

Response of water to climatic change in the Swiss Alps

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Overview

- The Swiss Alps: Europe's water tower
- Current and future climate
- Potential impacts on water
- Concluding remarks

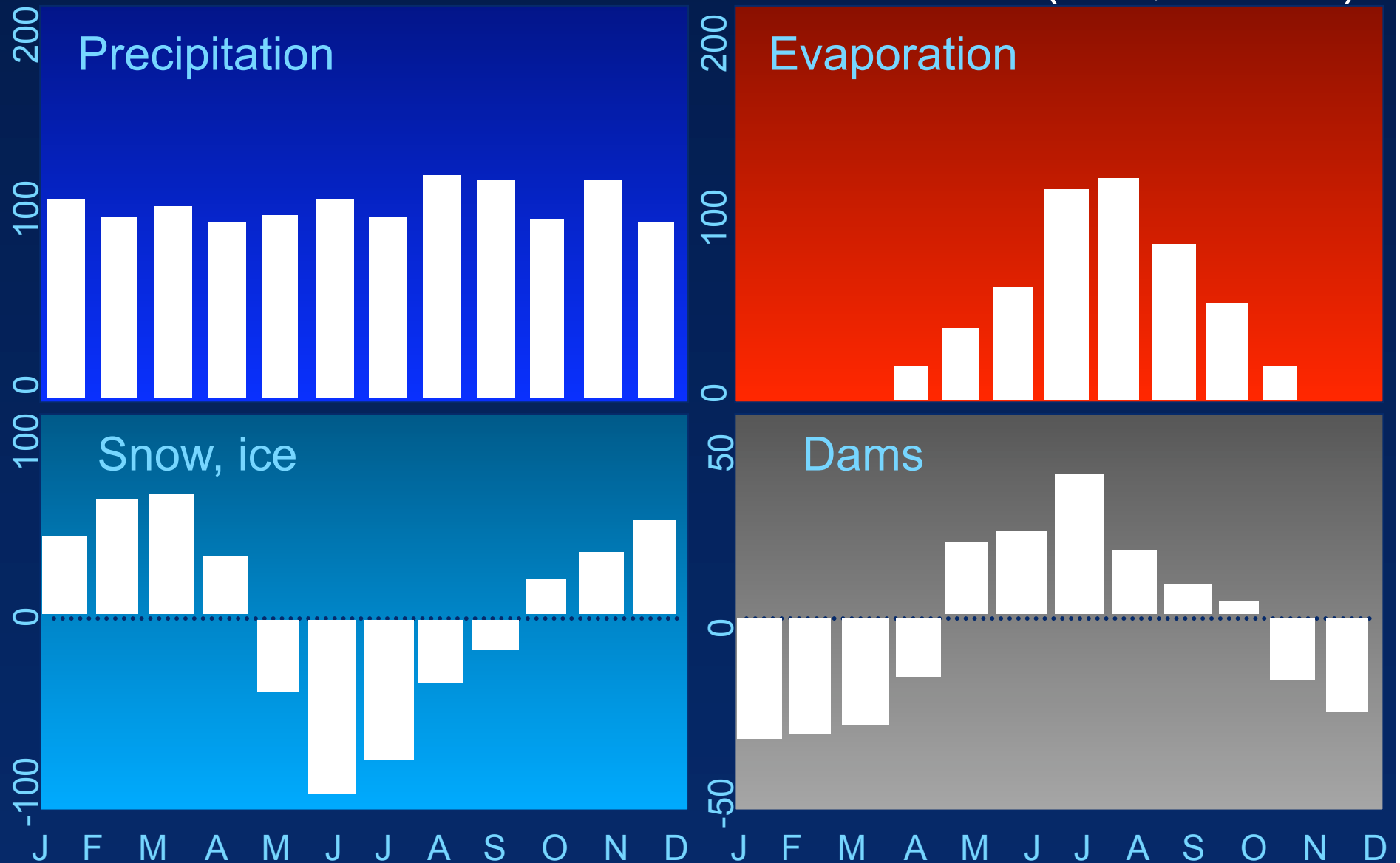
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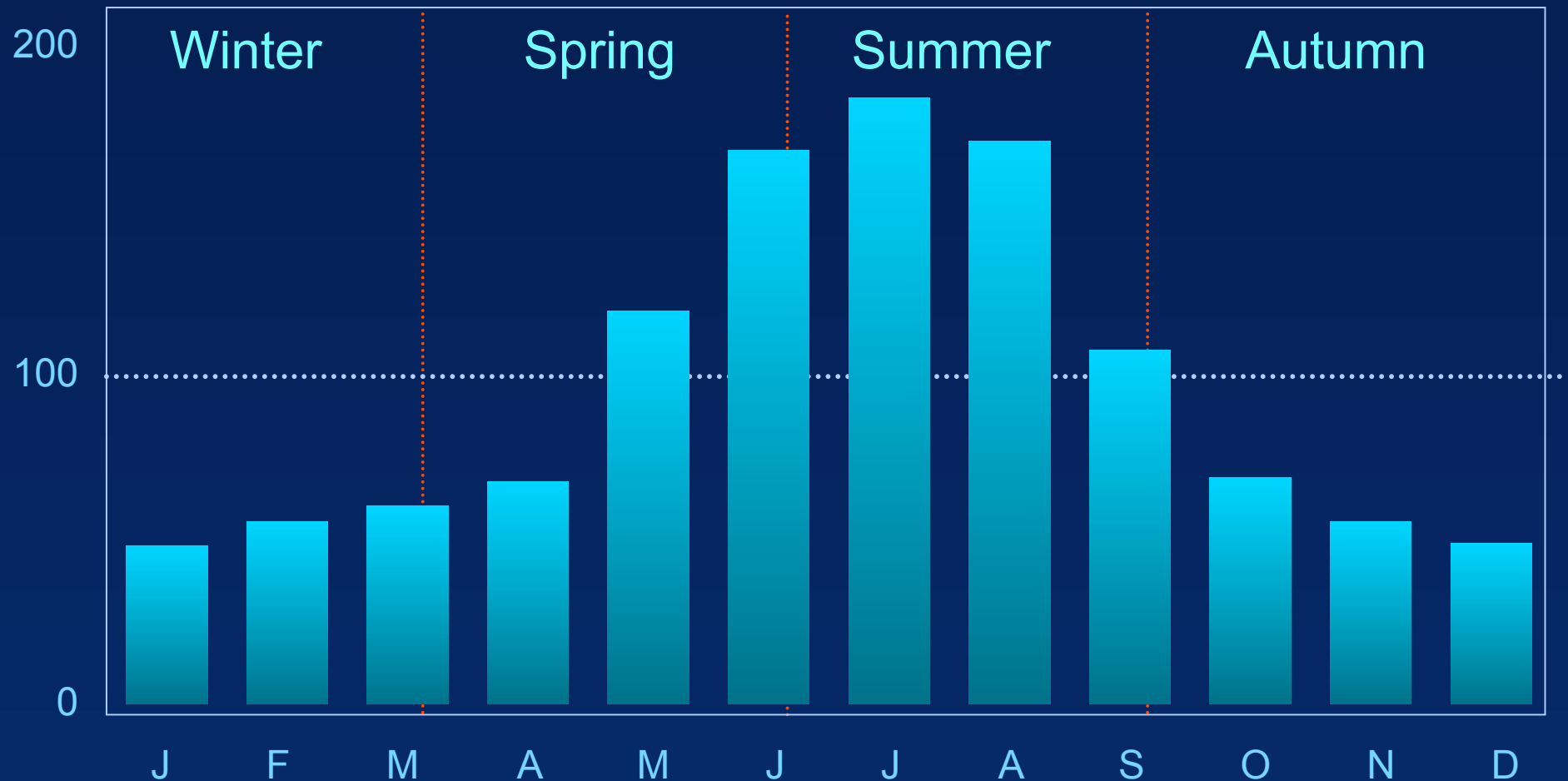
The Swiss Alps: Europe's « water tower »



