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Agroscope

Dry days, associated temperature anomalies and inter-annual variations in spring phenology

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Agroscope

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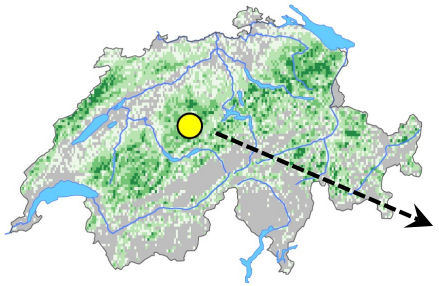
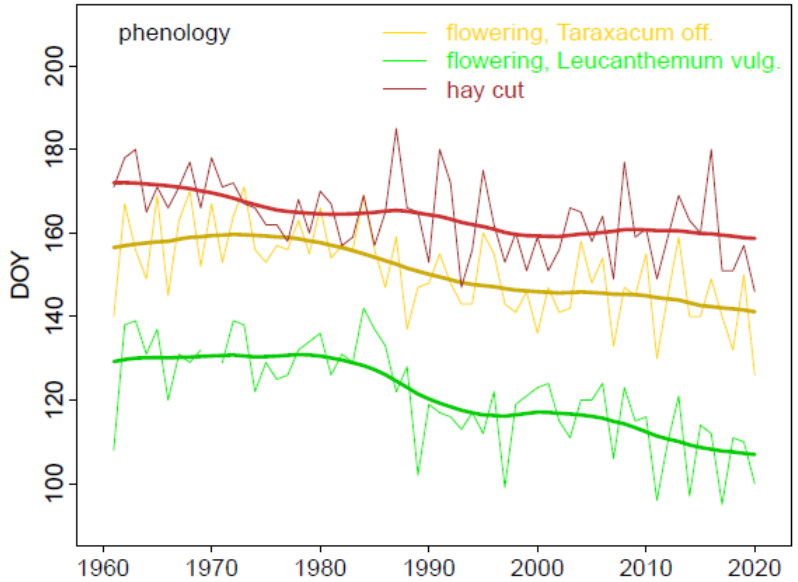
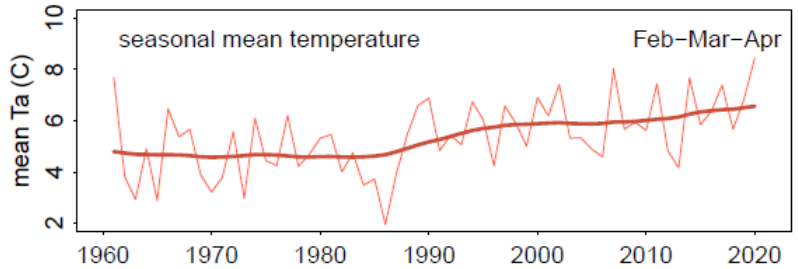
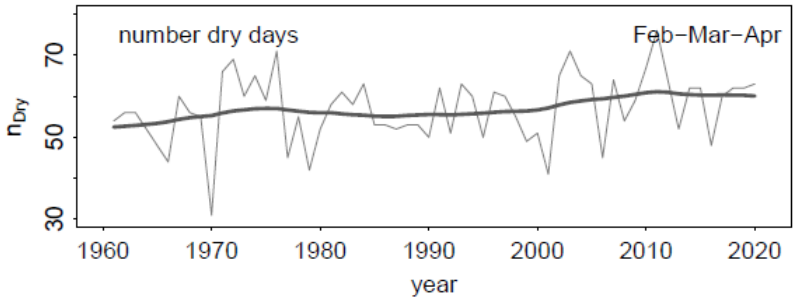
Motivation and background



