

Climate Change in the Alps (Focus Austria)

Innovative Training for Sustainable Shepherds
14.12.2021



Dr. Thomas Guggenberger
Agricultural research center Raumberg-Gumpenstein
Institute of Animal Production

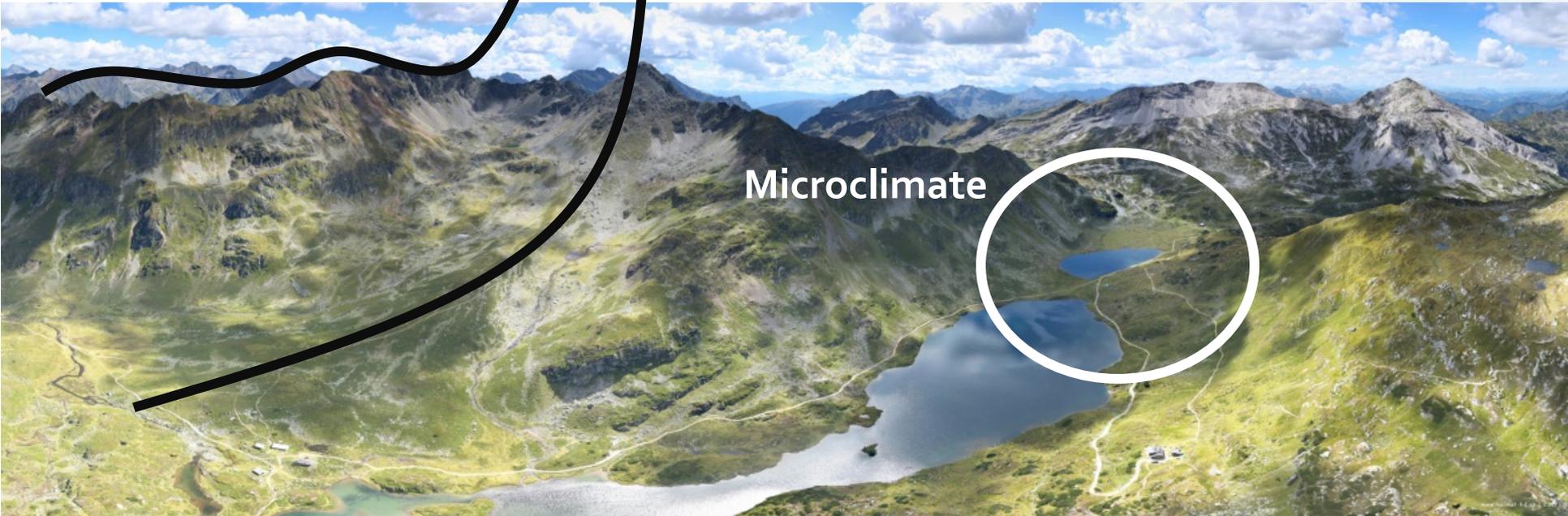
Impact

Terrain

Altitude

Global Warming

Microclimate



Effect

**Growth
Yield
