CL2.5 Phenology and seasonality in climate change

Long-term trends towards delayed autumn senescence

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I. INTRODUCTION

Spring leaf-out
Start-of-the season
(**SOS**)

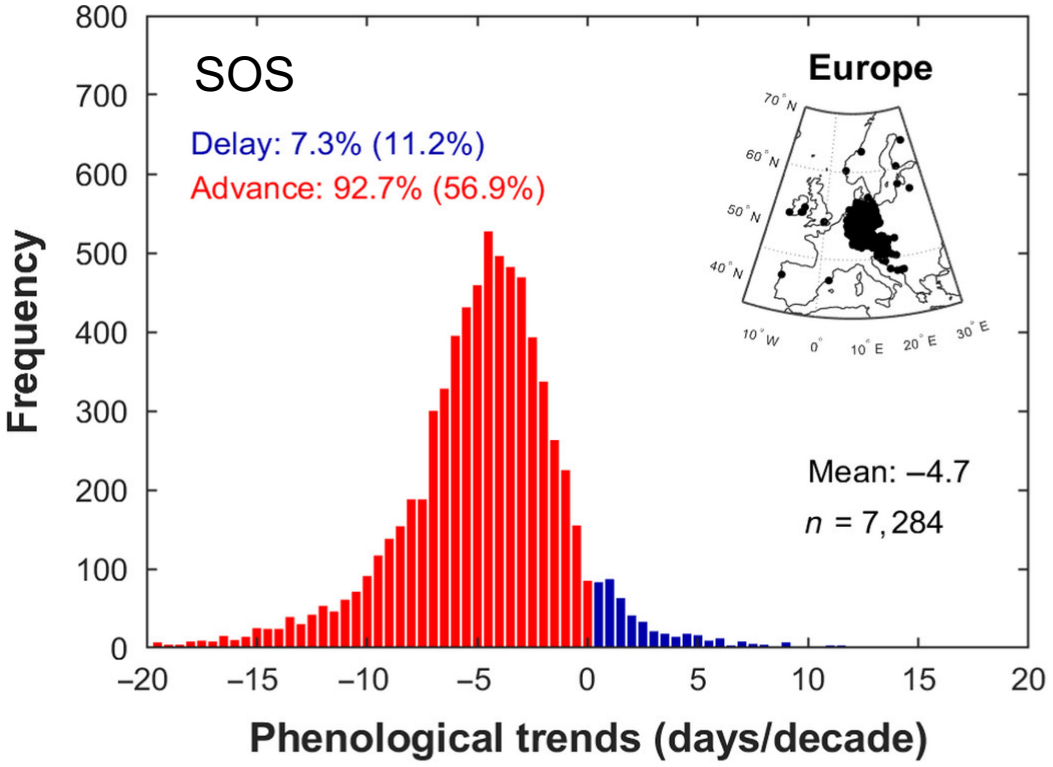
Autumn senescence
End-of-the season
(**EOS**)