Grassland area
in Switzerland



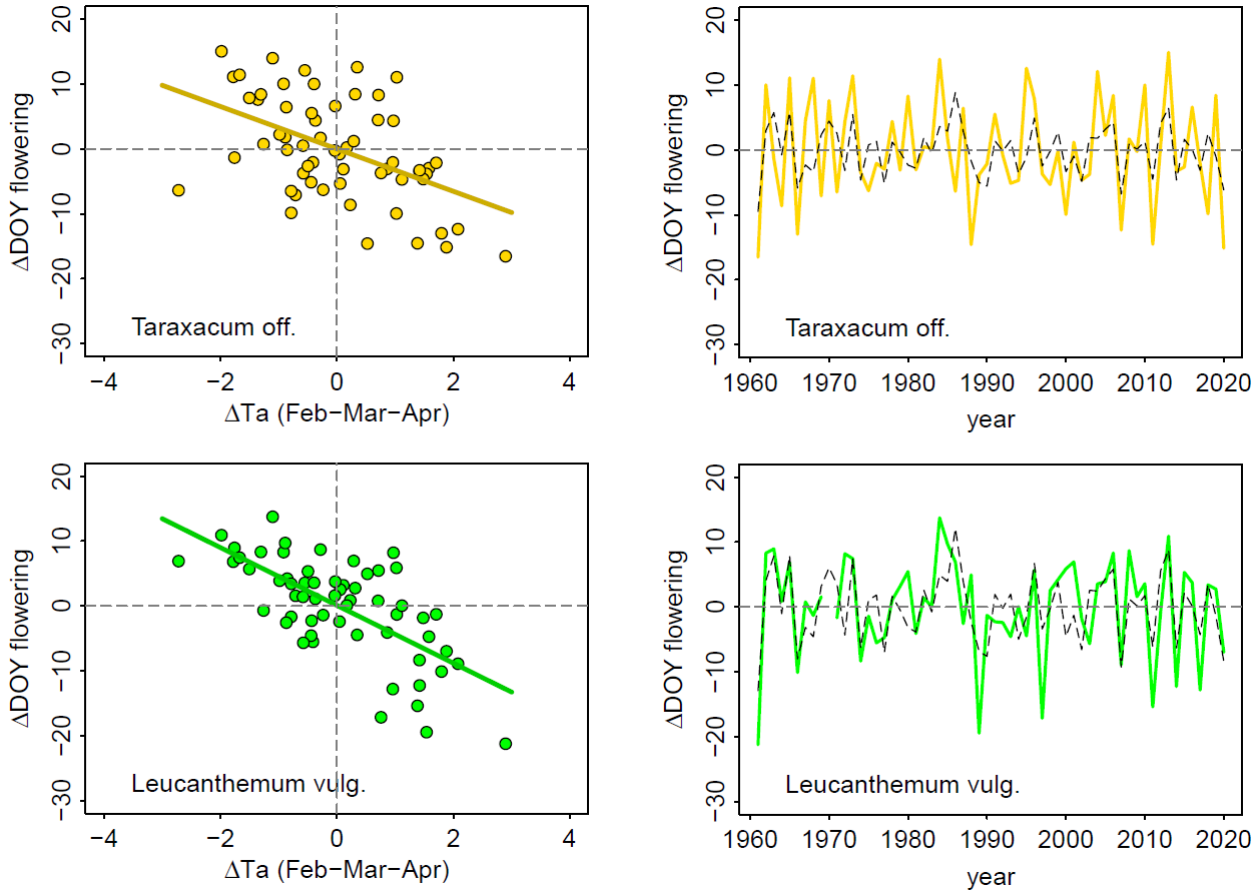




- Ecosystems, including grasslands, provide numerous services to society.
- Understanding phenology is essential for assessing the impacts of climate change on ecosystem services.
- Observations indicate clear trends and large inter-annual variations in phenology and temperature over the past 60 years.
- Shifts in weather types have also been documented (*).
- Weather records further display decadal variations in the number of dry days in spring.
- Could the latter play a role for phenology?