Nutrients**

Management

Welfare

Hazard

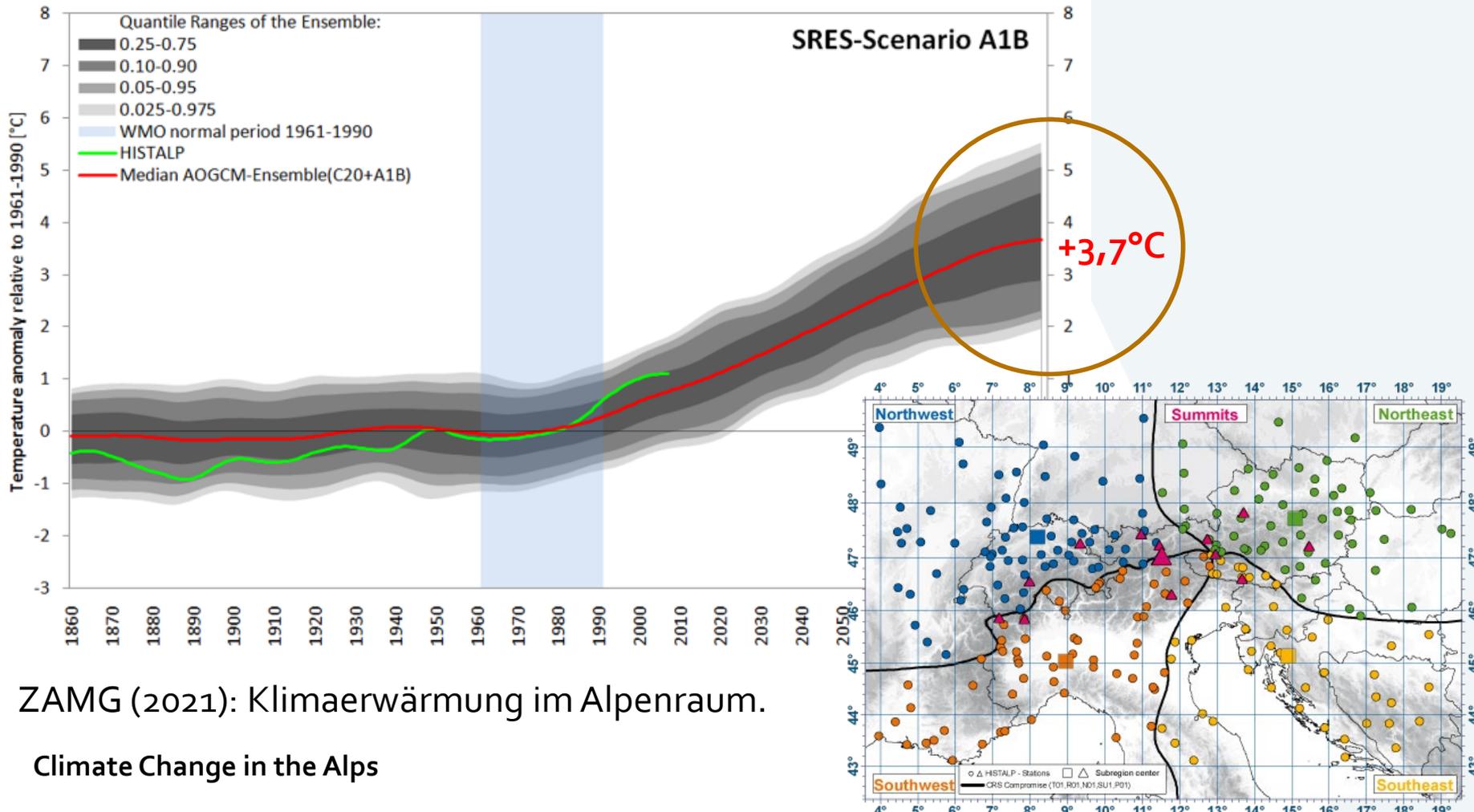
Plant

Animals

People



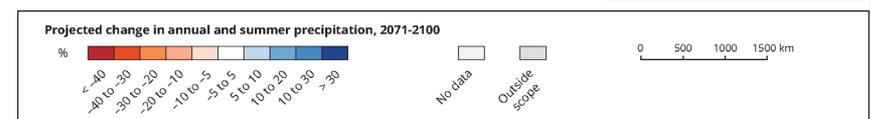
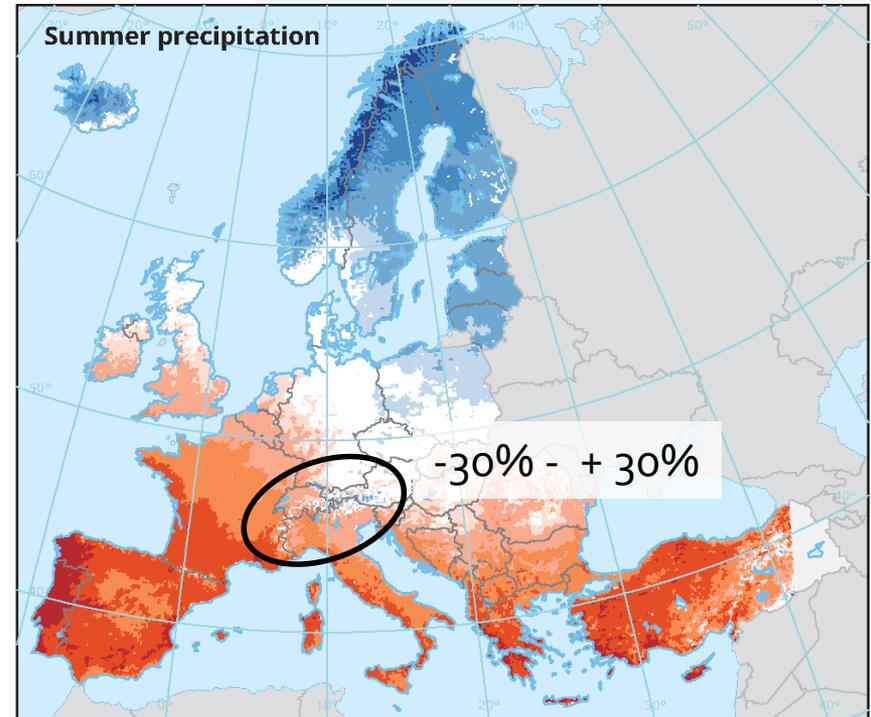
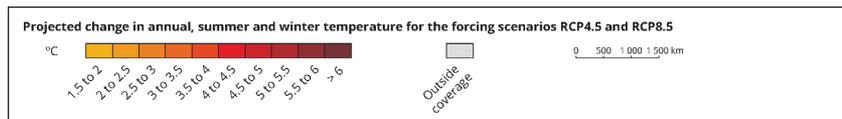
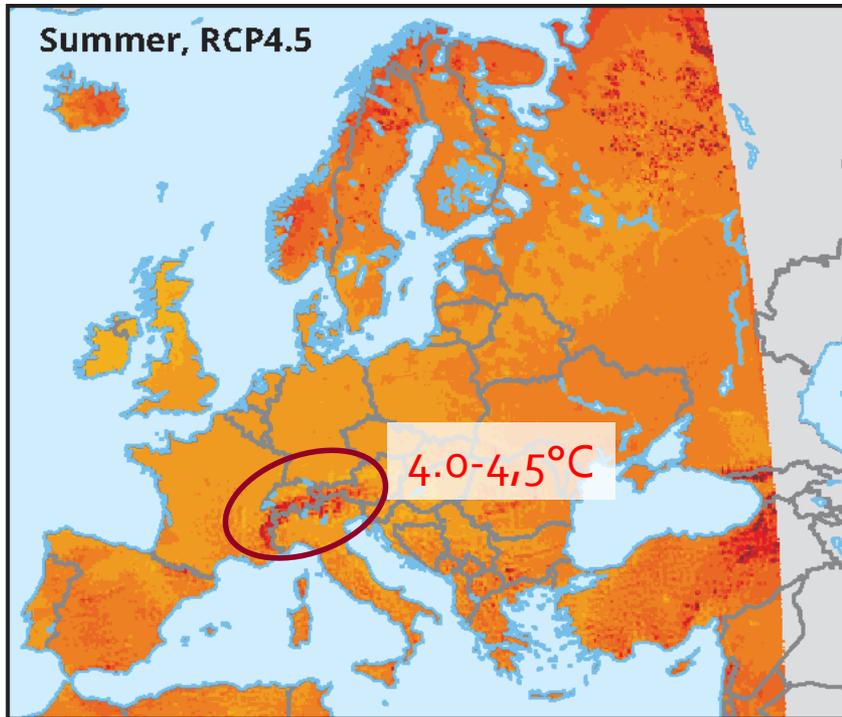
What should we expect in the Greater Alpine Region



