Climate Change and Mountains

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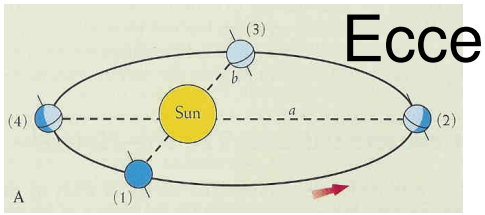
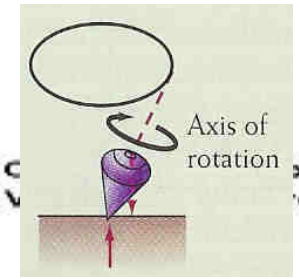
Temperature and CO_2-Concentration 400.000 years

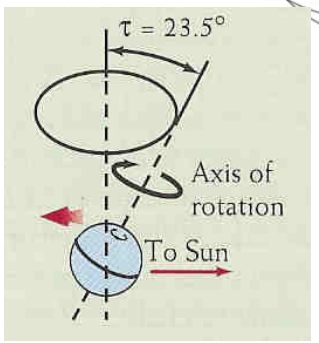


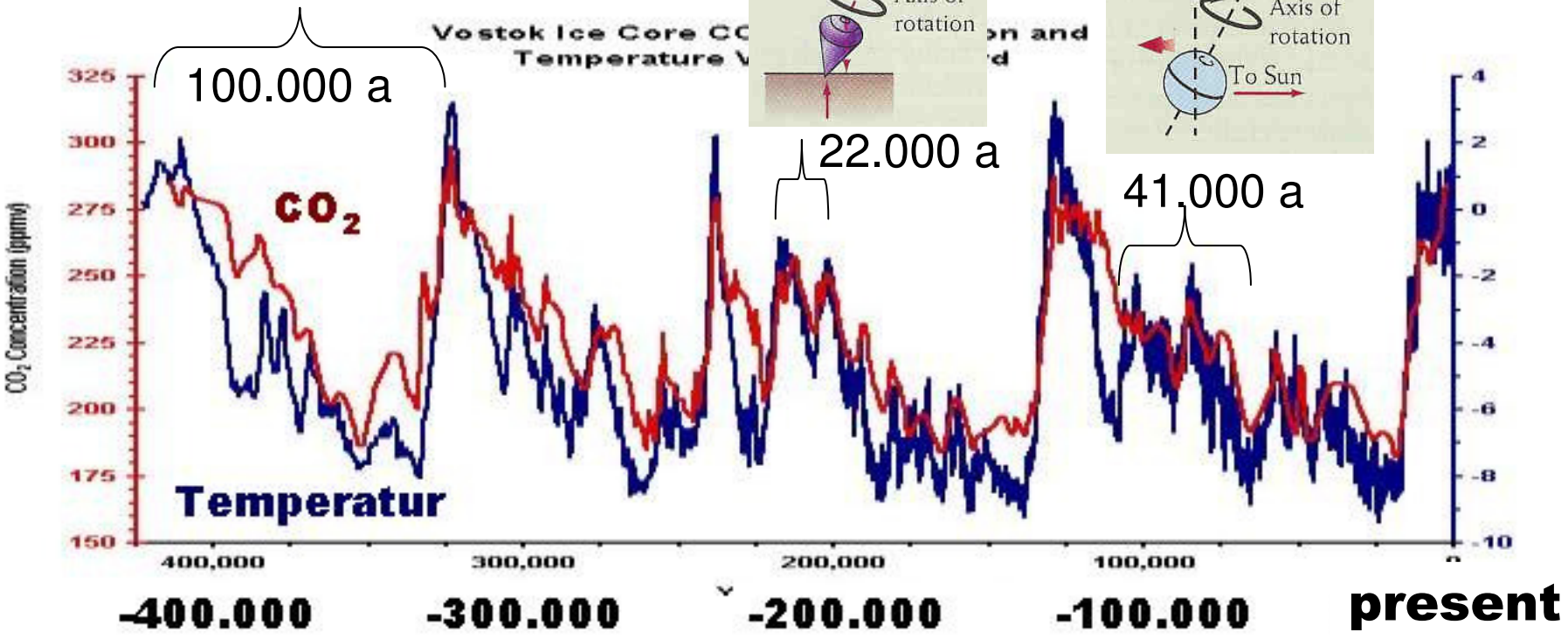
Eccentricity

Precession



Axial tilt





IPCC 2001

External forces

- Axial tilt - decreasing
  - Less radiation at poles, more near equator
  - Less radiation in summer, more in winter

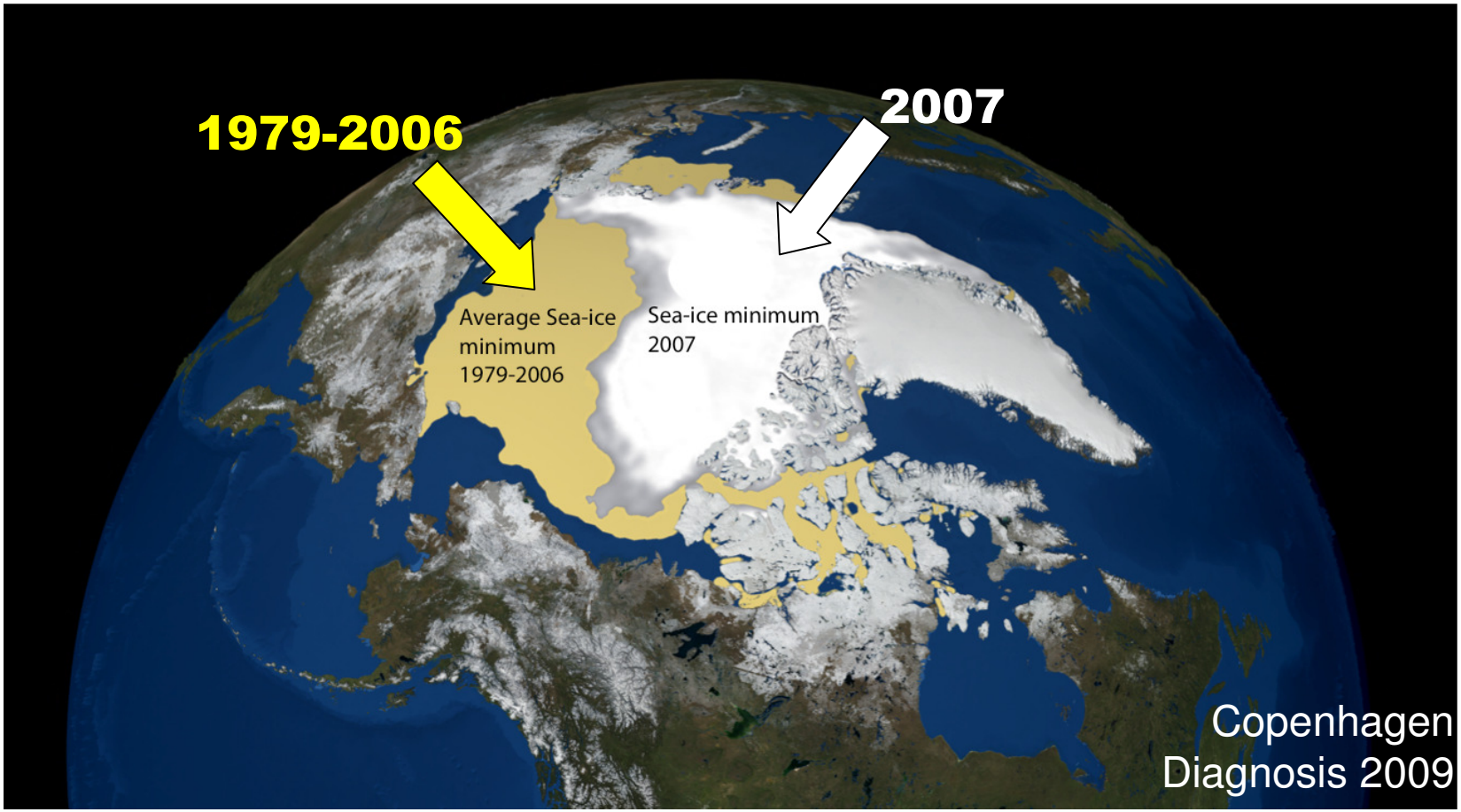
    → Increase in polar ice
- Precession – earth closer to sun in January
  - NH warm winters, cold summers

    → Increase in polar ice (NH)
- But: ice is melting

Feedback mechanisms

- Variability in radiation << 1 W/m^2
- Triggers 2 slow feedback mechanisms
  - Ice-Albedo-coupeling (regional differences)
  - GHG feedback (e.g. oceans)

Polar ice cover at the end of summer (positive feedback)