Components of the hydrological cycle under current climate (mm, Rhone)



Average monthly discharge (mm, Rhone River)

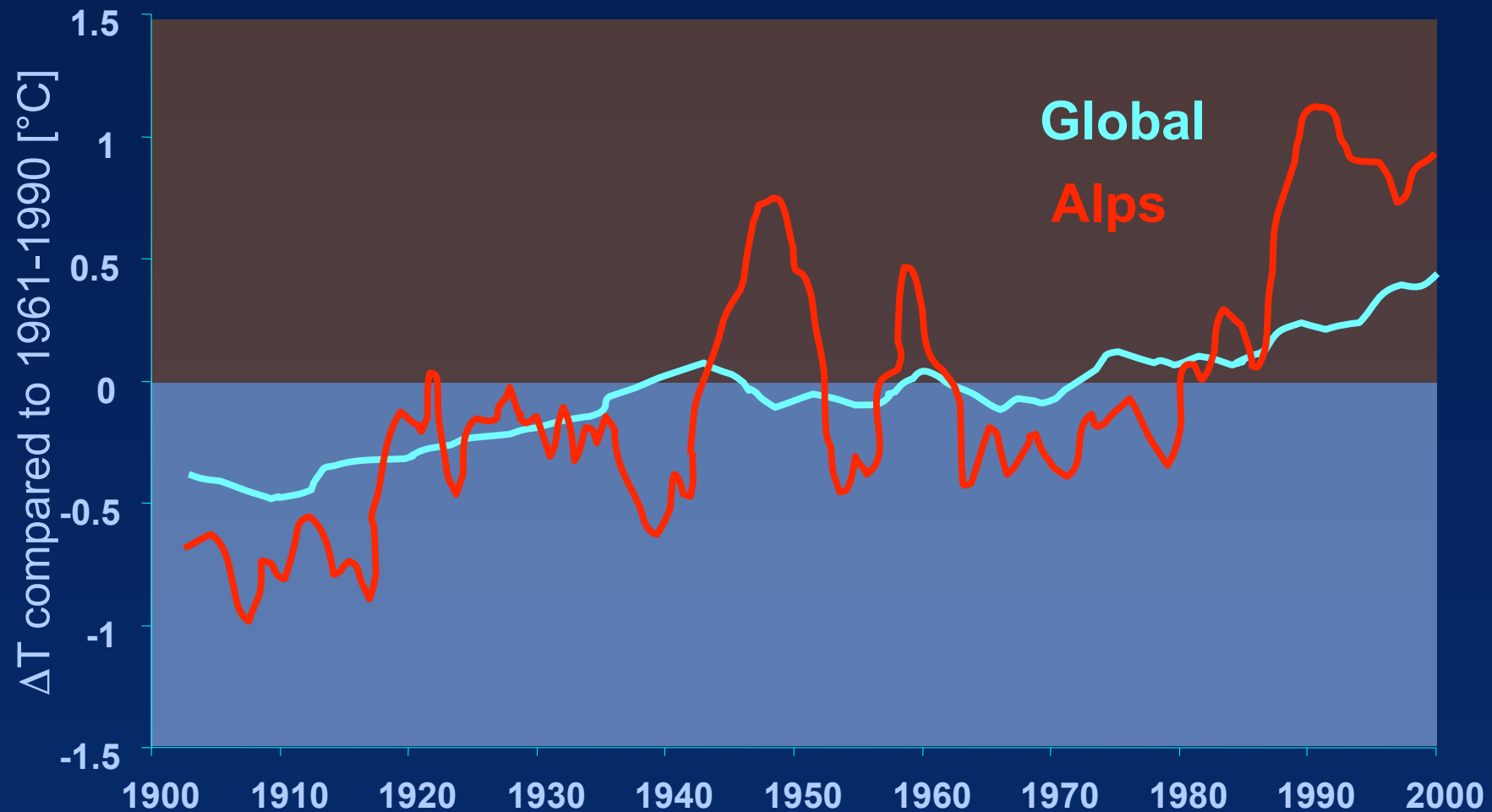