ZAMG (2021): Klimaerwärmung im Alpenraum.

Climate Change in the Alps

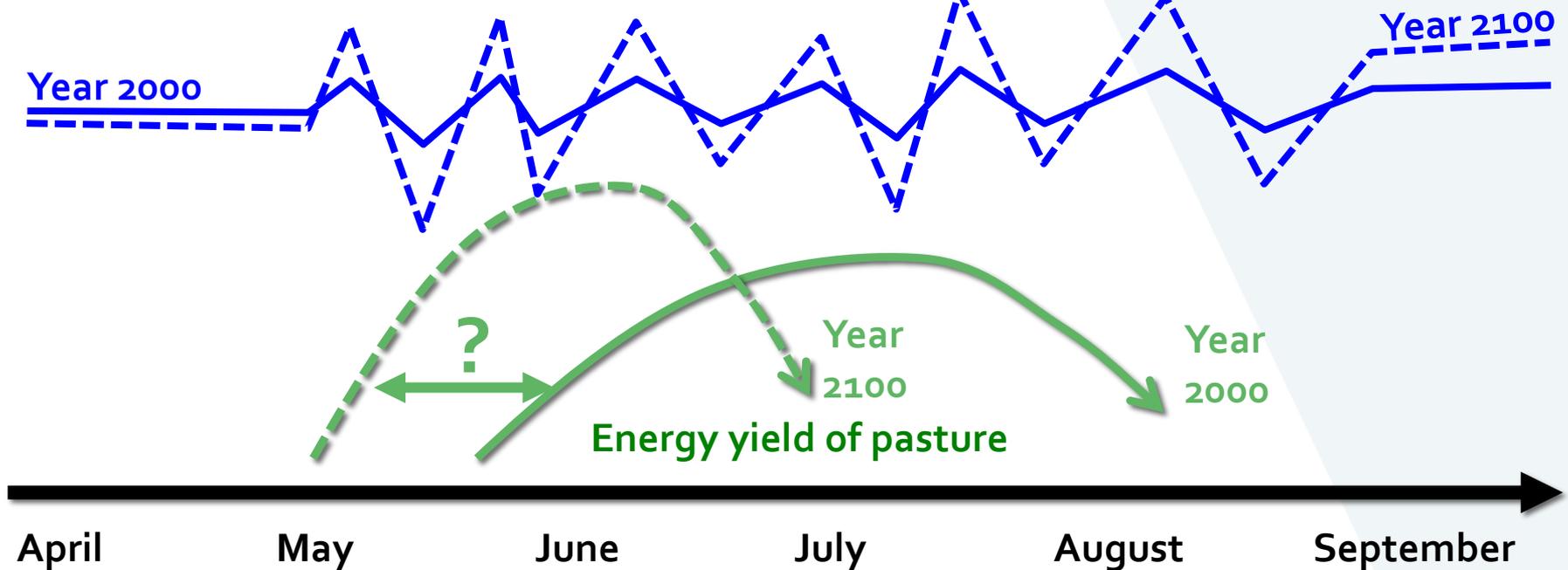
How the change is spatially distributed!



<https://www.eea.europa.eu/data-and-maps/figures/projected-changes-in-annual-summer-1>

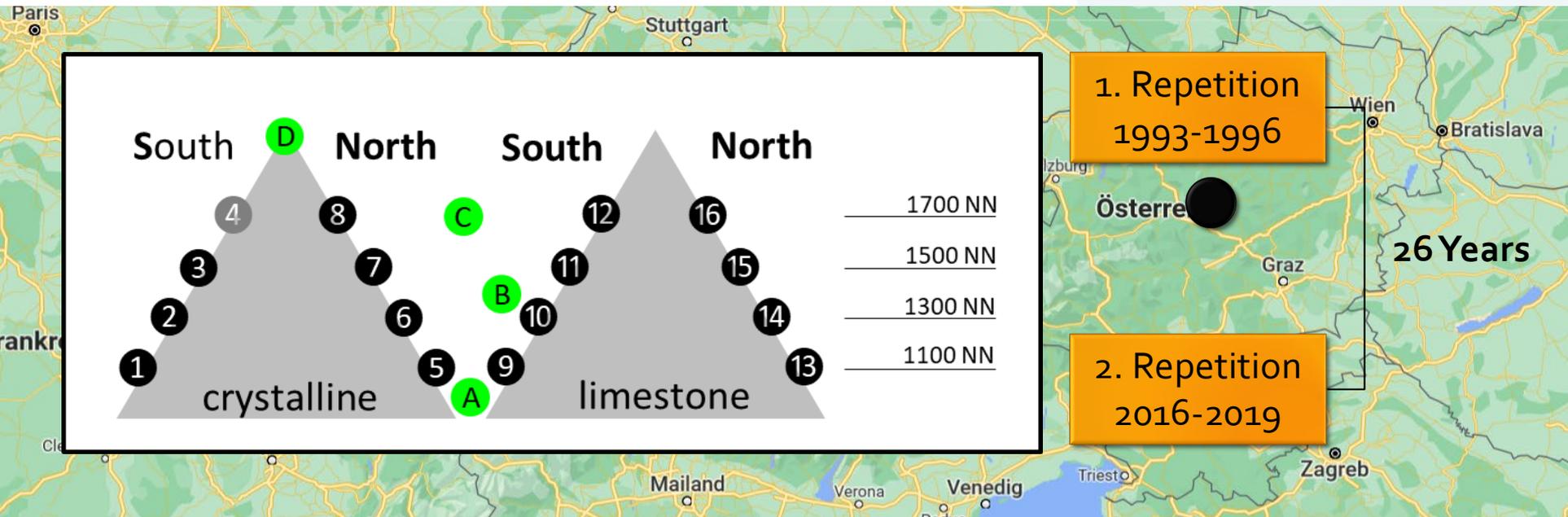
What we expect!