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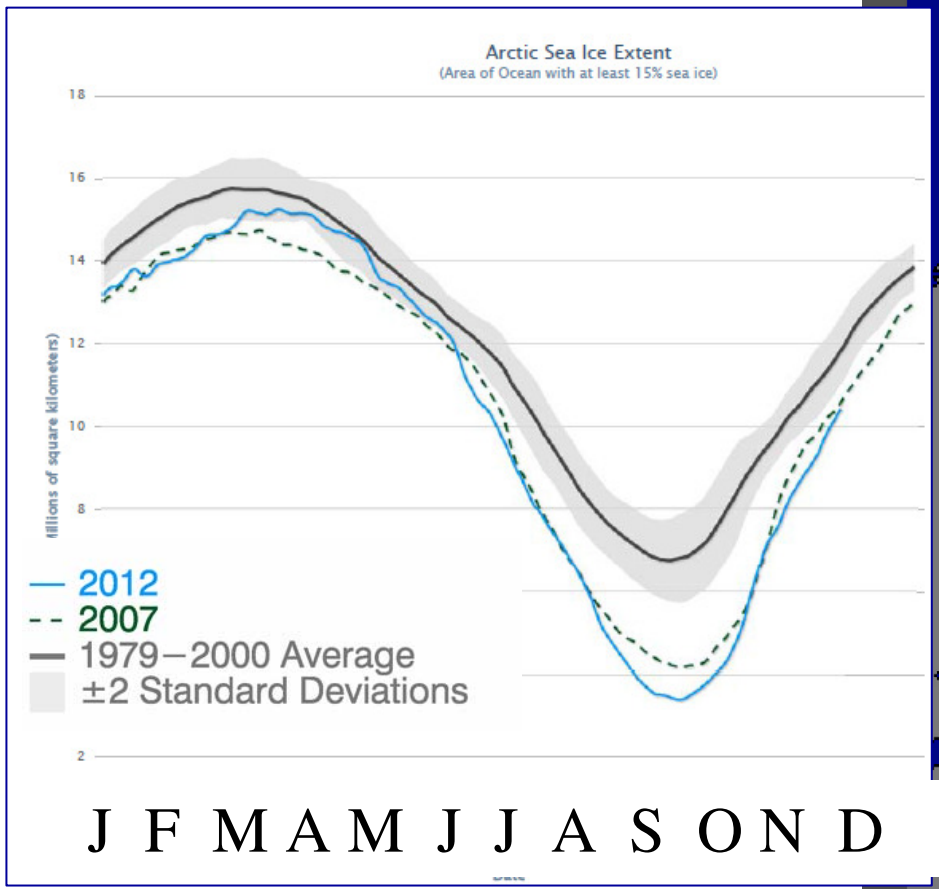
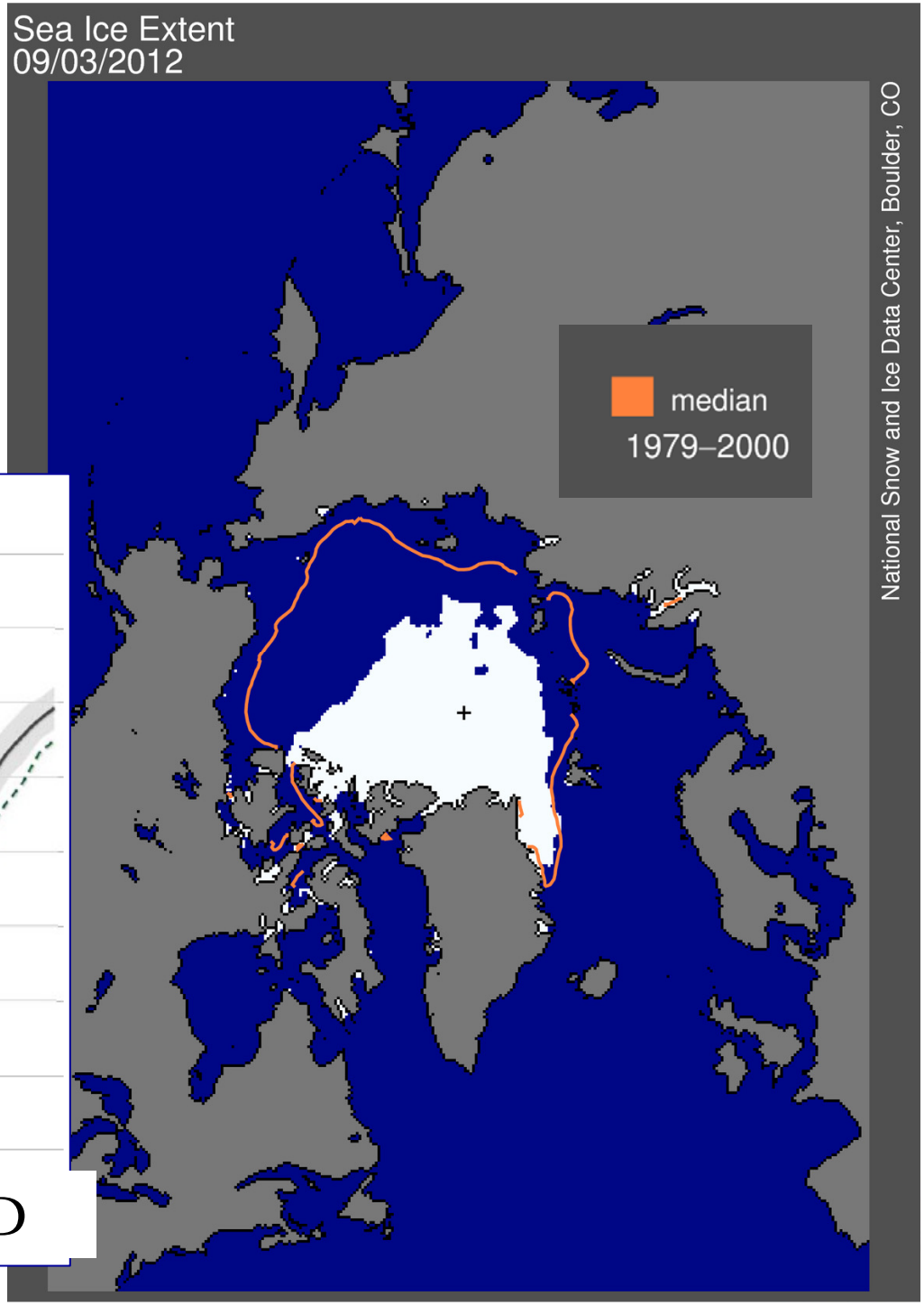
Arctic Ice 2012