(*) Kyselý, 2008, Global and Planetary Change 62, 147–163

Variability in spring temperature and phenology

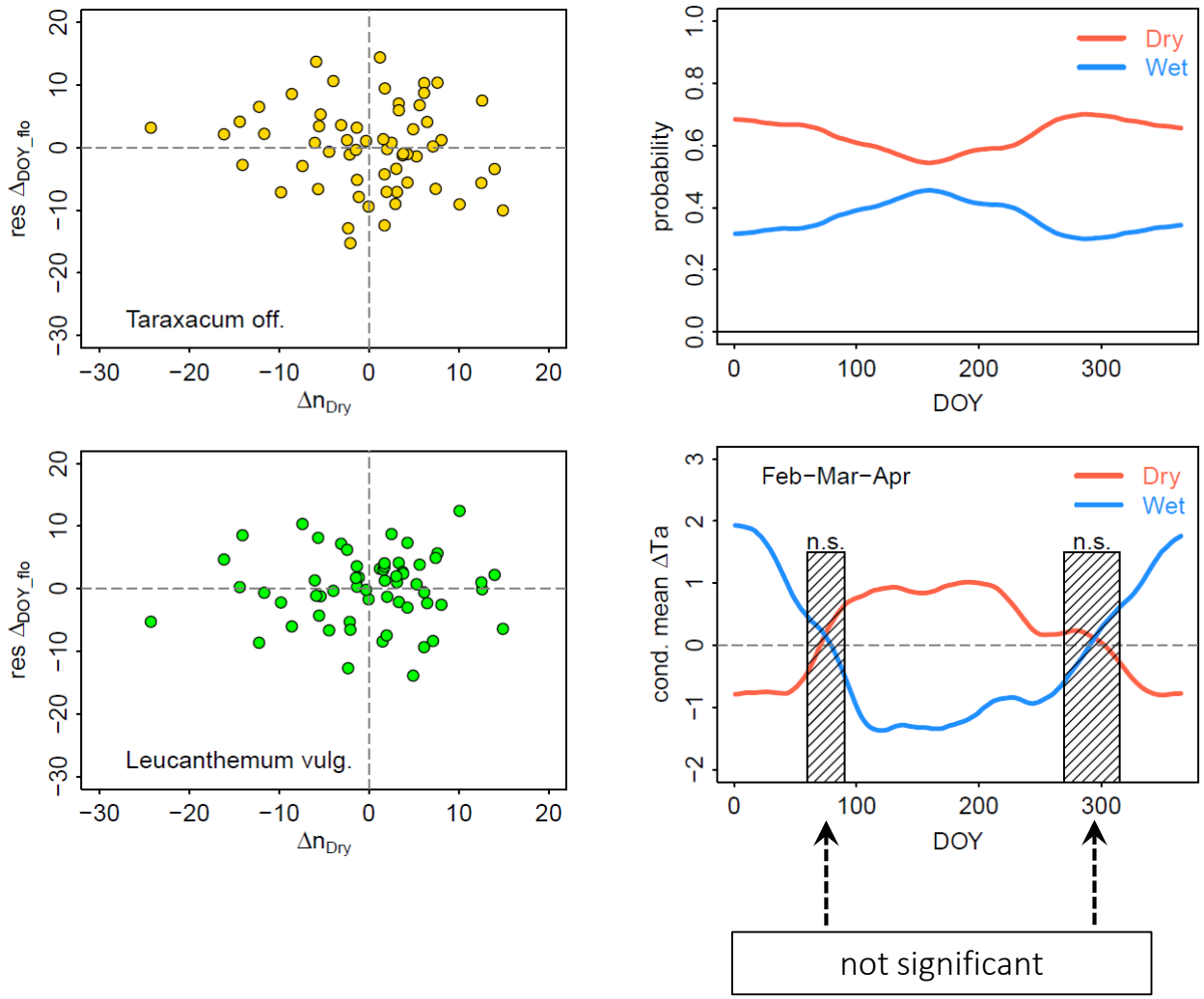


- Inter-annual variations in spring temperature can explain a significant part of variations in phenology (~ 50%) (*, **)
- Phenological observations on grassland species are notoriously “uncertain”.
- Results are even more significant for phenological observations on deciduous trees (e.g. “Basel reference cherry tree”).
- What are the causes for the unexplained part?

(*) For the analysis, time series were first detrended using a so-called Kolmogorov-Zurbenko filter (Yang & Zurbenko, 2010, WIREs Computational Statistics, 2, 340–351)