- Earlier development and faster growth and/or ageing of pastures
- Higher dynamics of the atmosphere = (Heavy rain / drought)

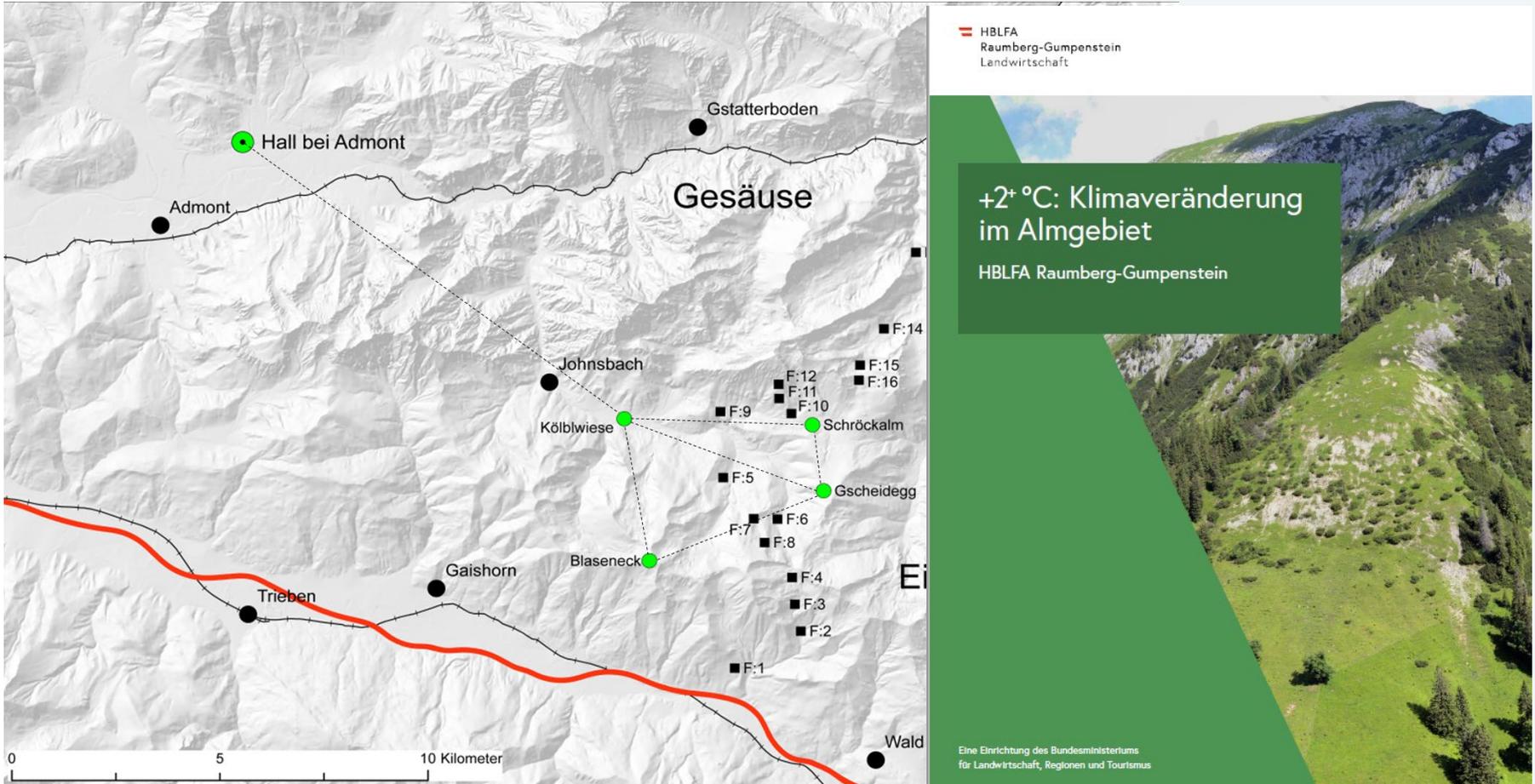


Field experiment „Altitude Profile Johnsbach“