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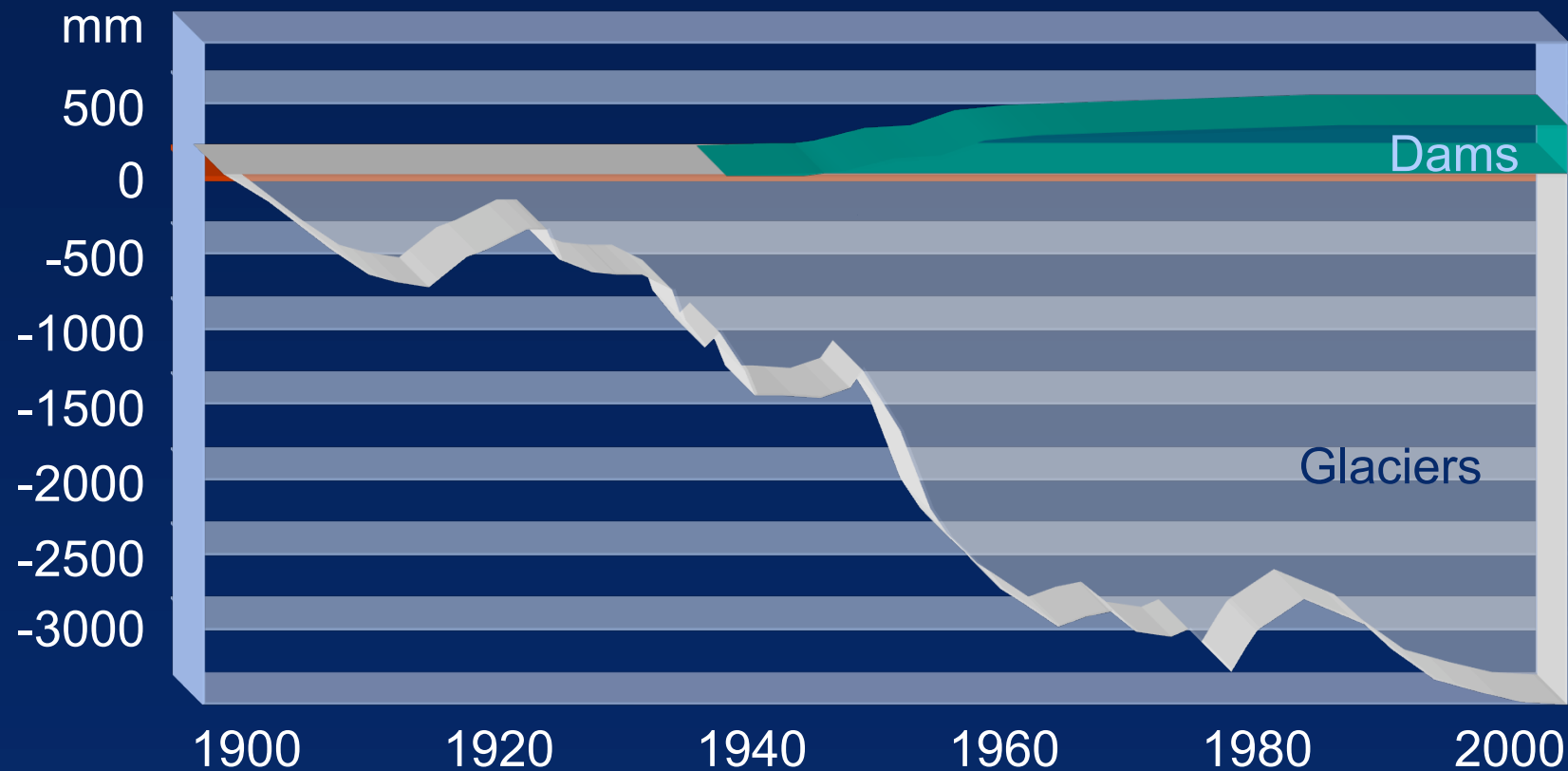
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Evolution