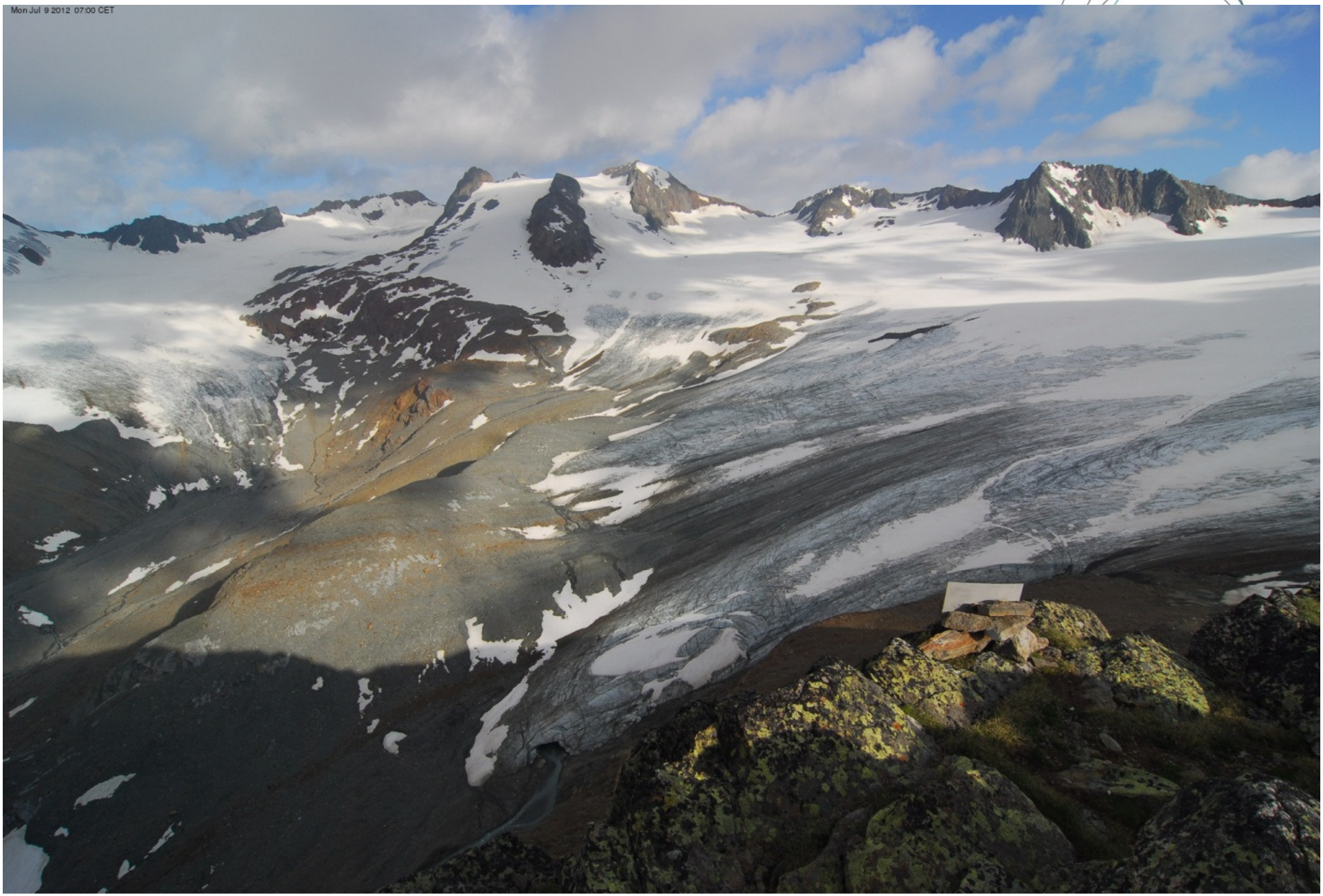




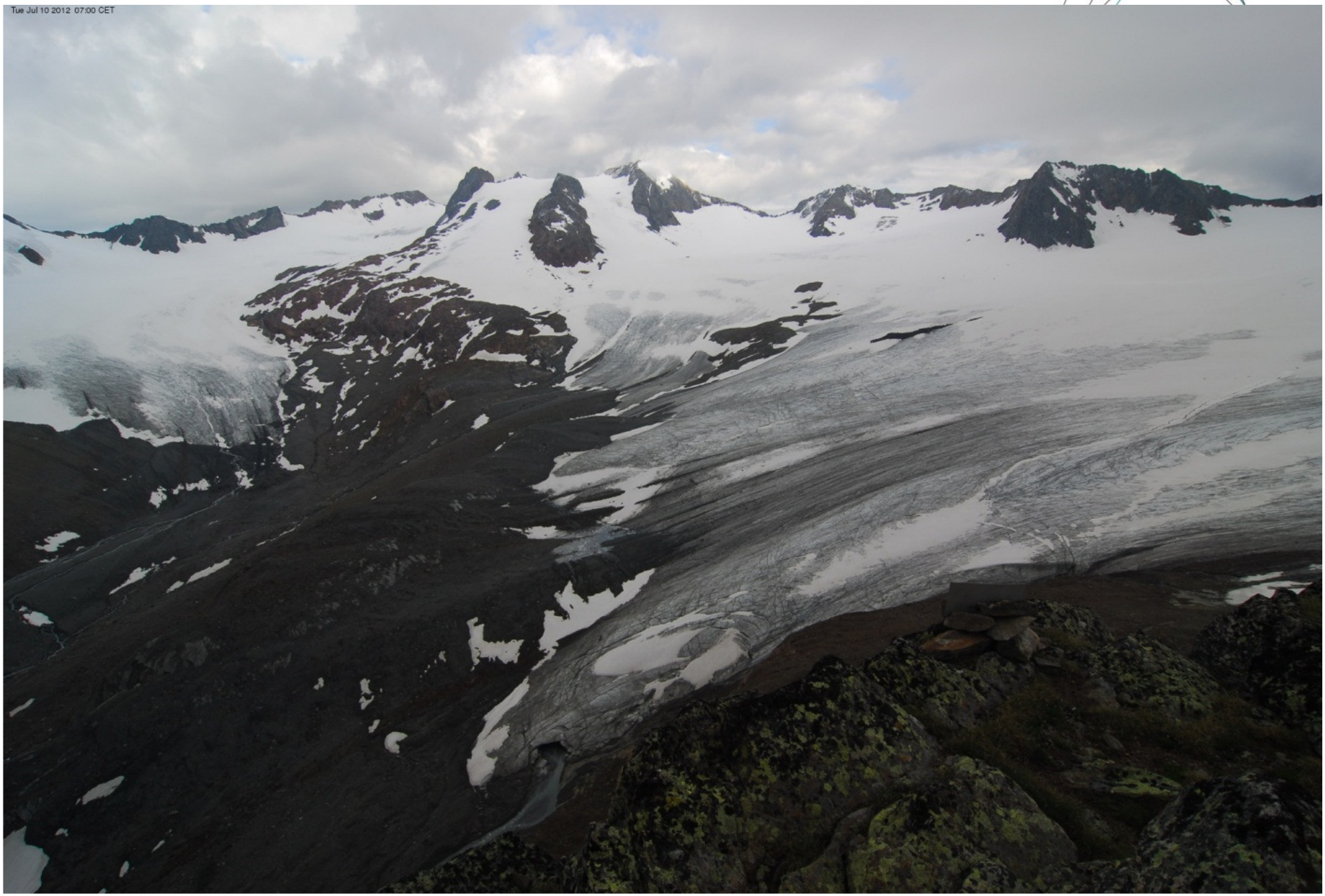
Pasterze 2010

Pasterze 2012

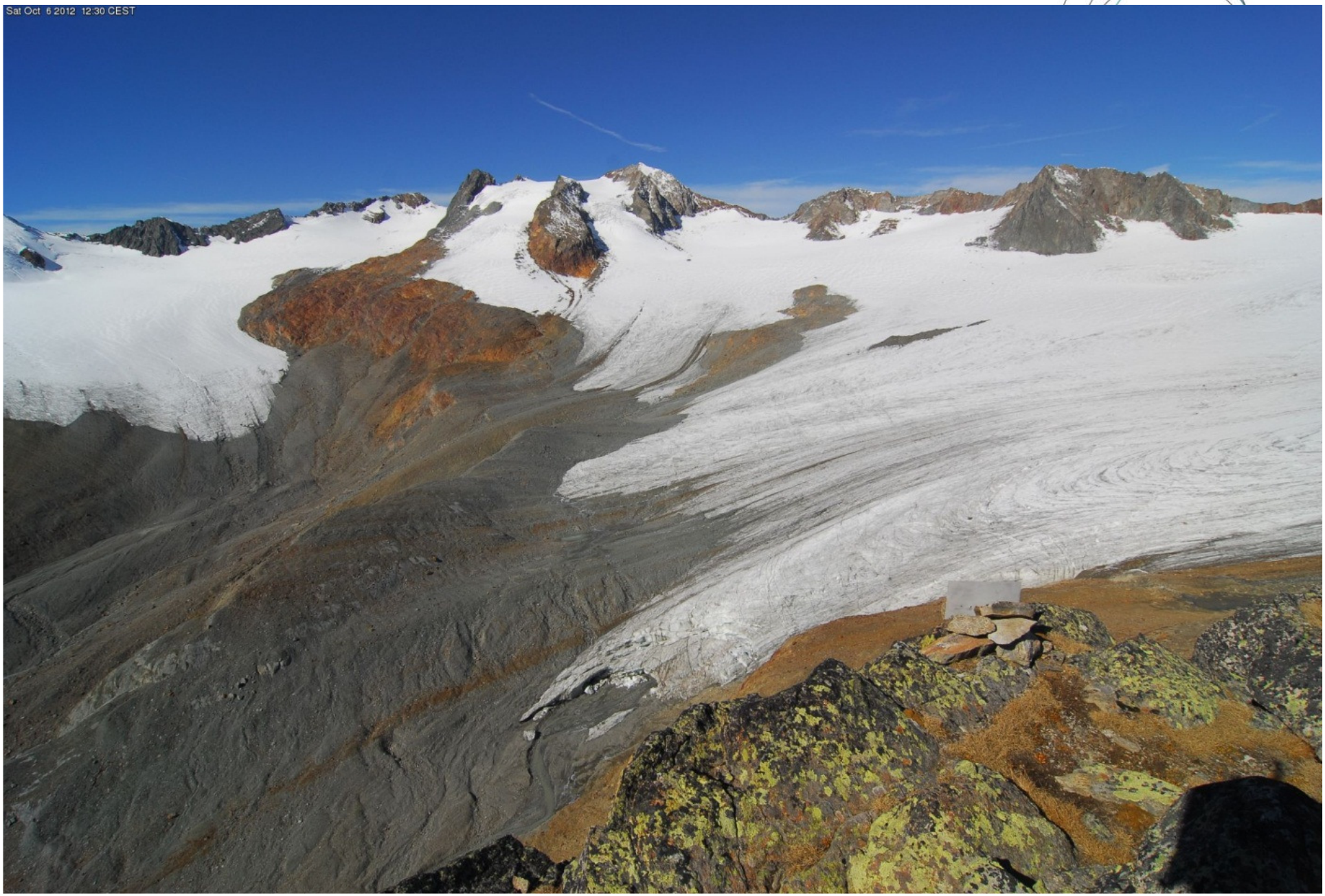
Vernagtferner 2010