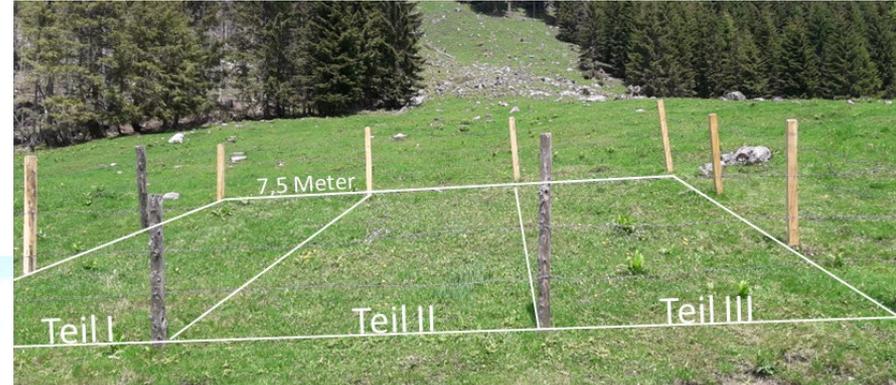
All work was done on the same calendar day in both replicates
(calendar fixed design).



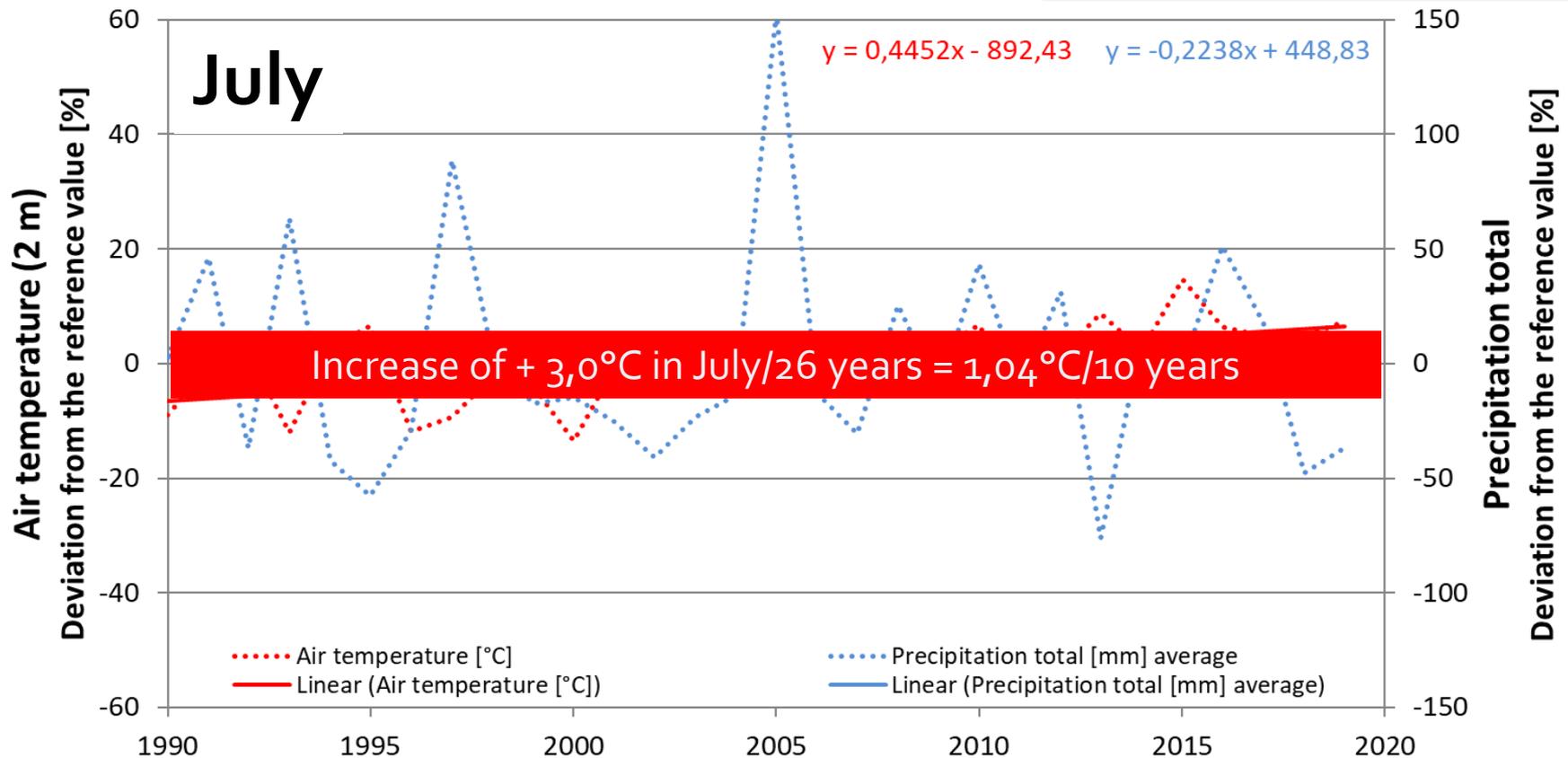
Design of scientific trial plots and local climate stations