of global and alpine temperatures, 1901-2000

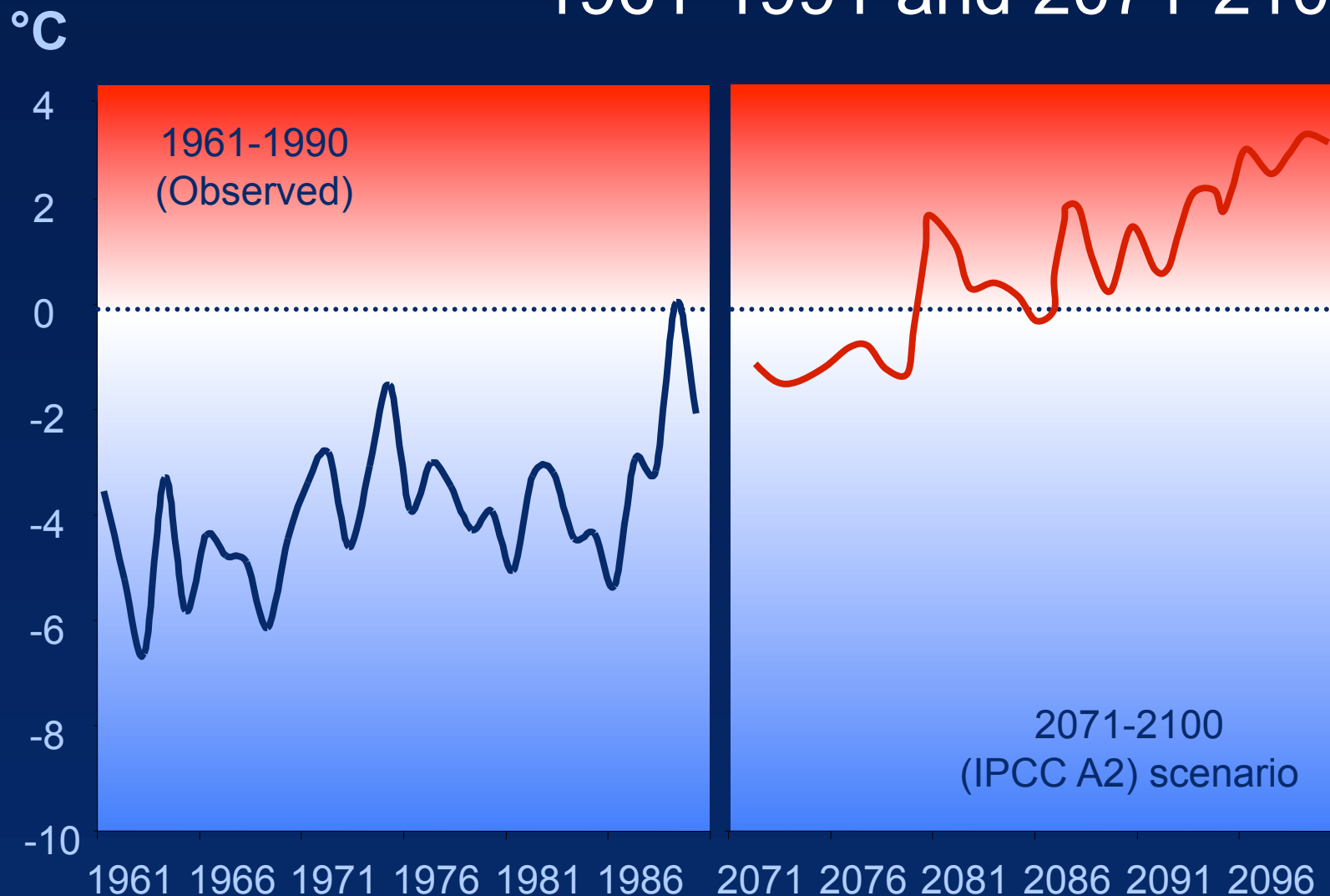
Beniston, 2000: Environmental Change in Mountains, Arnold, London



