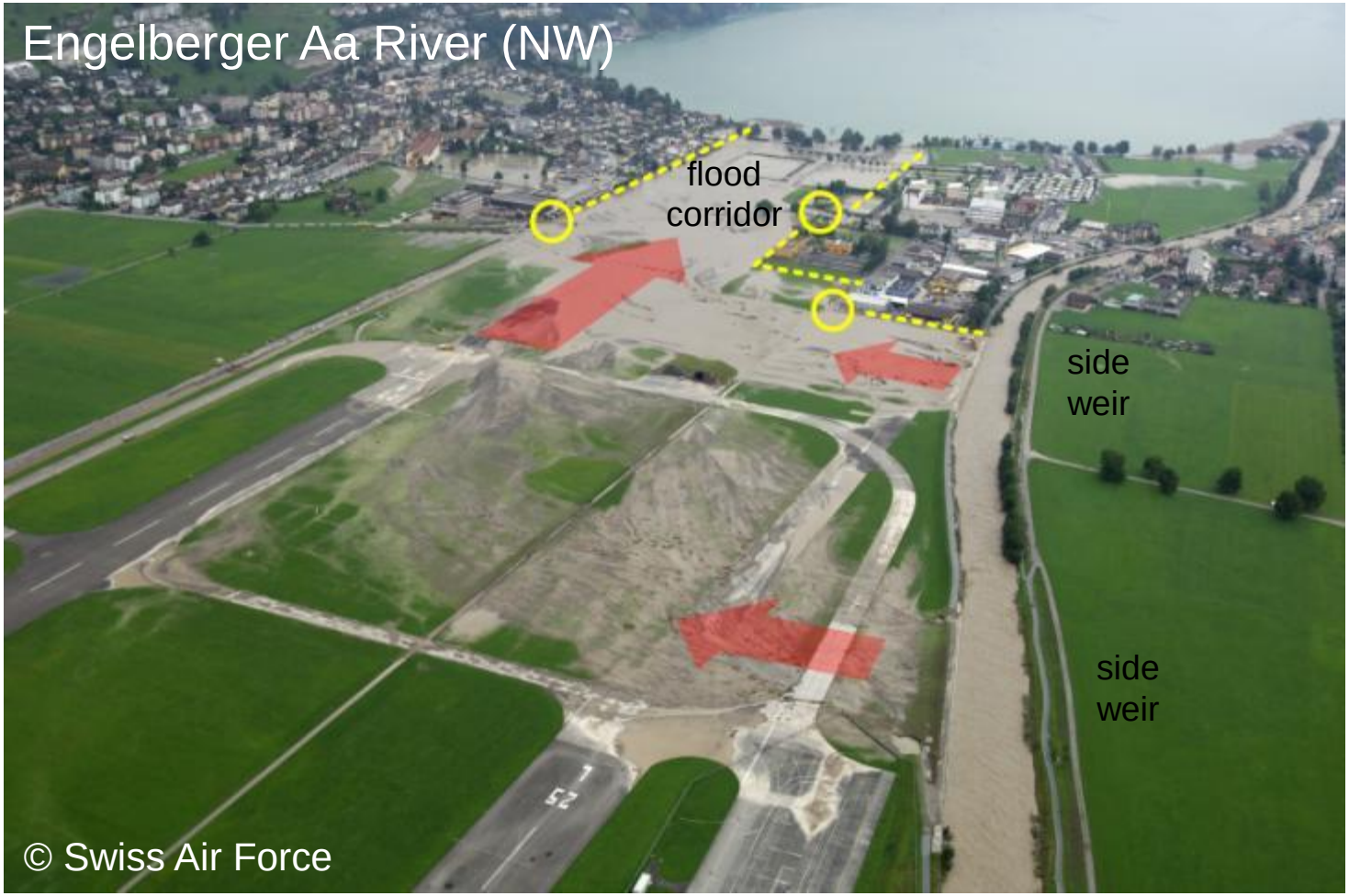
Adaptation to Climate Change
Natural Hazards