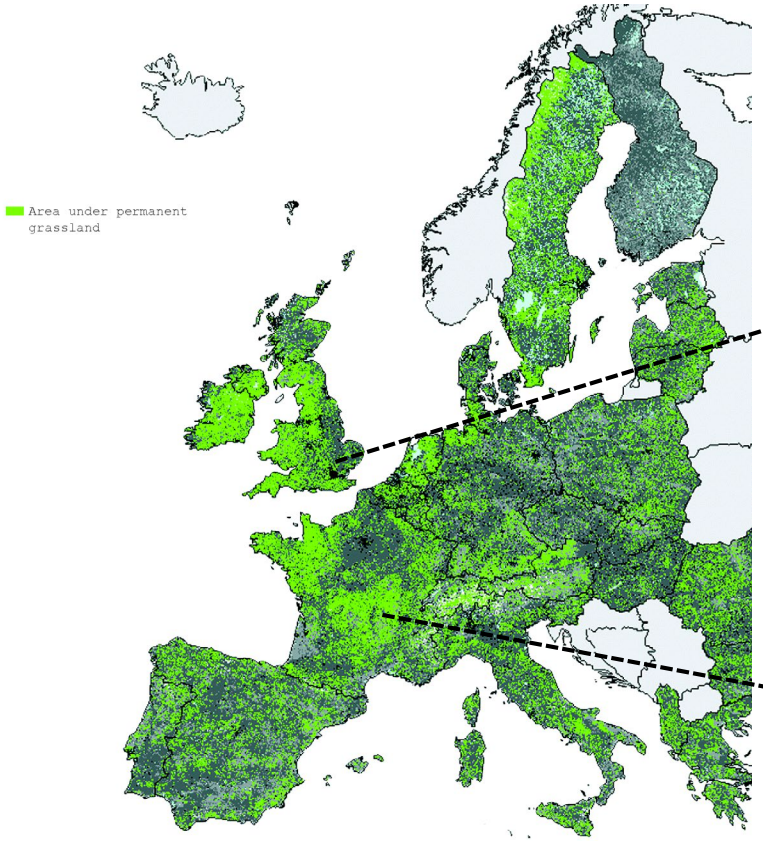
(**) More significant results can be obtained by selecting an more appropriate time window for temperature rather than looking only at the default Feb-Mar-Apr.

But: no clear sign (yet) of a “dry day signal”

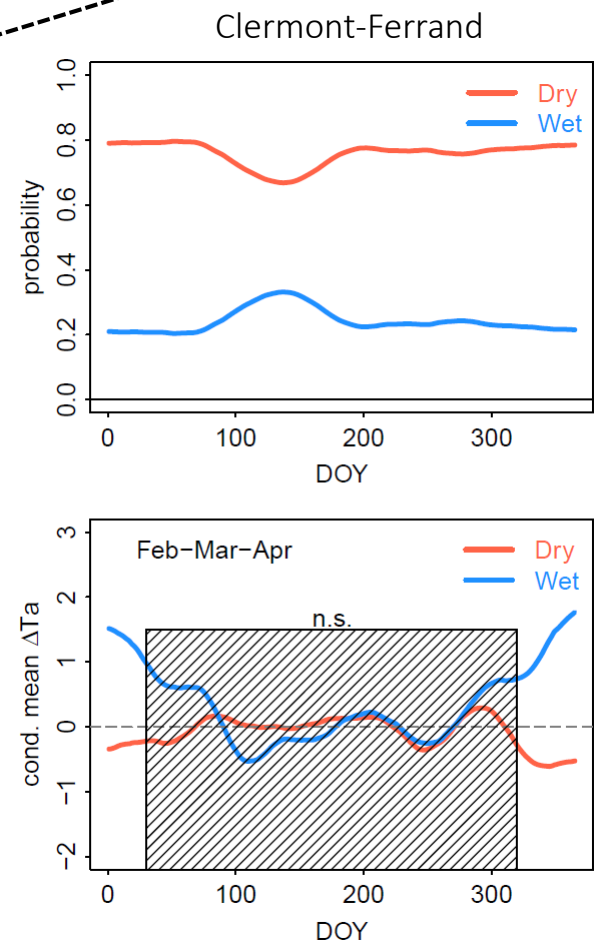


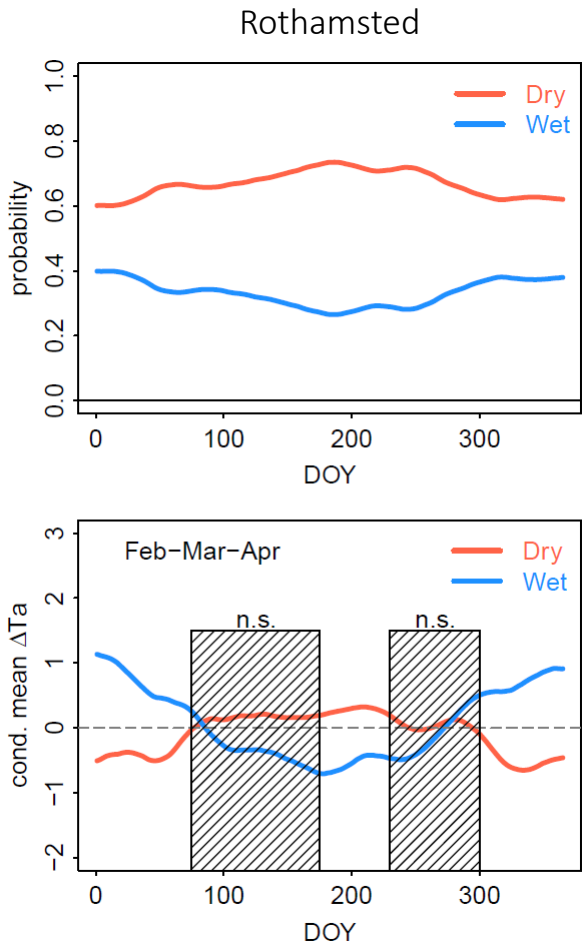
- The probability of a day being dry or wet varies over the year.
- For the study area (Switzerland), the conditional mean temperature anomaly on a dry day in late spring and summer is significantly larger than on a wet day.
- However, the opposite is true for winter.
- Moreover, during March the differences are not statistically significant.

