ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

IAC ETH

Land surface drivers of droughts: The role of soil moisture persistence

Rene Orth and Sonia I. Seneviratne

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Classical attribution studies investigate role of human influence vs. natural variability for extreme events

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We want to study:

(1) Role of initial conditions vs. atmospheric forcing for soil moisture dynamics (and drought events)
→ Attribution of processes → "Physical attribution"

(2) Classical attribution: Changes in drought risk through long-term soil moisture trends

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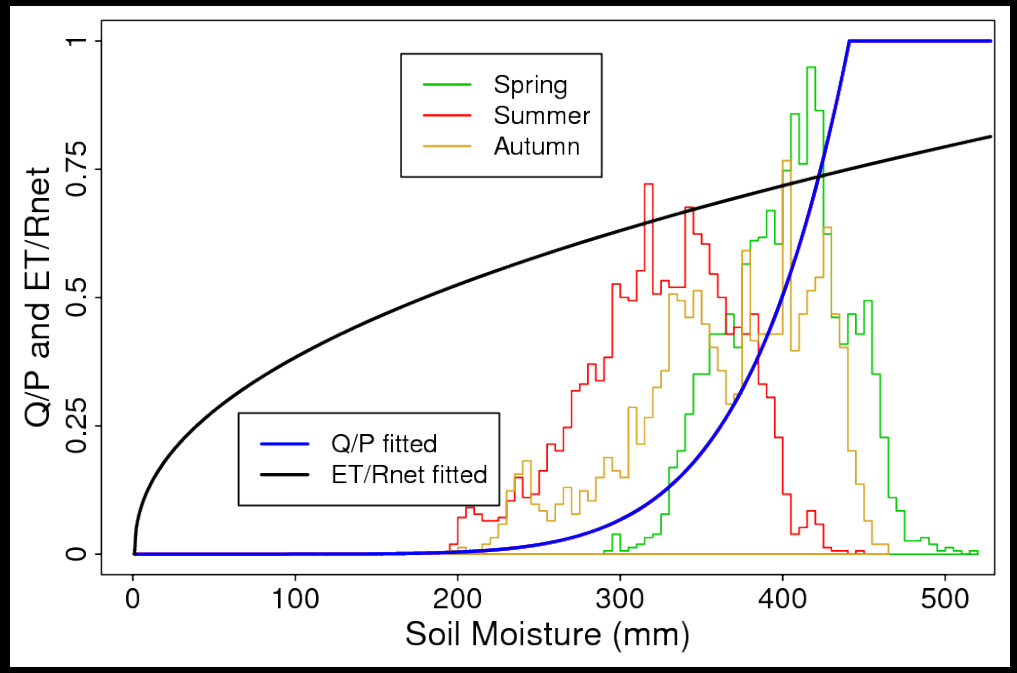

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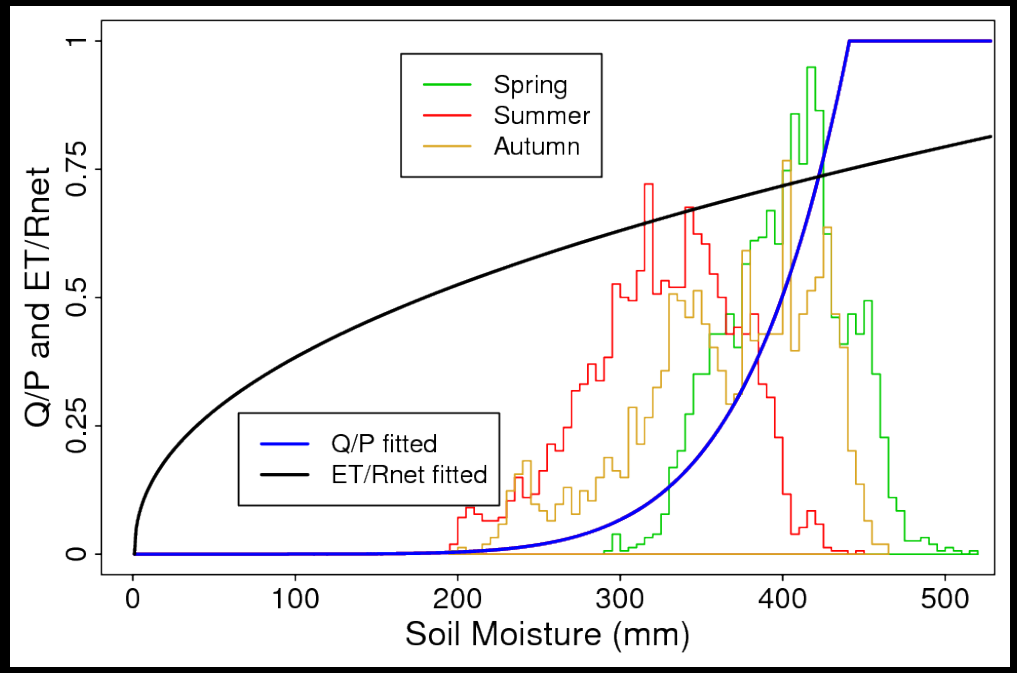