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



Climate Change Adaptation



Integrated flood risk management
→ robust and adaptive protection concepts

Climate Change Adaptation
Grindelwald Glacier

Climate Change Adaptation
Grindelwald Glacier

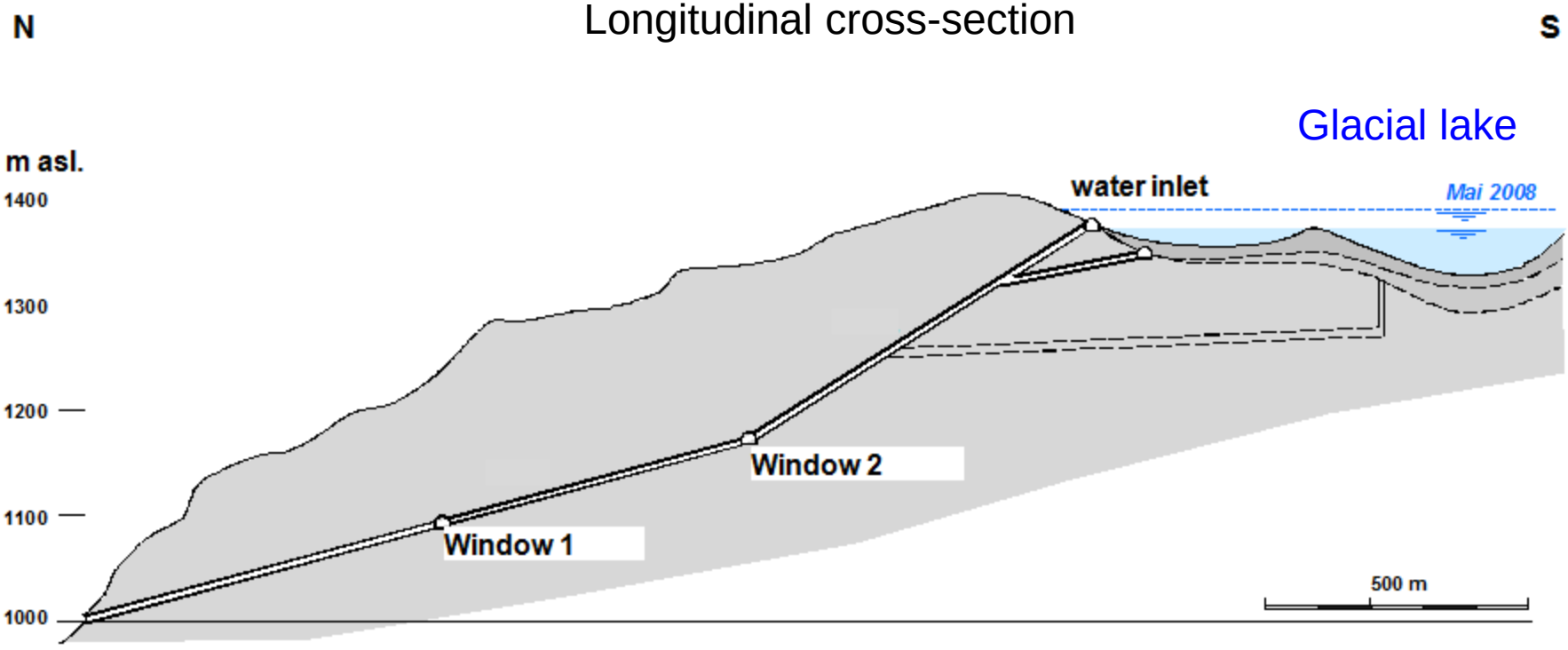
- Permanent monitoring of lake level and glacier
- Early warning system: glacier avalanches, glacial lake outburst, flooding
- Warning of population via local radio

