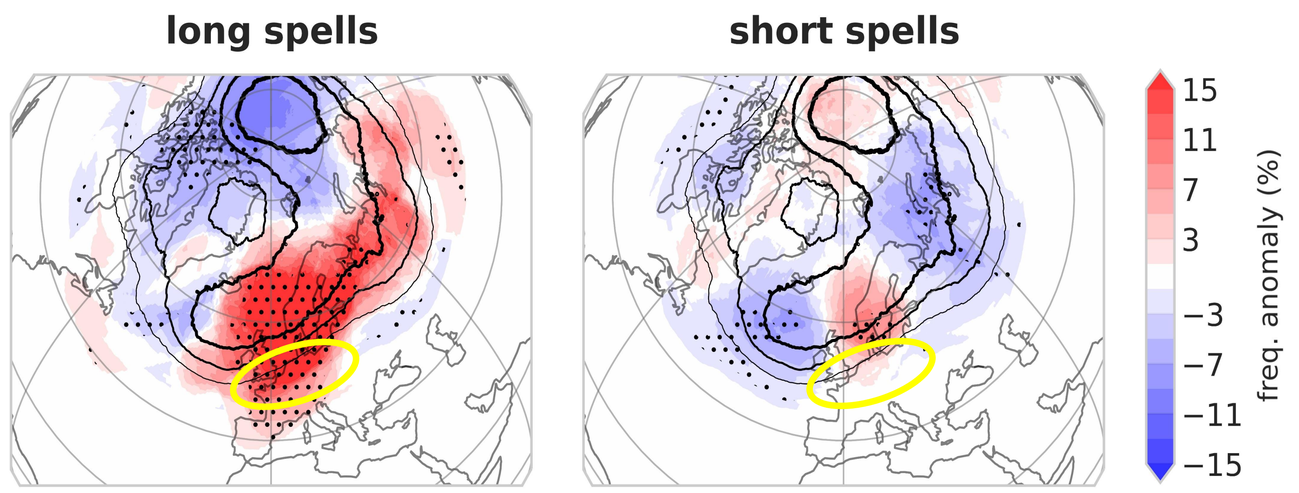
Blocking and **persistent surface hot spells** in Europe: a **sporadic relationship**

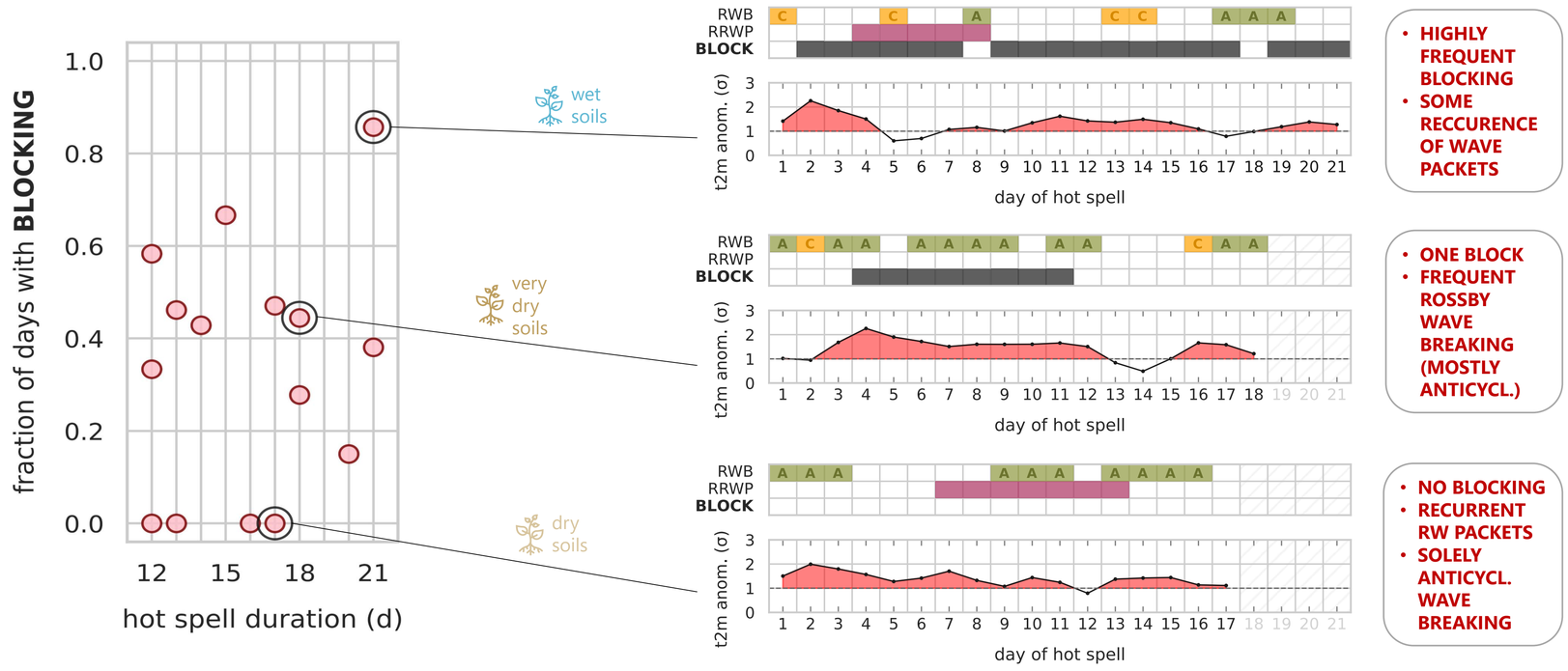
Background: surface weather persistence at sub-seasonal to seasonal (S2S) timescales can severely impact human and natural systems. Therefore, understanding long-lasting hot spells and their many drivers – including blocking – is crucial.

Results

Comparing blocking frequency anomalies during hot spells in Western/Central Europe, we find that long spells are – on average – associated with a higher frequency and spatial extent of blocks, unlike shorter heat periods. Larger anticyclones are more stationary, and their repeated occurrence is more likely to induce prolonged hot spells at the surface.



Looking at individual events reveals the real complexity of interactions. More frequent blocking does not necessarily equal longer hot spells; numerous other mechanisms determine their duration. Persistent hot spells can happen despite wetter-than-average soils or absence of blocking. Predicting the complex chain of drivers will continue to be a major challenge in S2S forecasting.



Methods

Hot spell definition

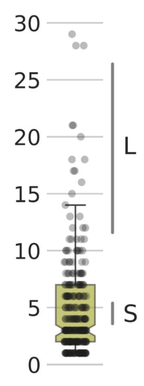
Blocking

Composite analysis

ERA5 reanalysis 1959-2022

1 Hot spells are defined as region-averaged quasi-continuous daily exceedances of +1σ. Short hot spells (S) last 4/5 days, while long hot spells (L) range from 12 to 26 days.

2 Blocks are identified as Z500 anomalies exceeding the 90th percentile (40°-80°N).



3 We use composite analysis to identify commonalities, differences and then assess their statistical significance.

Limitation: only a small sample of long hot spells available in reanalysis.

Outlook: is there such a thing as a typical long hot spell? Time to find out.

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SCAN ME !