Changes in water availability for the Rhône River

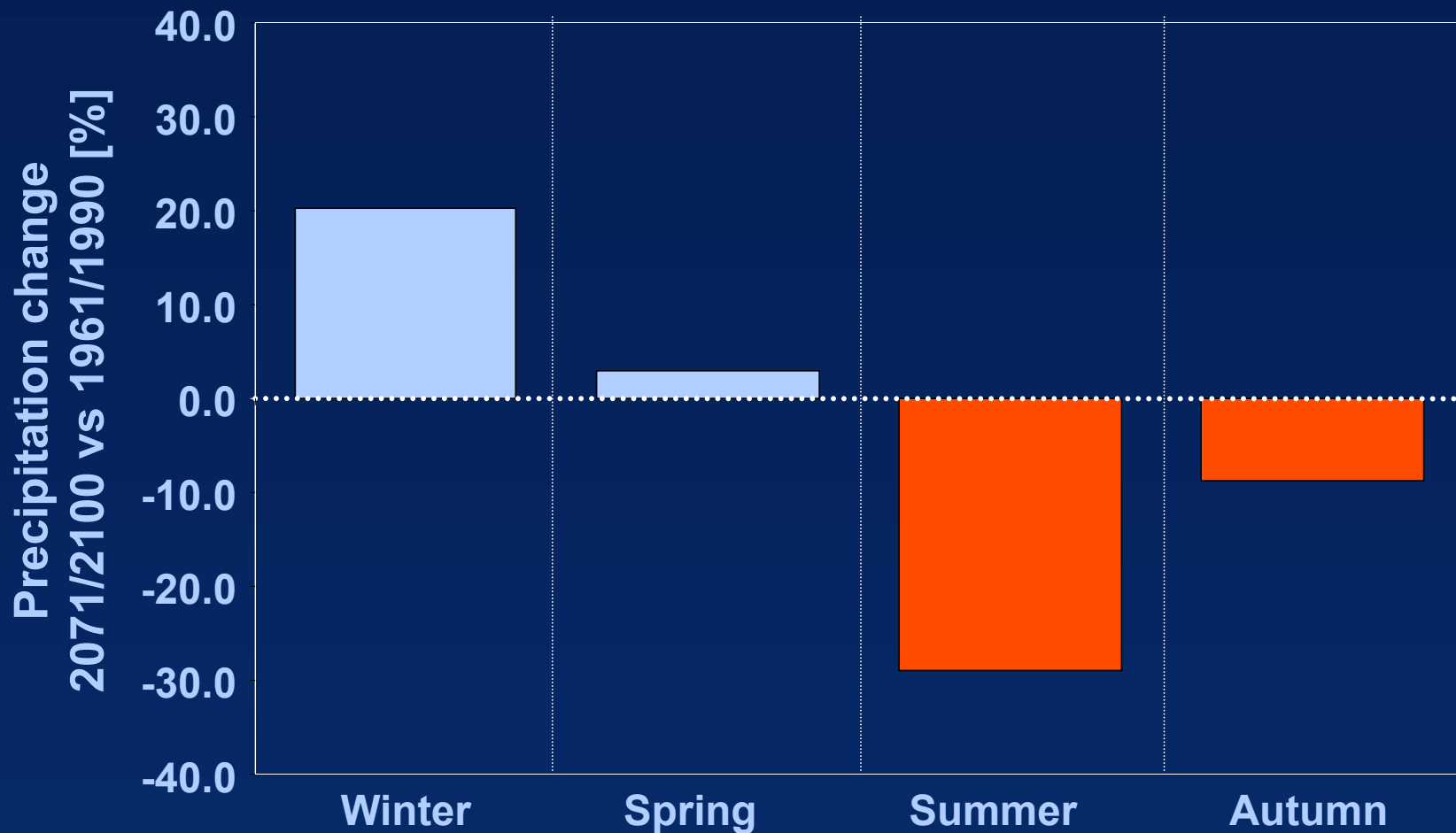


Winter temperatures at Säntis (2,500 m): 1961-1991 and 2071-2100



Beniston, 2004: Climatic Change and Impacts, Springer Publishers

Changes in seasonal precipitation (Central Swiss Alps)

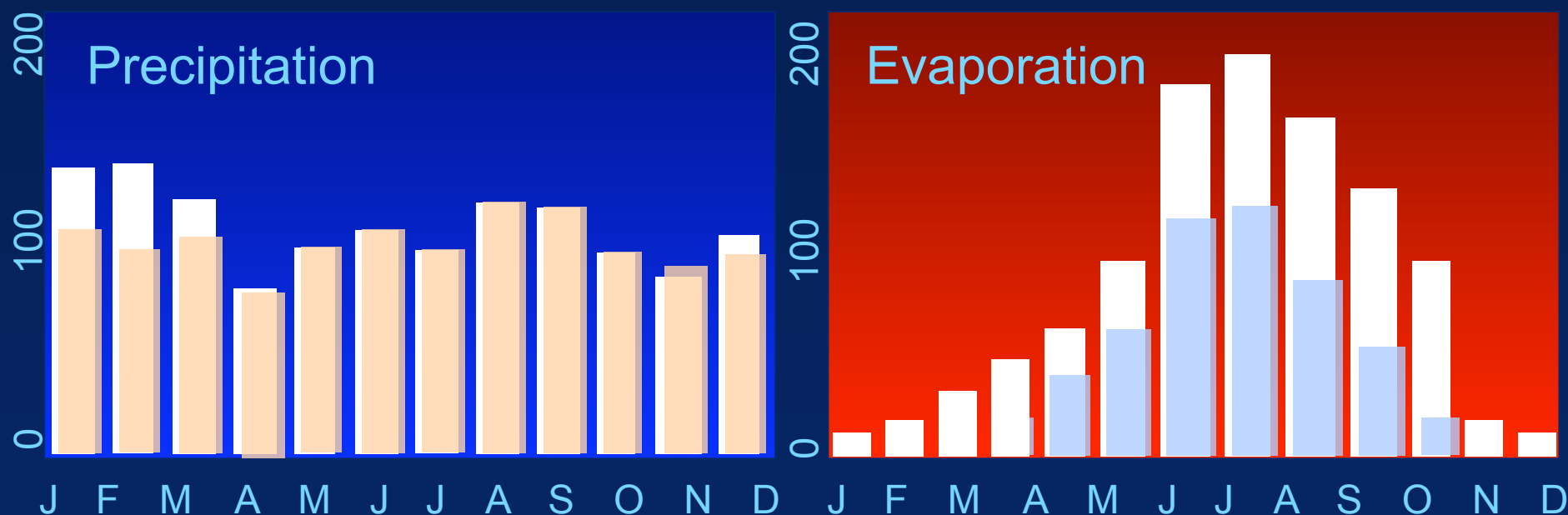


Beniston, 2006: Geophysical Research Letters

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Components of the hydrological cycle by 2100 (mm, Rhone)