Global changes are causing **phenological shifts**

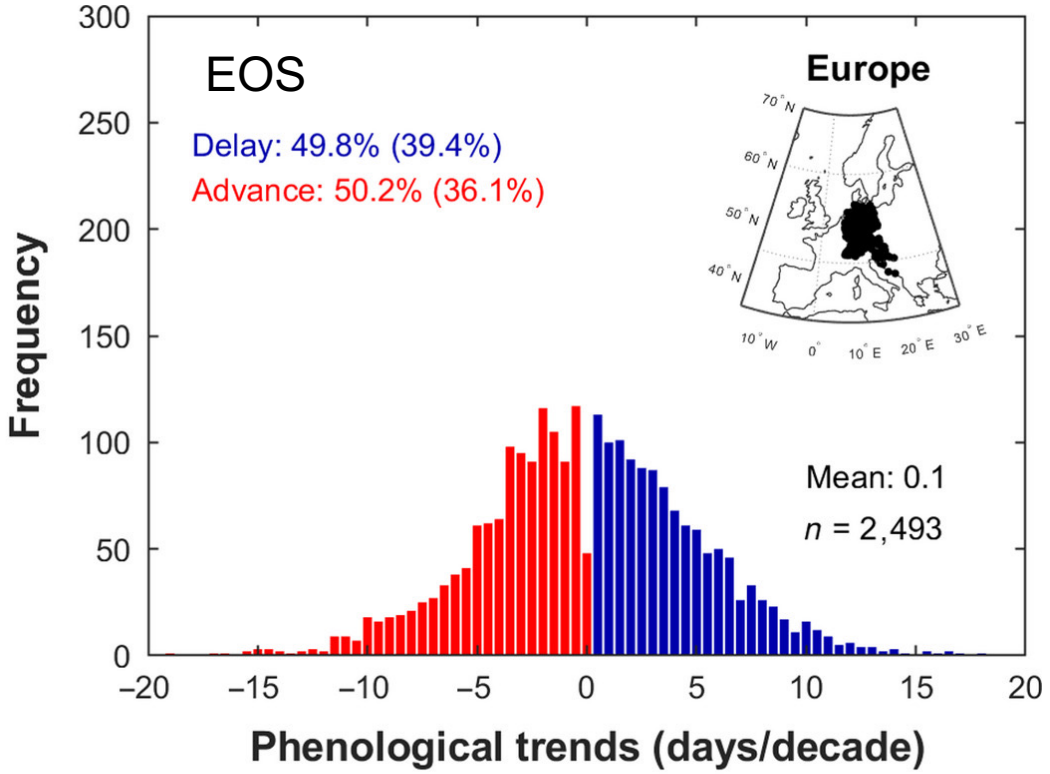
Photos: Swiss NFI

I. INTRODUCTION

Long-term temporal trends towards **earlier SOS**



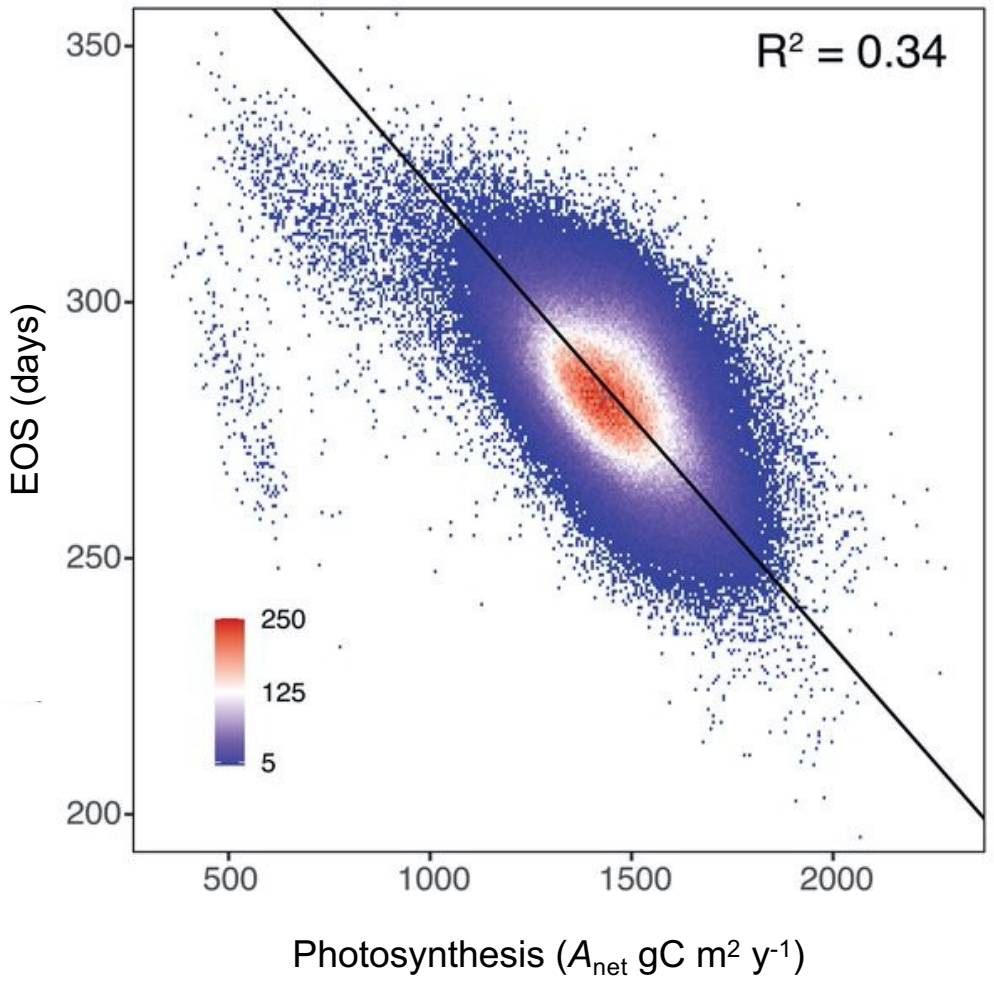
No clear temporal trends of **EOS**



Piao et al. 2019 *GCB*

I. INTRODUCTION

Negative relationship between A_{net} and **EOS**



Need to decompose the levels of variation