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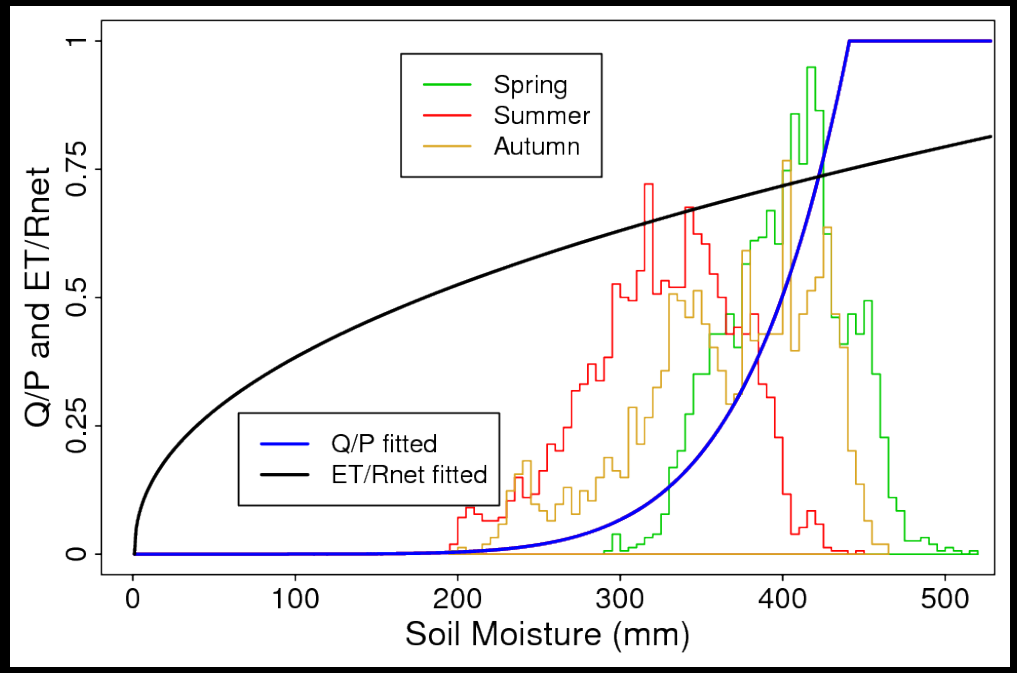

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→ for North America mean values of the derived parameters were applied

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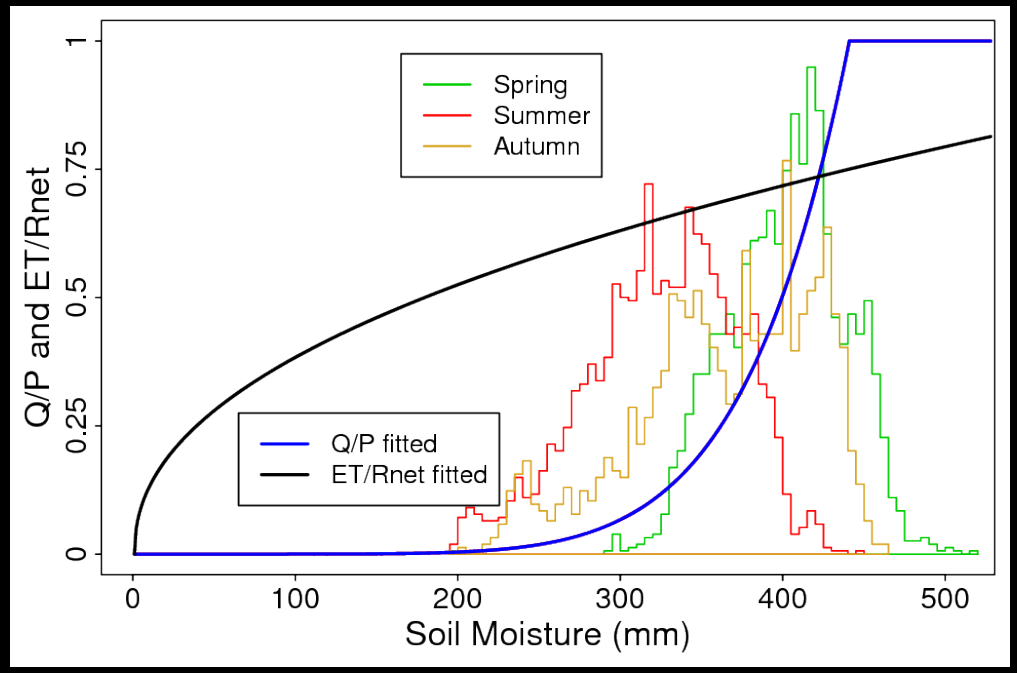