Explaining temp. anomalies in spring remains difficult

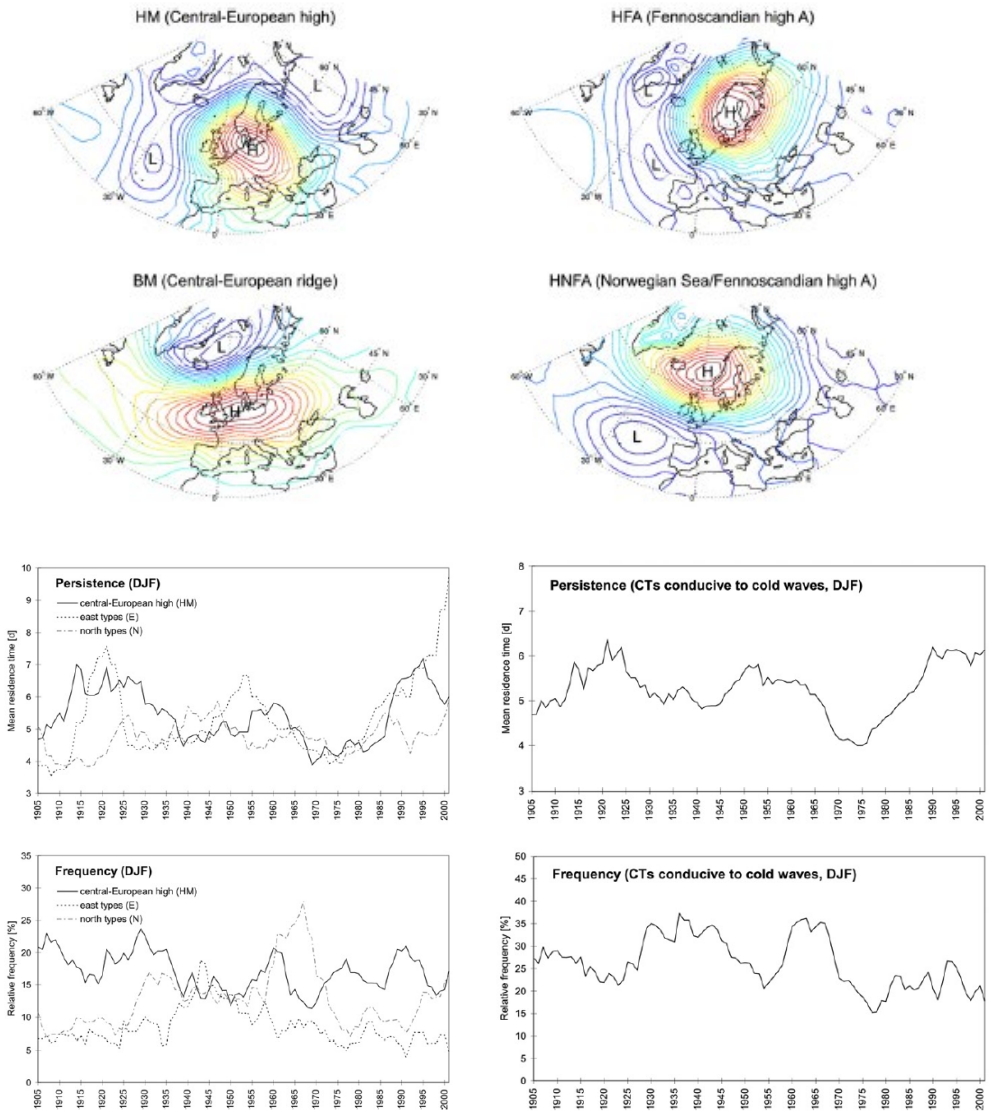


Area under permanent grassland in Europe (© EEA)