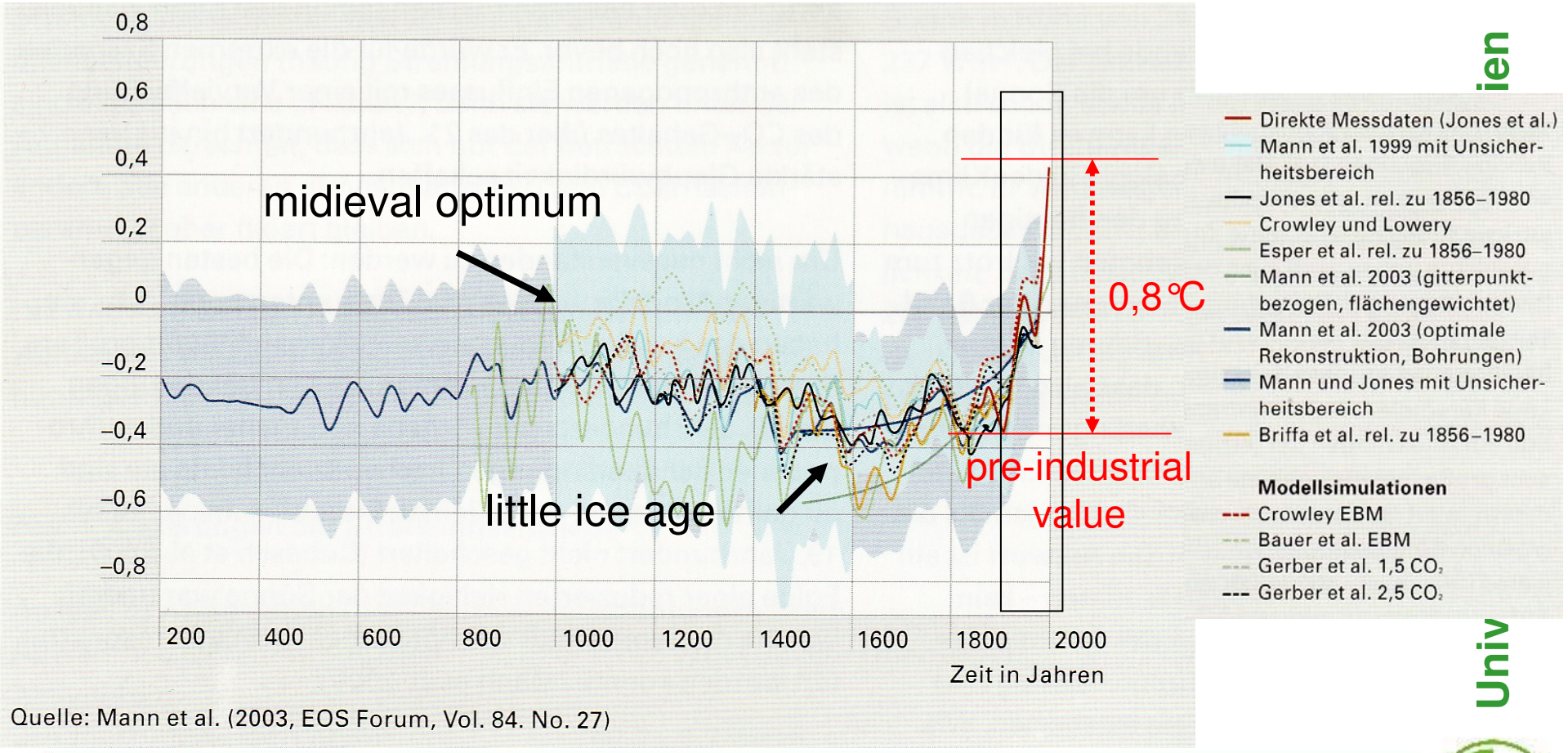
Vernagtferner 2011



Vernagtferner 2012

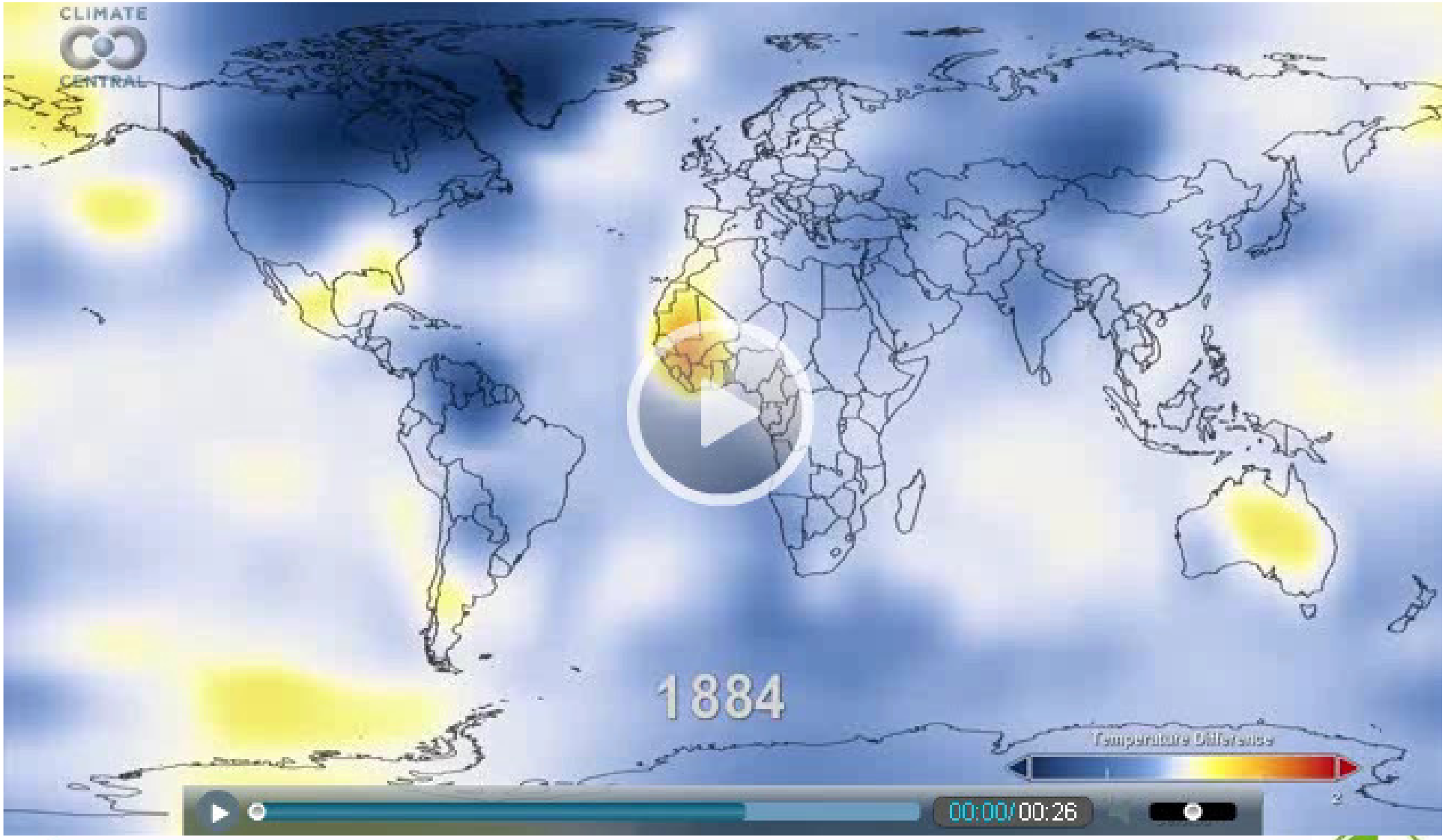


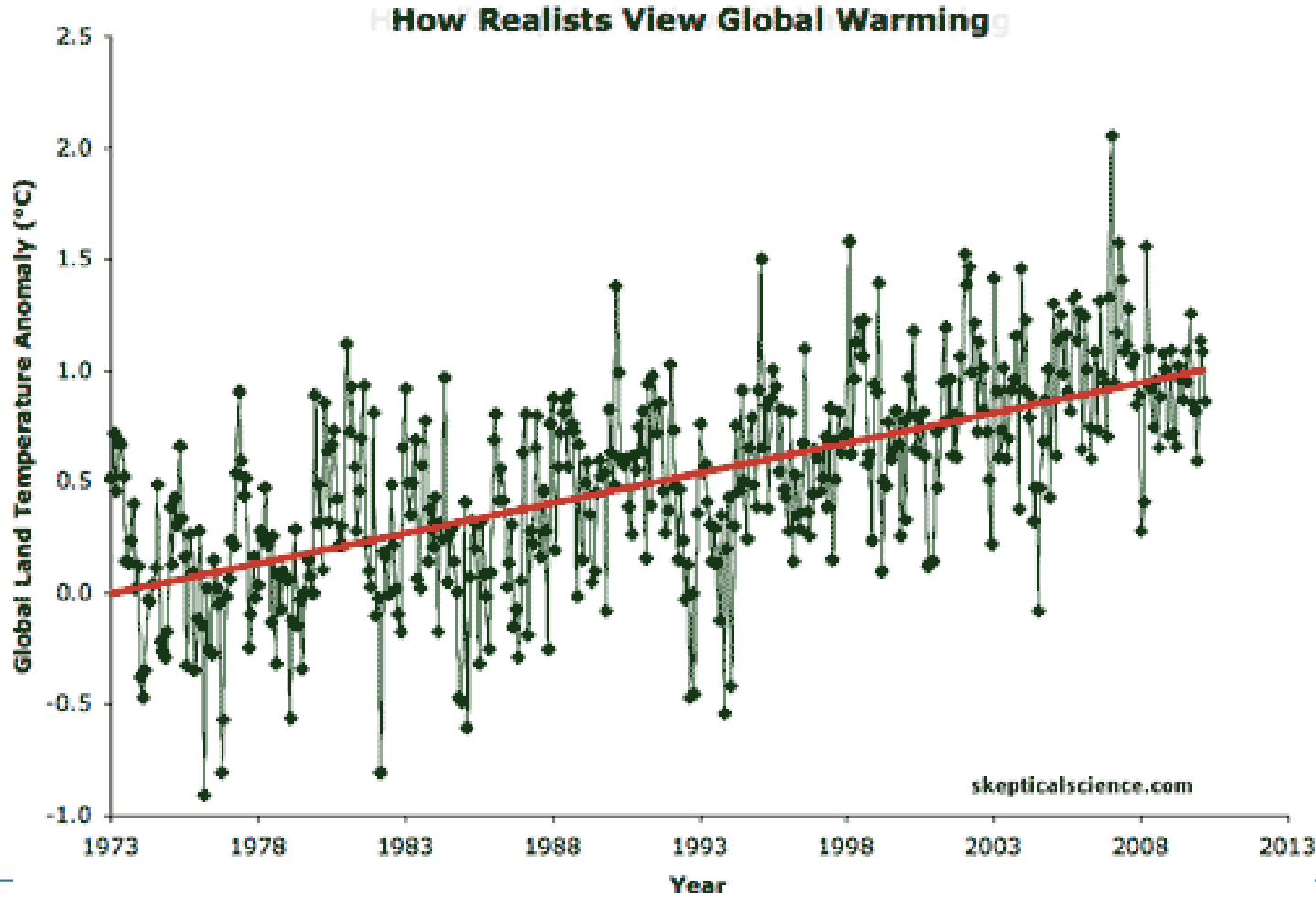
Temperature 200-2000