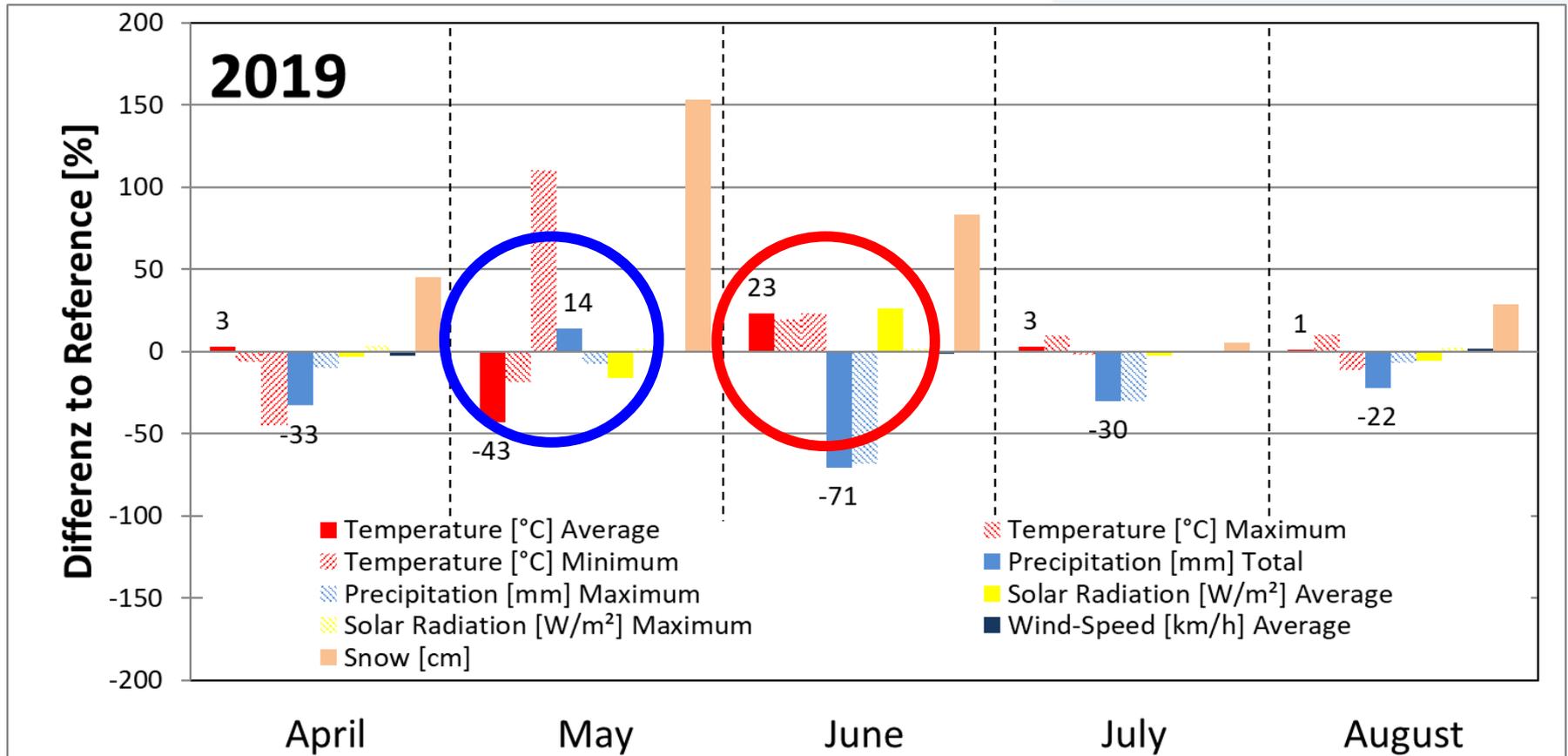
Limestone, South, 1.300 – 1.700



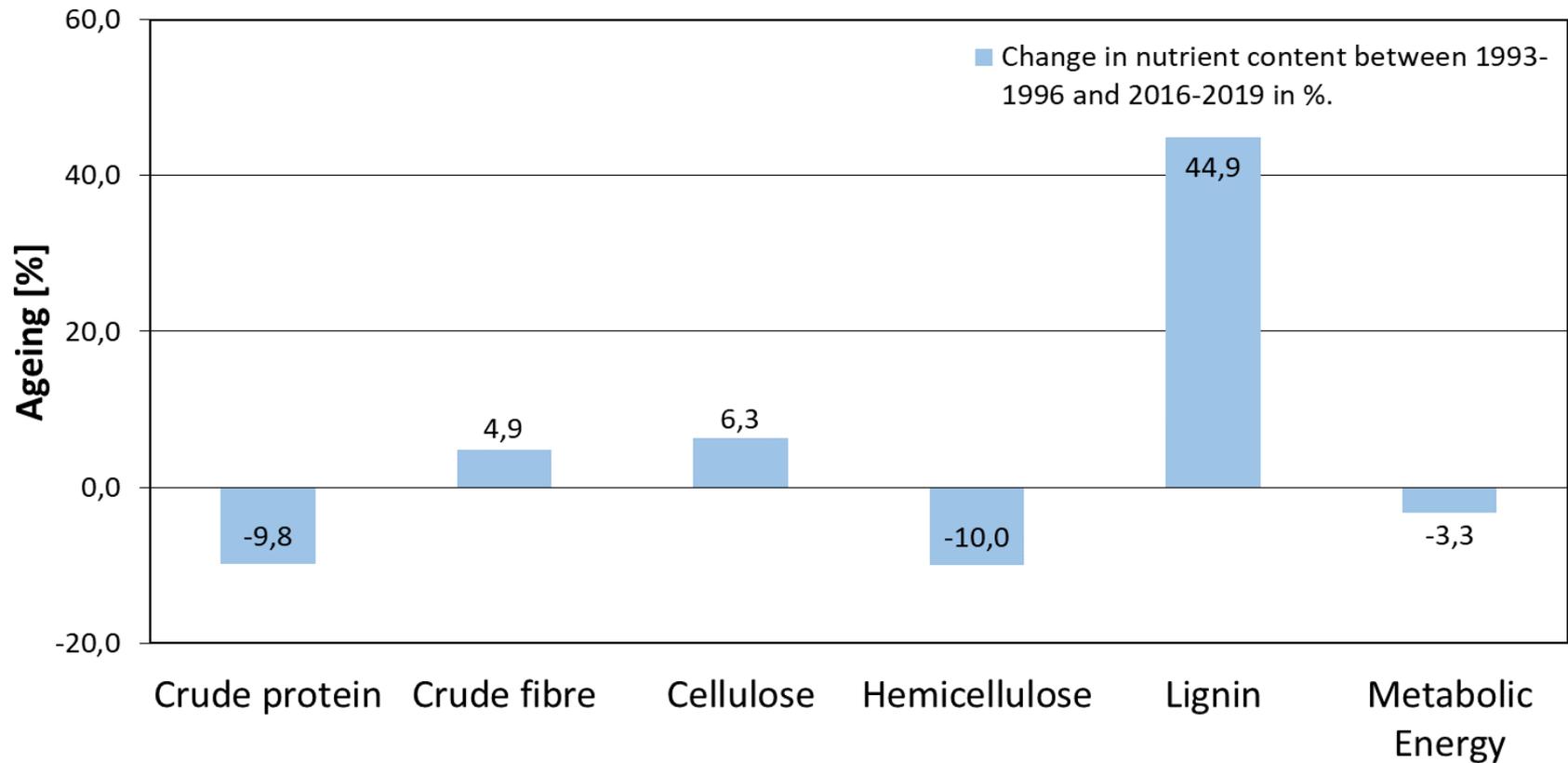
Lesson 1: The increase in temperature can be confirmed