Sources: Christoph Haemmig / GEOTEST, OIK

Climate Change Adaptation
Grindelwald Glacier

Artificial draining gallery

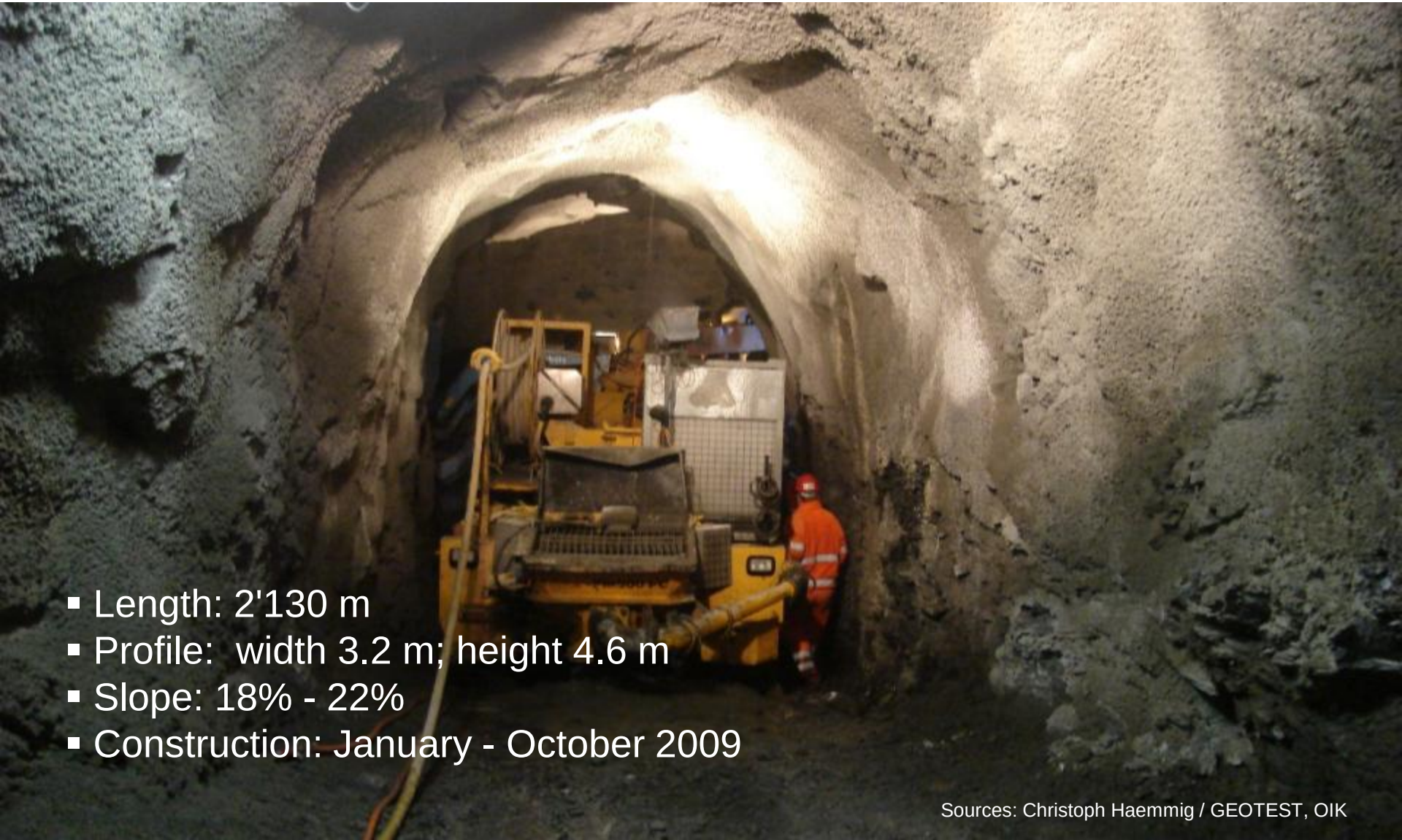
Longitudinal cross-section



Grindelwald village

Source: Christoph Haemmig / GEOTEST

Climate Change Adaptation
Grindelwald Glacier



- 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

Thank you very much for your attention