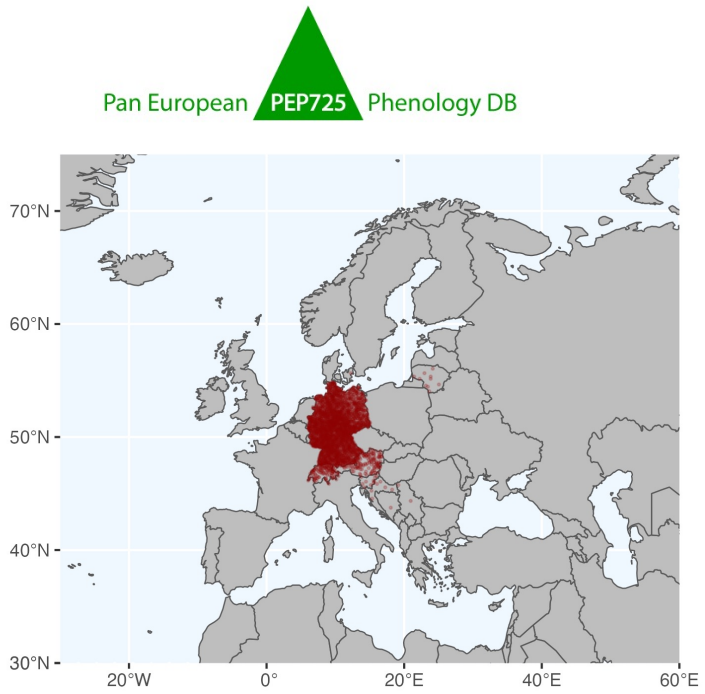
- Interannual
- Long-term
- Spatial

To identify general trends in the changes of EOS and reconcile conflicting observations.

Zani et al. 2020 *Science*

Opposing A_{net} and EOS relationships at interannual and decadal times

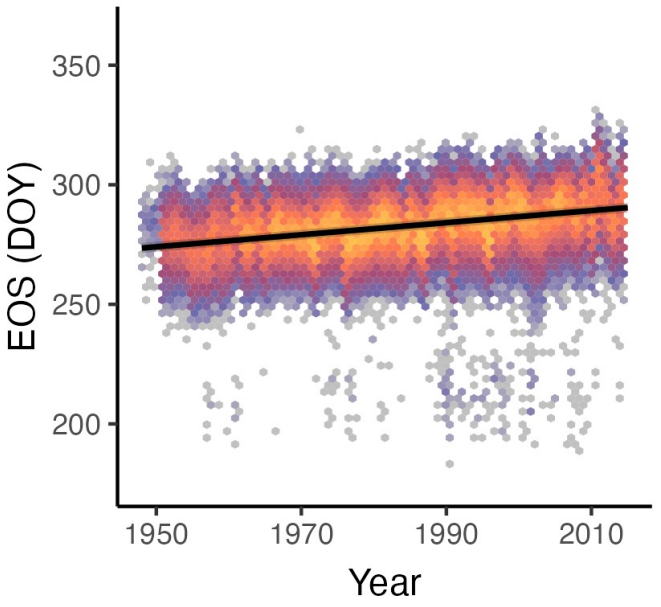
- Ground observations (1948-2015)
- A_{net} simulations with LPJ model (Sitch et al. 2003) and P-model (Stocker et al. 2020)