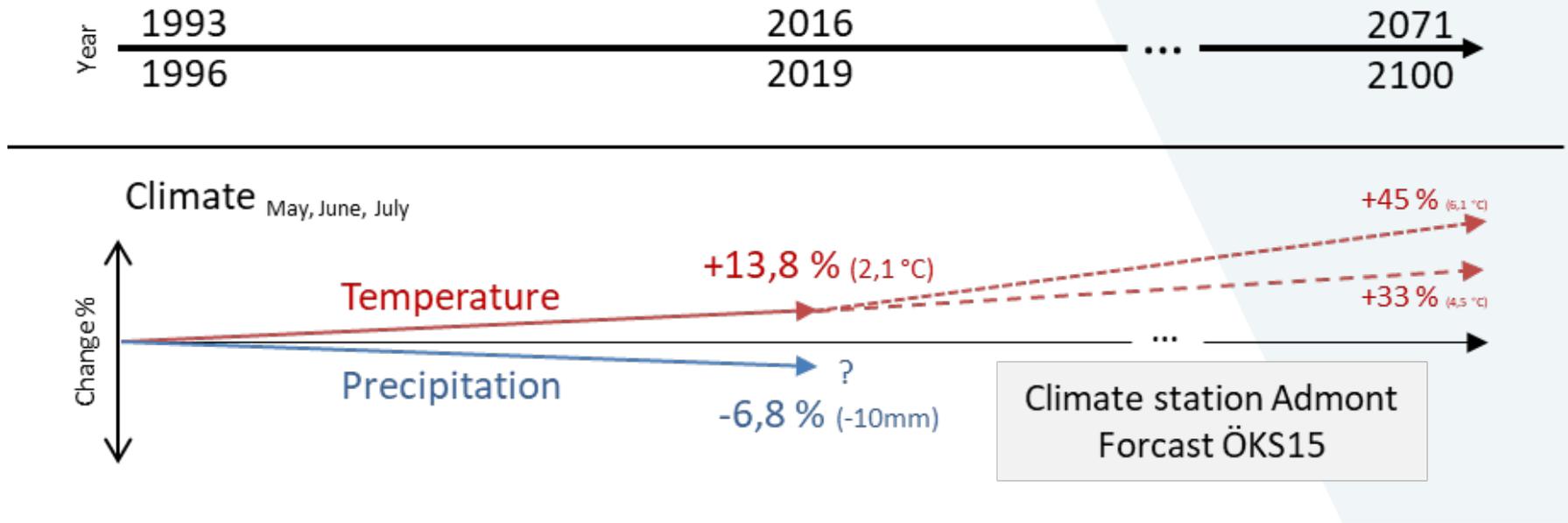
Lesson 2: Nothing is constant, certainly not the weather



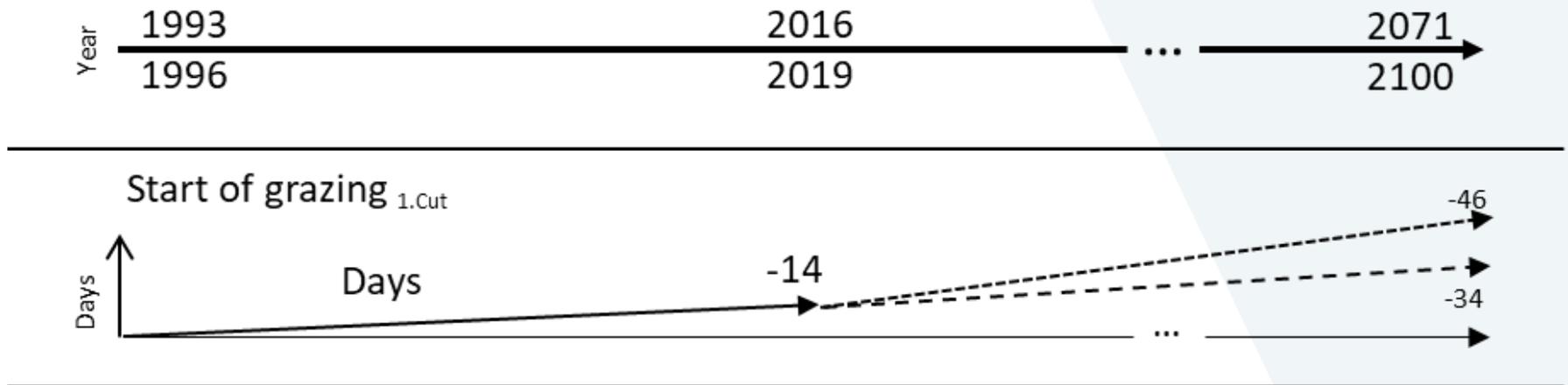
Lesson 3: One phenological stage delay (14 days)