Quelle: Mann et al. (2003, EOS Forum, Vol. 84. No. 27)

Temperature over 131 Years





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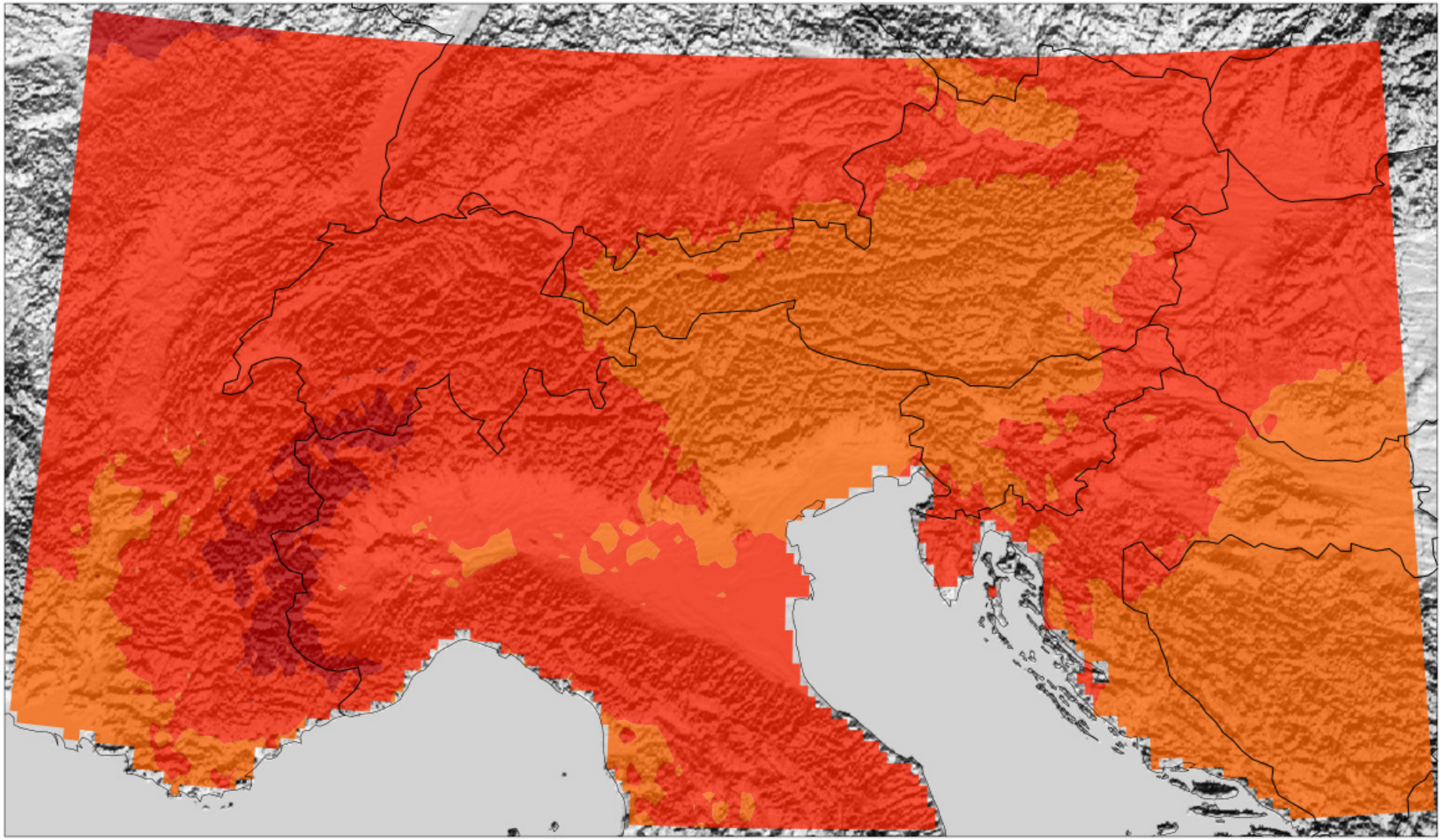
Yearly