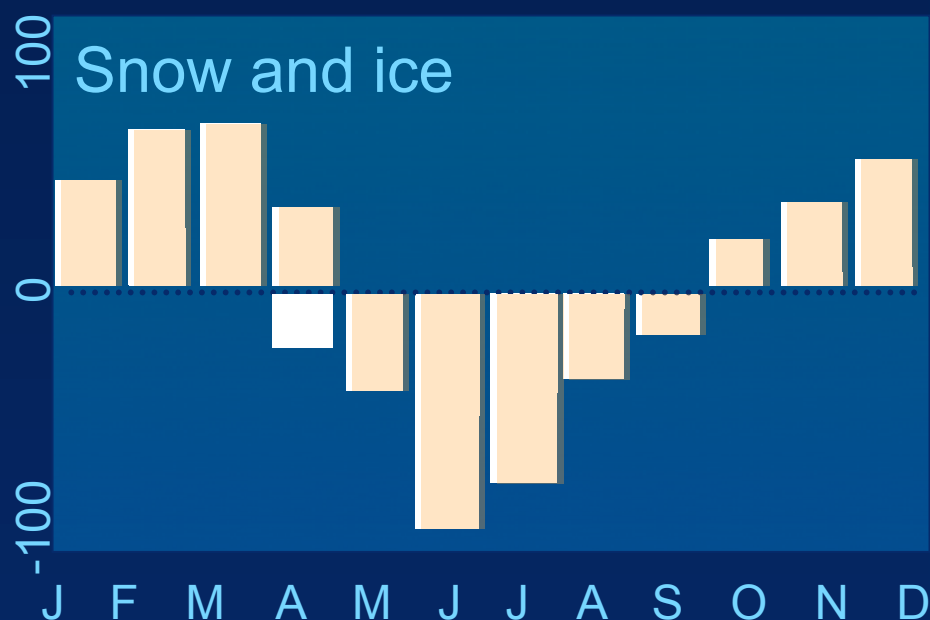


Glacier retreat: Tschierva Glacier, Engadine

Courtesy: Max Maisch
University of Zurich, Switzerland



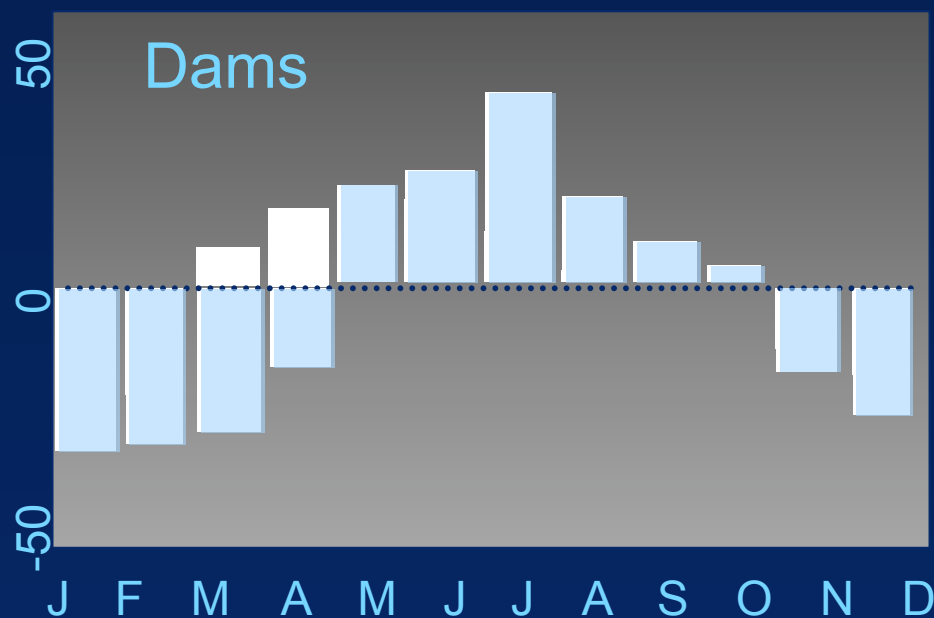
Components of the hydrological cycle by 2100 (mm, Rhone)