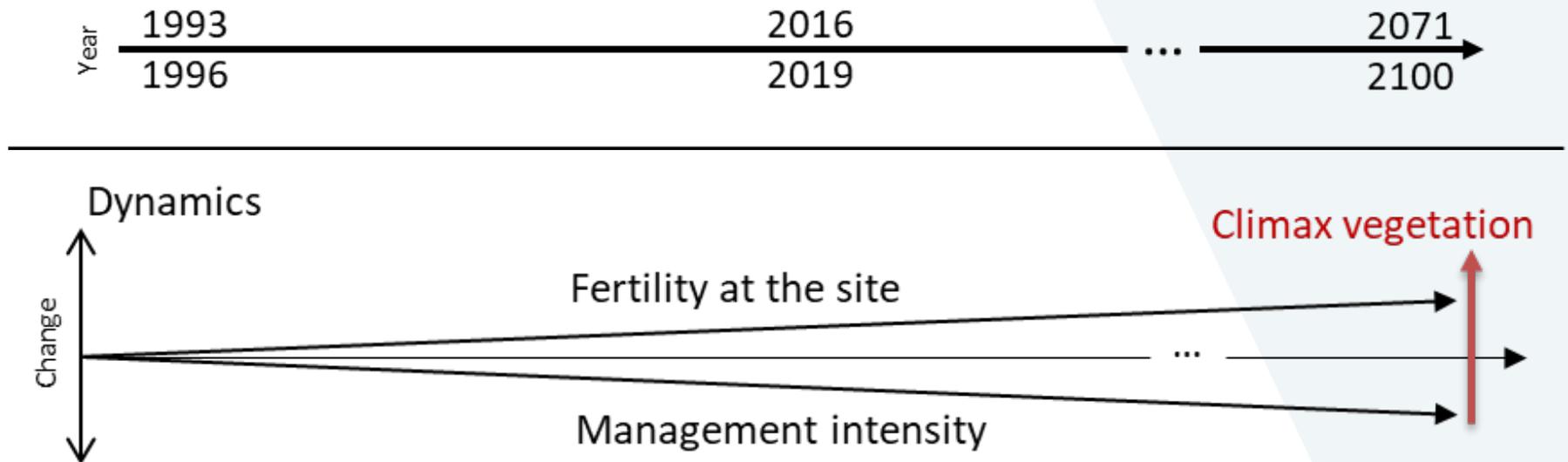
Lesson 4: Future forecasts by the IPCC can easily come true



Lesson 6: Earlier start of grazing is absolutely necessary



Lesson 7: Forestation will easily happen



Mission to the shepherds

- **Expect further global warming!**
- **Expect more and stronger fluctuations in the weather!**
- **Expect an earlier start of grazing!**
- **Expect faster ageing of the pastures!**
- **Expect more trees, shrubs and dwarf shrubs!**



The Question?

**Should we still use the pastures at all
under these conditions?**

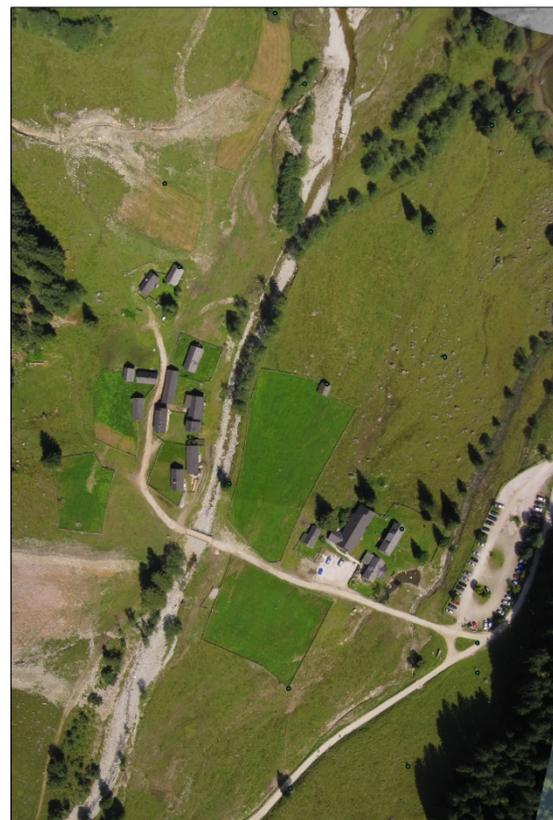
**Yes, because in many regions of Europe
the yield of agriculture will decrease.**

An advise in case of natural hazards

2010



2011



Be prepared but never give up!



Thank you!
I am ready for questions