Anomalies of yearly mean temperature in °C 2008



Source: Histalp Dataset, ZAMG

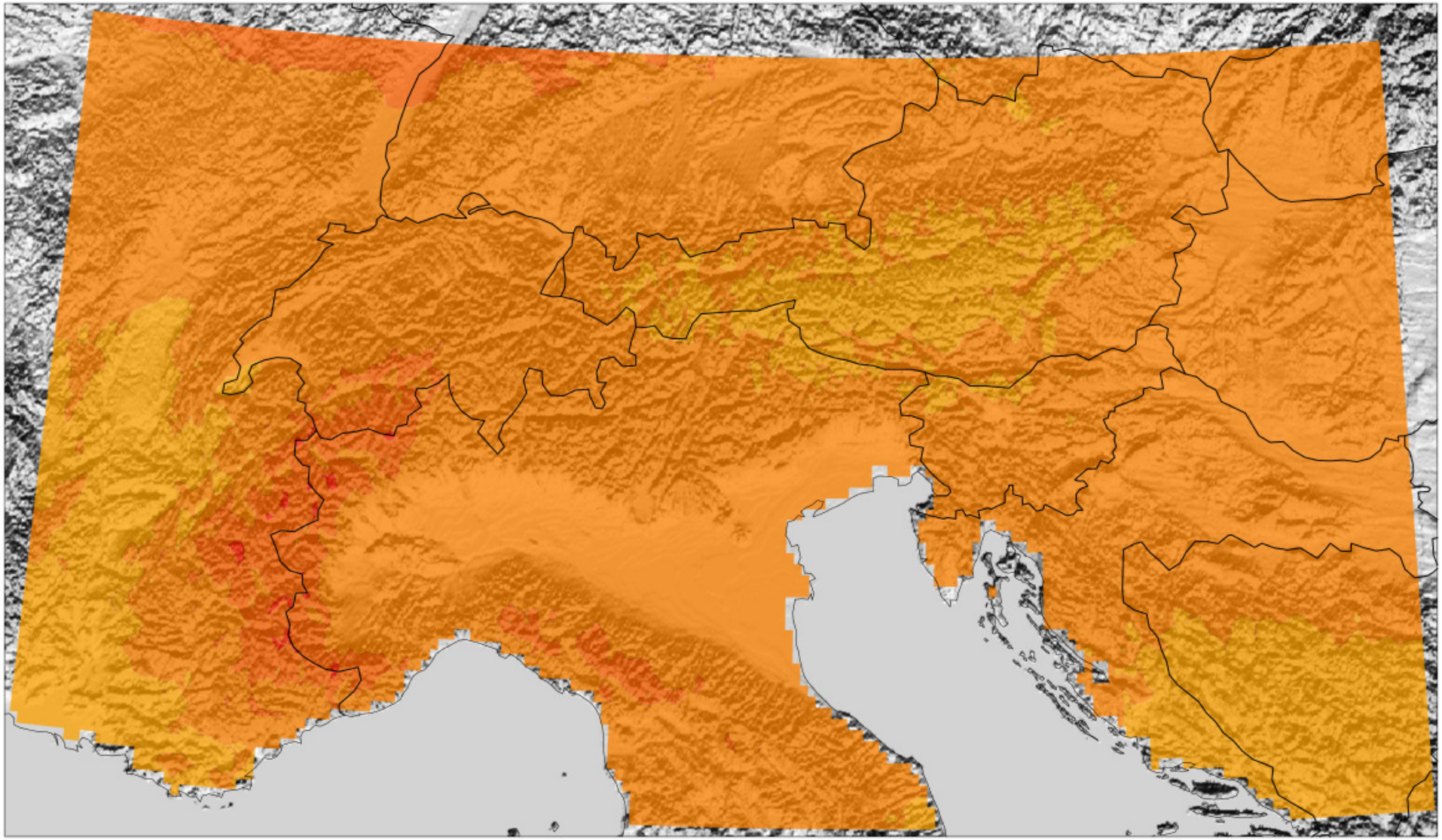
Created by: Imran Nadeem

-1.1 -0.9 -0.7 -0.5 -0.3 -0.1 0.1 0.3 0.5 0.7 0.9 1.1 1.3 1.5 1.7

BOKU Met

DJF

Anomalies of Winter mean temperature in °C 2008



Source: Histalp Dataset, ZAMG

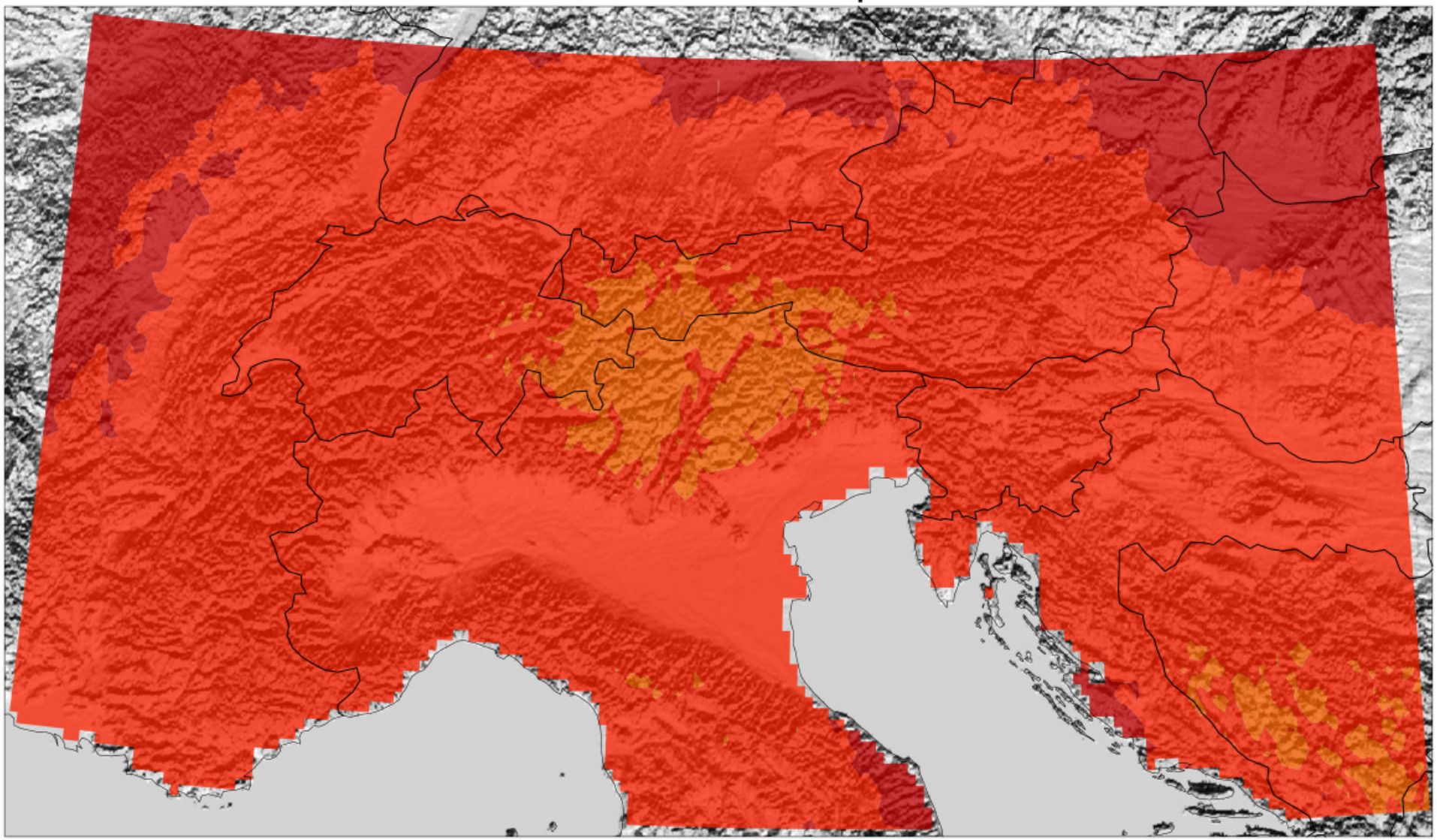
Created by: Imran Nadeem

-2.0 -1.75 -1.5 -1.25 -1.0 -0.75 -0.5 -0.25 -0.1 0.1 0.25 0.5 0.75 1.0 1.25 1.5 1.75 2.0