Grande Dixence, Switzerland

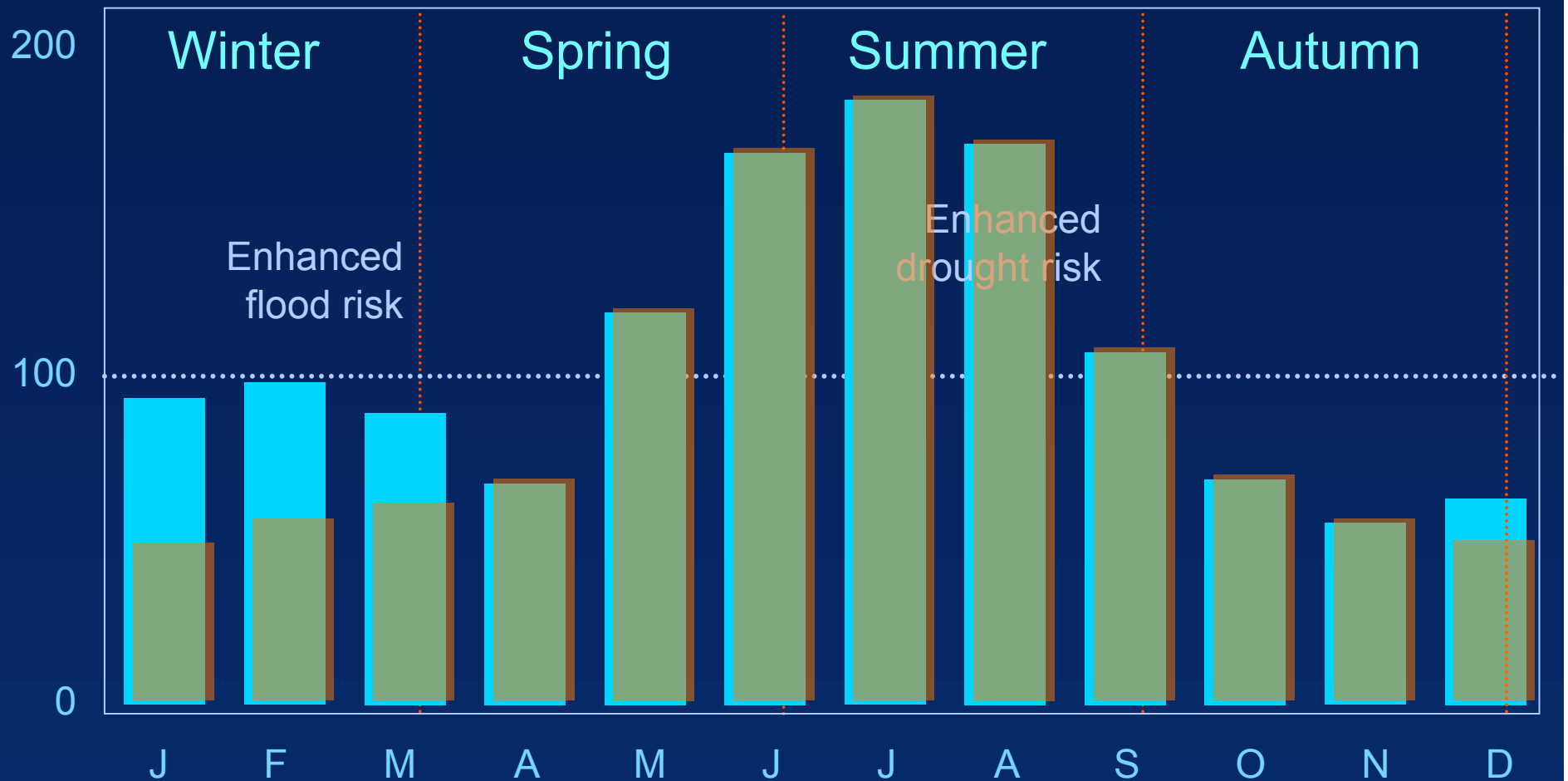


Components of the hydrological cycle by 2100 (mm, Rhone)



Average discharge by 2100 (mm, Rhone)

Beniston, 2004:
Climatic Change and Impacts,
Springer Publishers



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Snow and ice in mountains: expect major hydrology impacts in a warmer climate!

- Snow and ice in Switzerland are dominant elements for runoff characteristics in numerous catchments
- Shifts in temperature and precipitation regimes could significantly modify the behavior of the mountain snow pack, thus changing:
 - ◆ the seasonal character of runoff
 - ◆ the timing of the peak flow
- Changing water amount will have numerous impacts:
 - ◆ Tourism
 - ◆ Energy
 - ◆ Agriculture
 - ◆ Mining
 - ◆ Natural hazards
 - ◆ Insurance sector

Swiss and EU research

- EU Framework 7 « ACQWA » Project
- Coordinated by the University of Geneva
- 2008-2013, 37 partners, US\$ 9.5 million
- www.acqwa.ch

An aerial photograph of a vast, white ice shelf. A large, irregularly shaped lake of turquoise meltwater is situated in the center of the shelf. The water's color suggests the presence of sediment or mineral content. The surrounding ice shows various textures, including cracks and ridges.

Many thanks for your attention

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www.unige.ch/climate

www.acqwa.ch