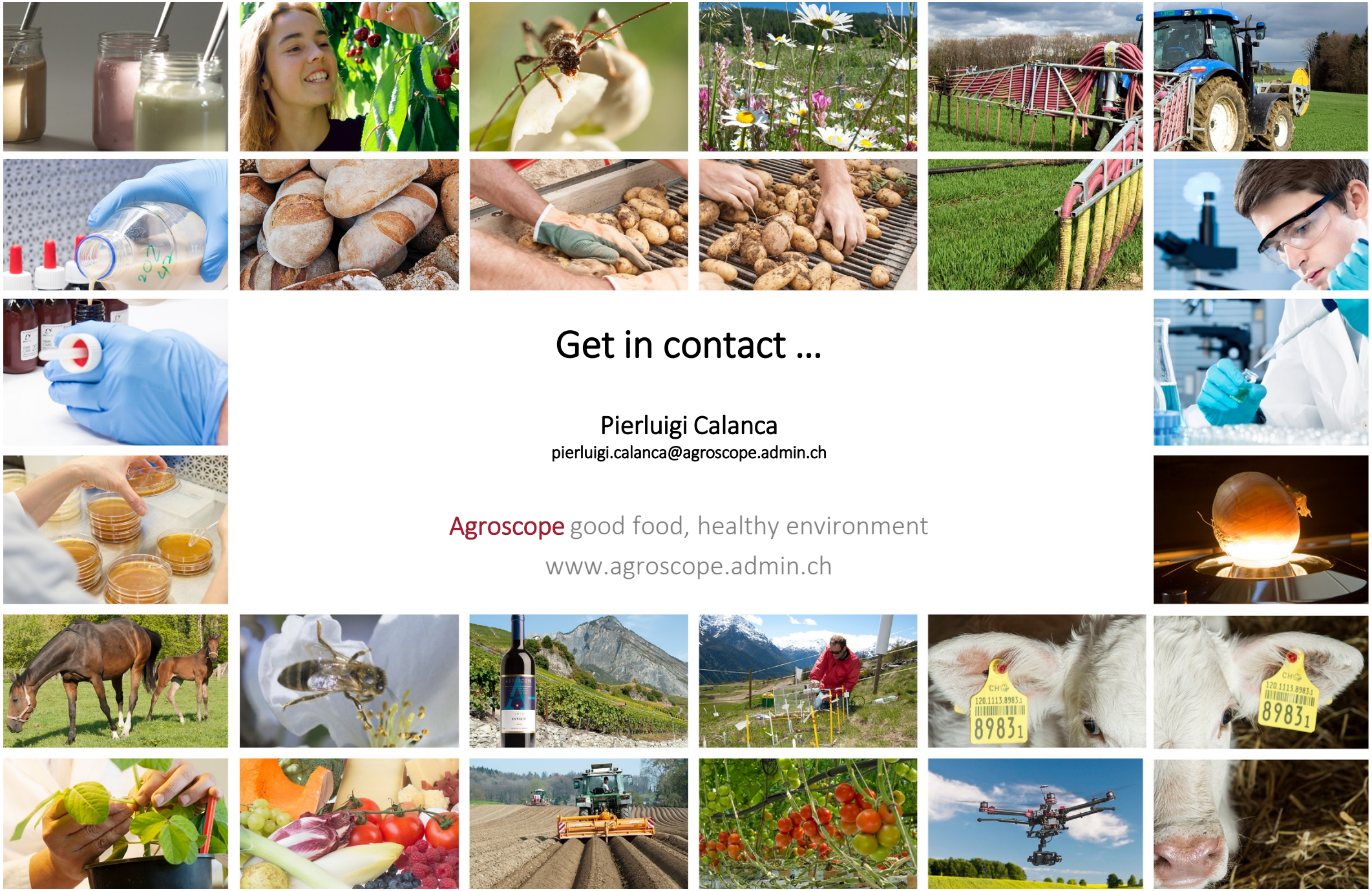


Additional homework can not be avoided … ☹



Kyselý (2008)

- In many areas, there is a significant difference in summer temperature anomalies conditional on a day being dry or wet.
- Spring remains elusive in this respect.
- Re-examining the frequency, resp. persistence of weather (or circulation) types could be a way off.
- Yet, a proper (statistical) characterization of spring climate anomalies is a challenge also in this respect.



Get in contact …

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