BOKU Met

JJA

Anomalies of Summer mean temperature in °C 2008



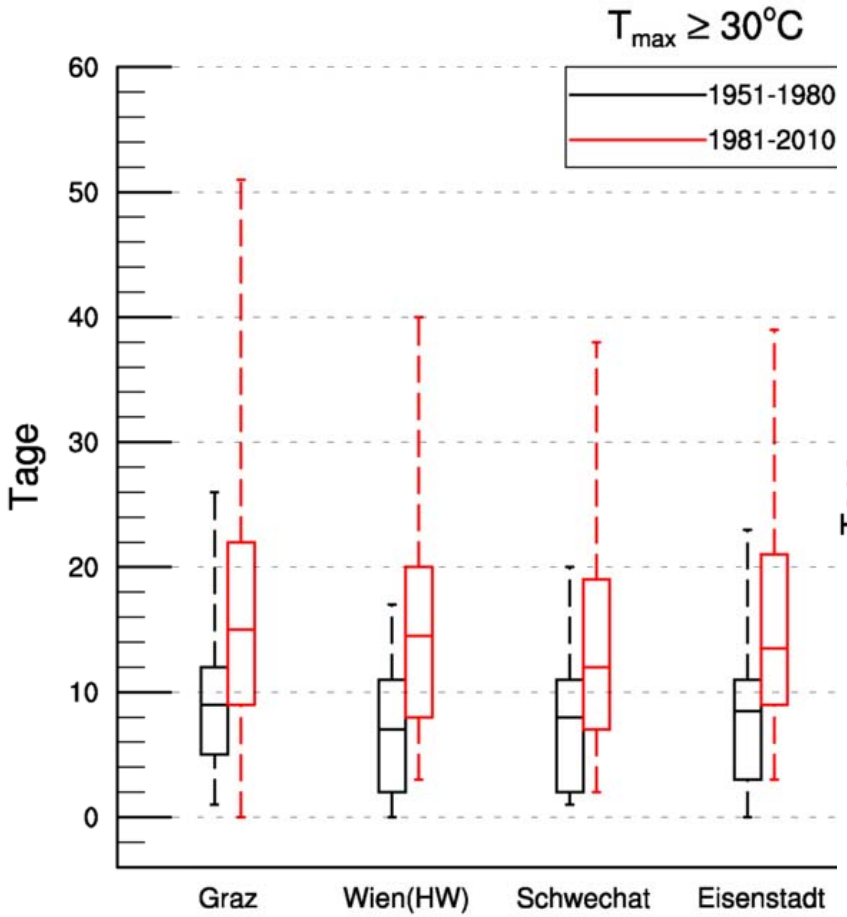
Source: Histalp Dataset, ZAMG

Created by: Imran Nadeem

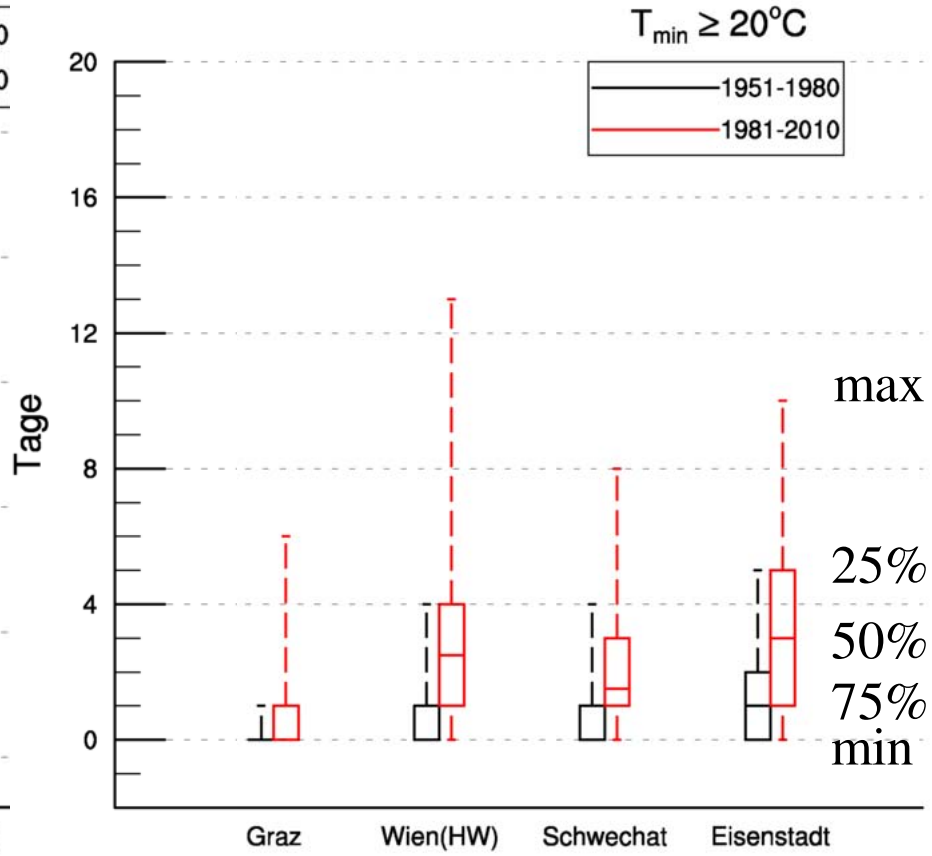
-2.0 -1.75 -1.5 -1.25 -1.0 -0.75 -0.5 -0.25 -0.1 0.1 0.25 0.5 0.75 1.0 1.25 1.5 1.75 2.0

BOKU Met

Days, temp. >30 °C



Nights, temp. >20 °C



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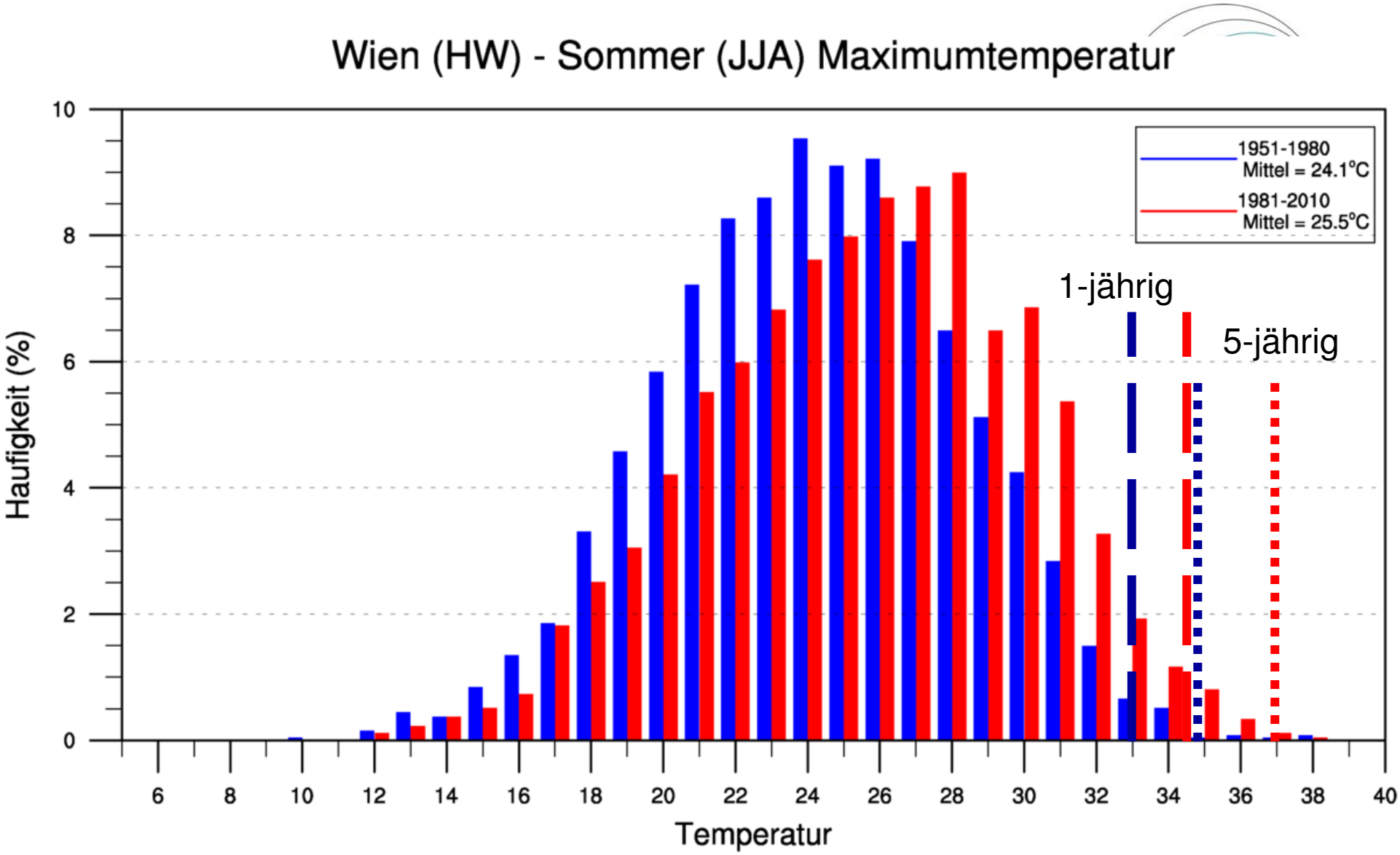
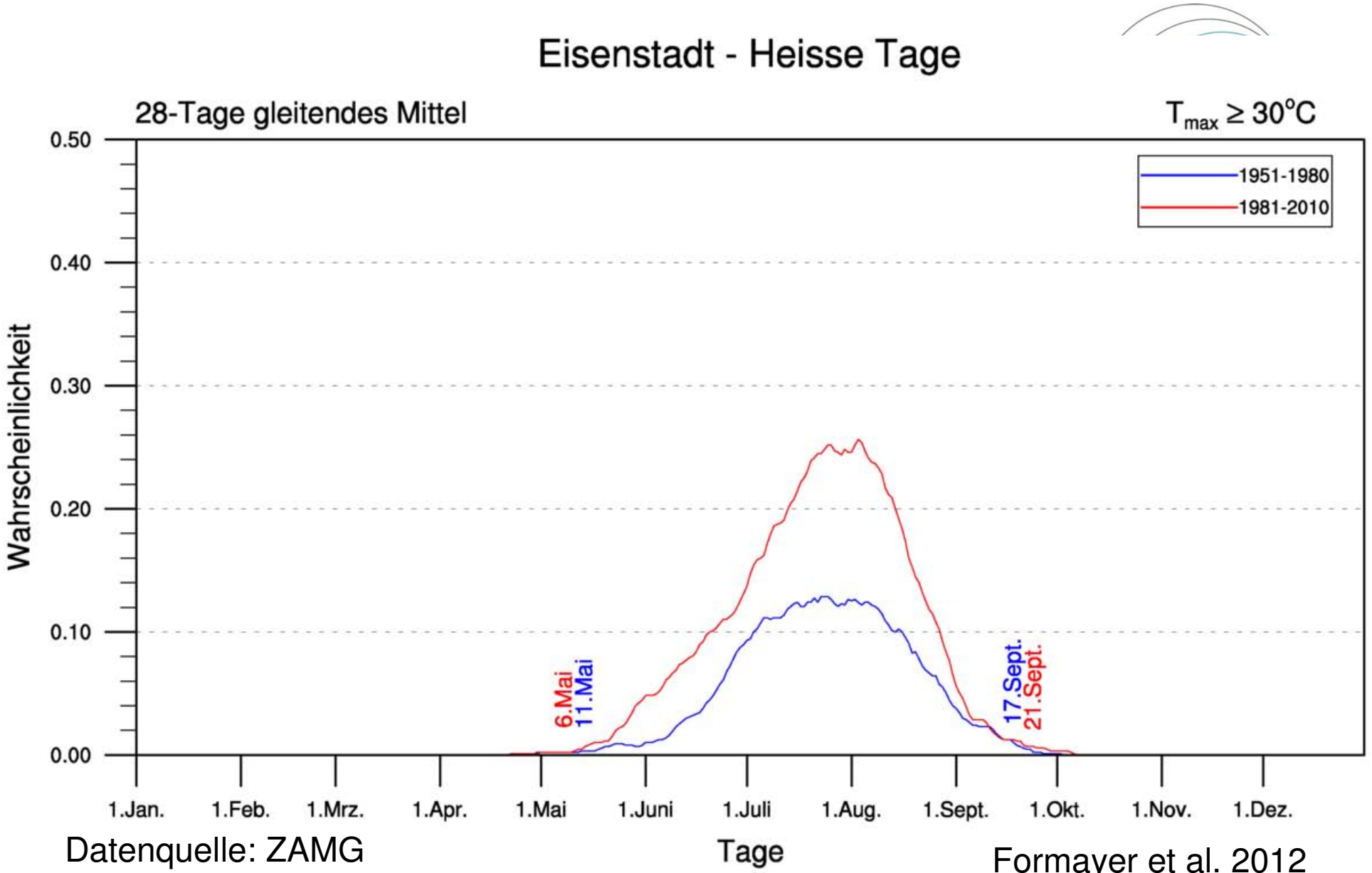