Site locations of the phenological observations

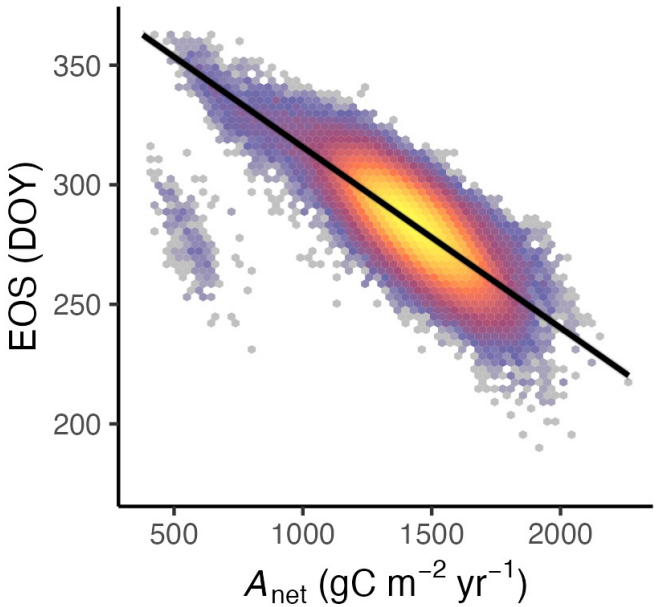
EOS ~ **Year** + A_{net}

PEP data and LPJ



EOS ~ Year + $\boldsymbol{A_{net}}$

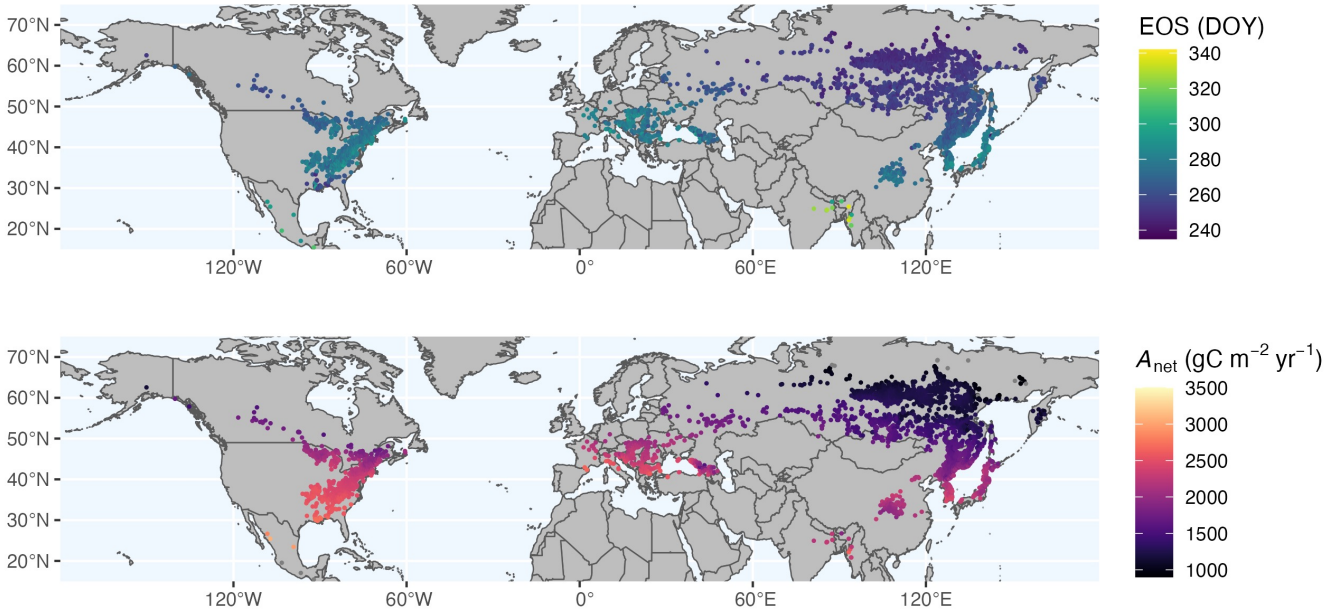
PEP data and LPJ



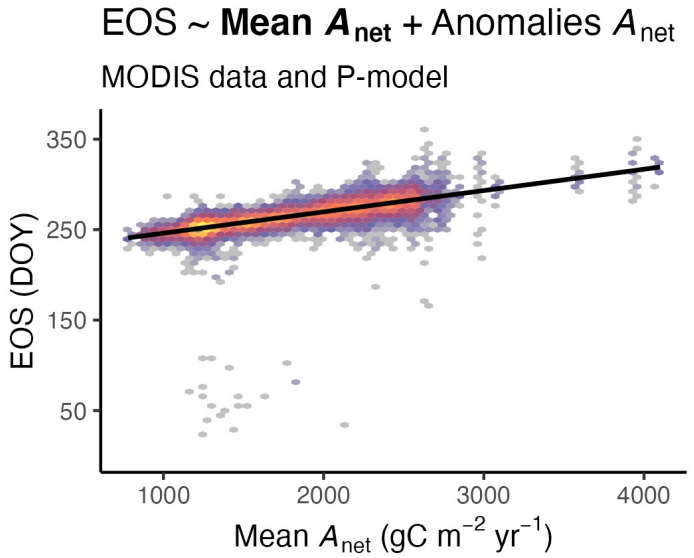
A **decadal trend** towards **later EOS** persists despite the **negative A_{net}-EOS** relationship at the **interannual** scale.

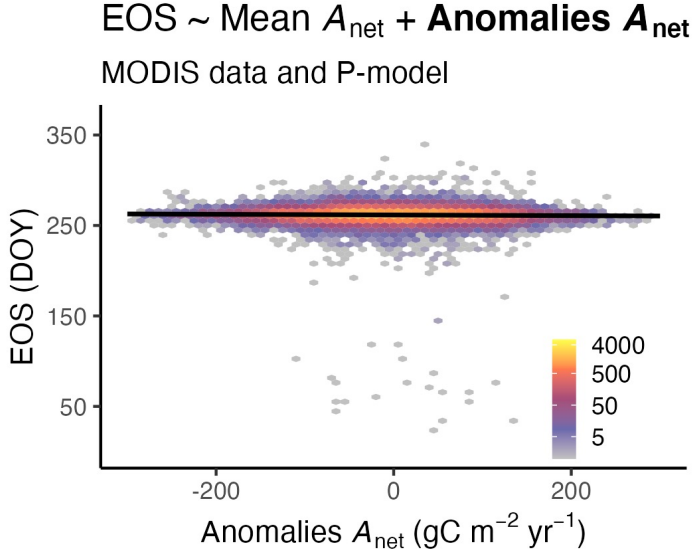
Opposing A_{net} and EOS relationships at interannual and spatial scales

- Remote sensing observations - MODIS MCD12Q2
- A_{net} simulations with P-model (Stocker et al 2020)



A **positive mean A_{net}-EOS** relationship exists **across space**, while the opposite prevails when considering **interannual variations** at a given site.





III. CONCLUSIONS

- The **opposing relationships** at **different scales** found in this study **reconcile the apparent conflicts** by previous reports of **autumn phenology**.

- The **non-stationary A_{net}-EOS relationship** indicates a gradual **acclimation** of phenological processes, leading to a relief of constraints at the interannual scale.

EGU abstract

Preprint

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THANKS!