Datenquelle: ZAMG

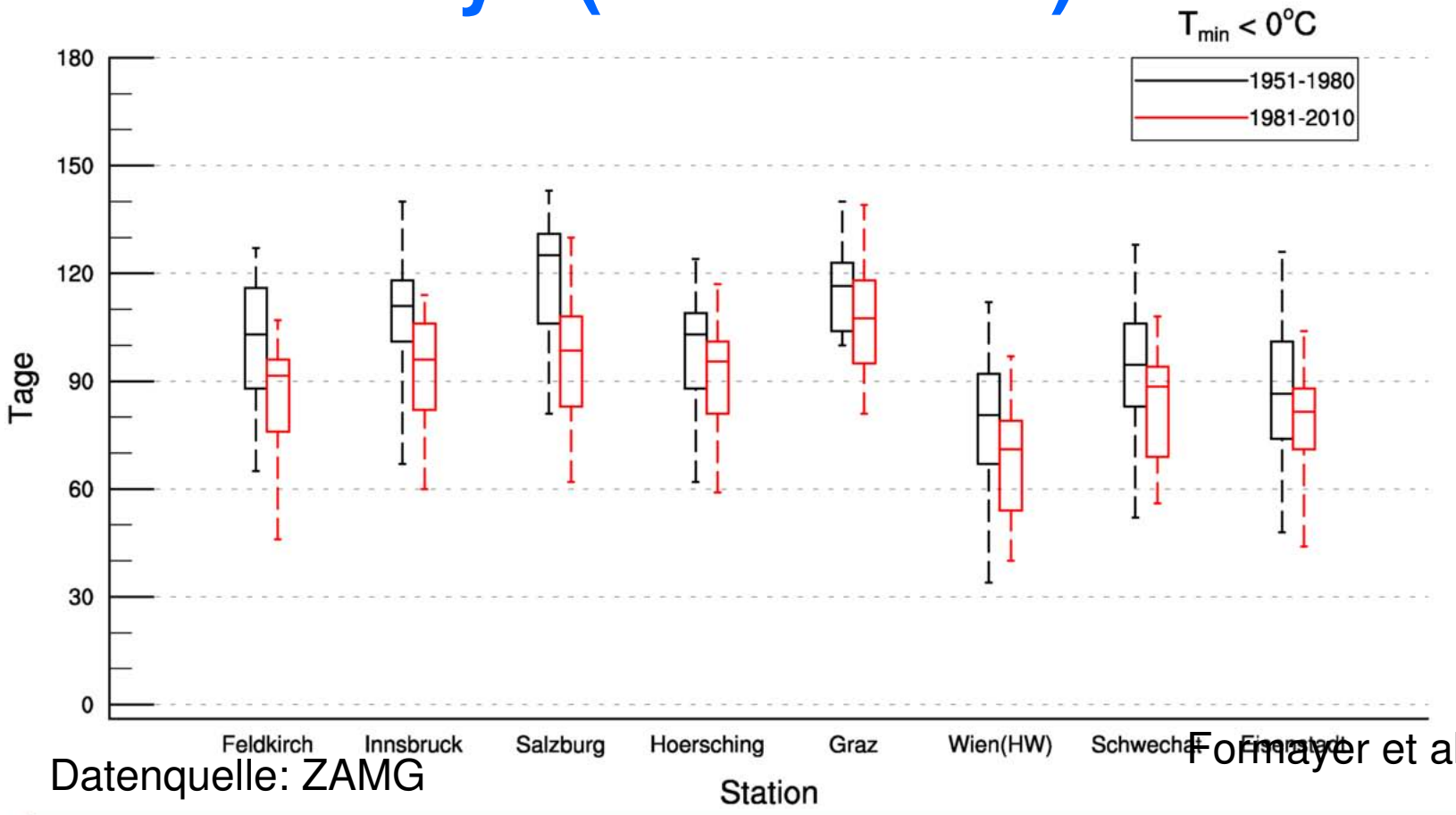
Formayer et al. 2012



Datenquelle: ZAMG

Formayer et al. 2012

Frost days (Tmin < 0°C)



Datenquelle: ZAMG

Formayer et al. 2012

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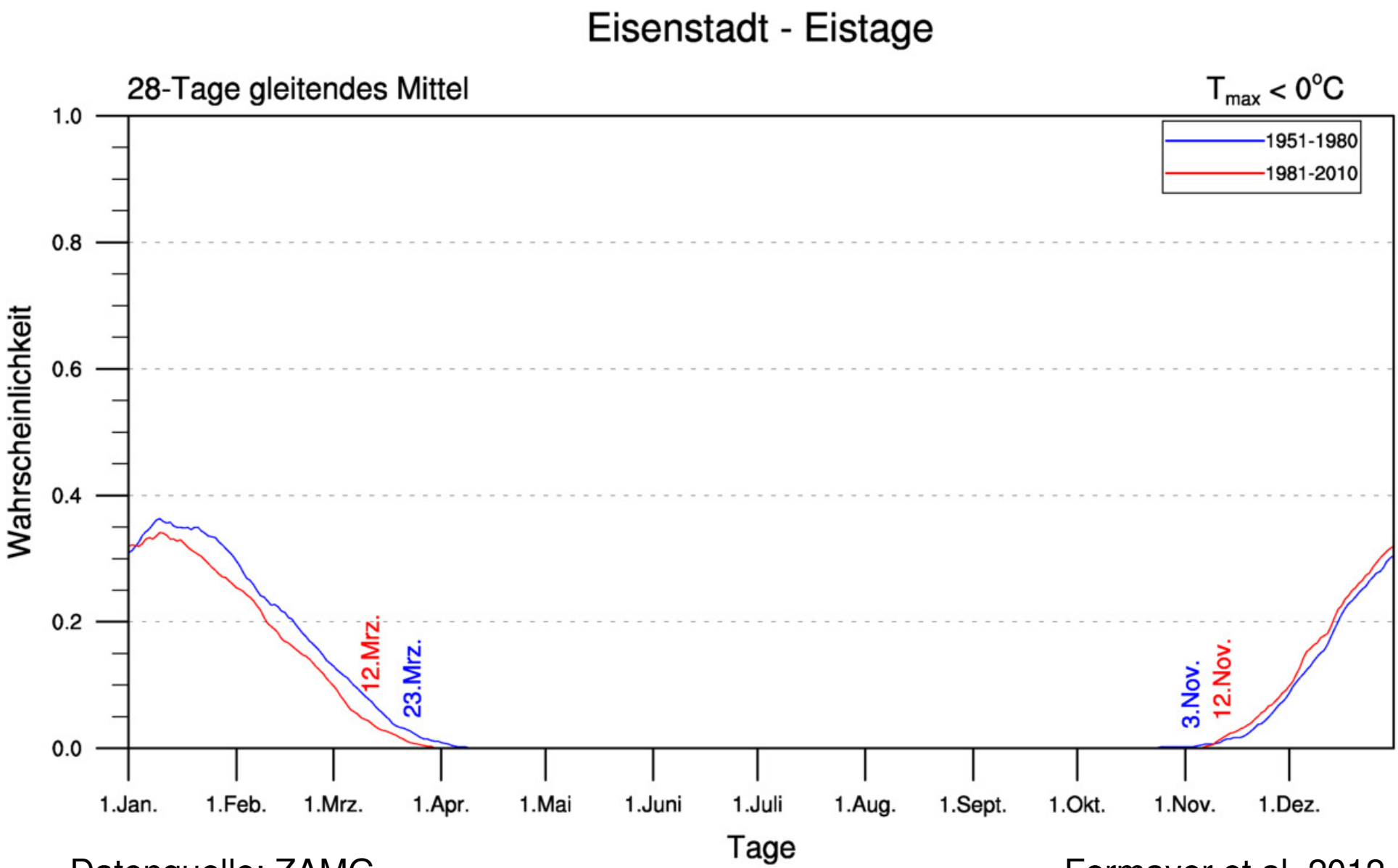

Datenquelle: ZAMG

Formayer et al. 2012