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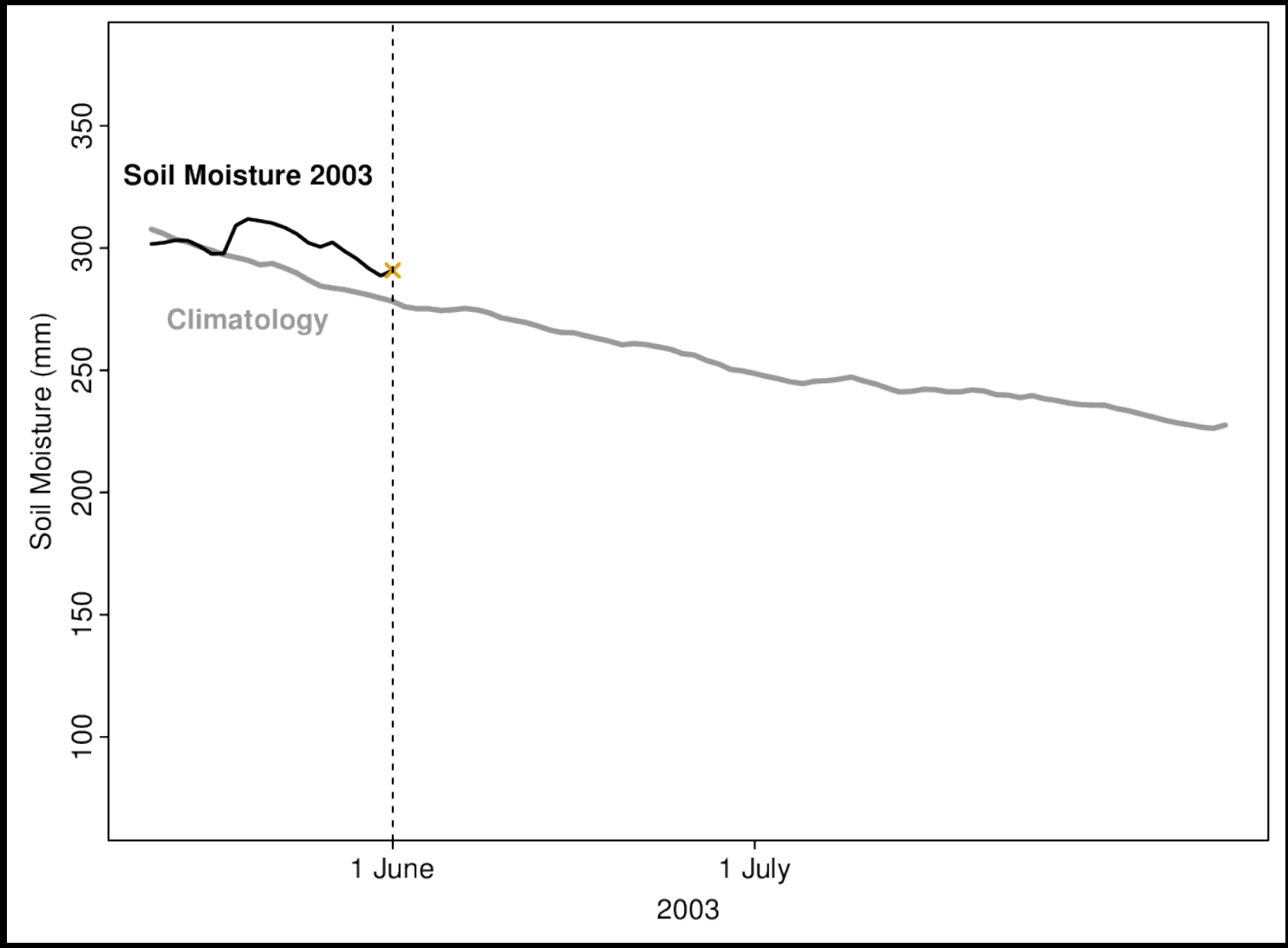
Data

- satellite-derived net radiation from CERES experiment
- observation-based precipitation from GPCP data set
- temperature from ERA-Interim reanalysis

→ deriving soil moisture, ET and runoff with conceptual model

- considered time period 1998-2012
- focus on North America

Methodology



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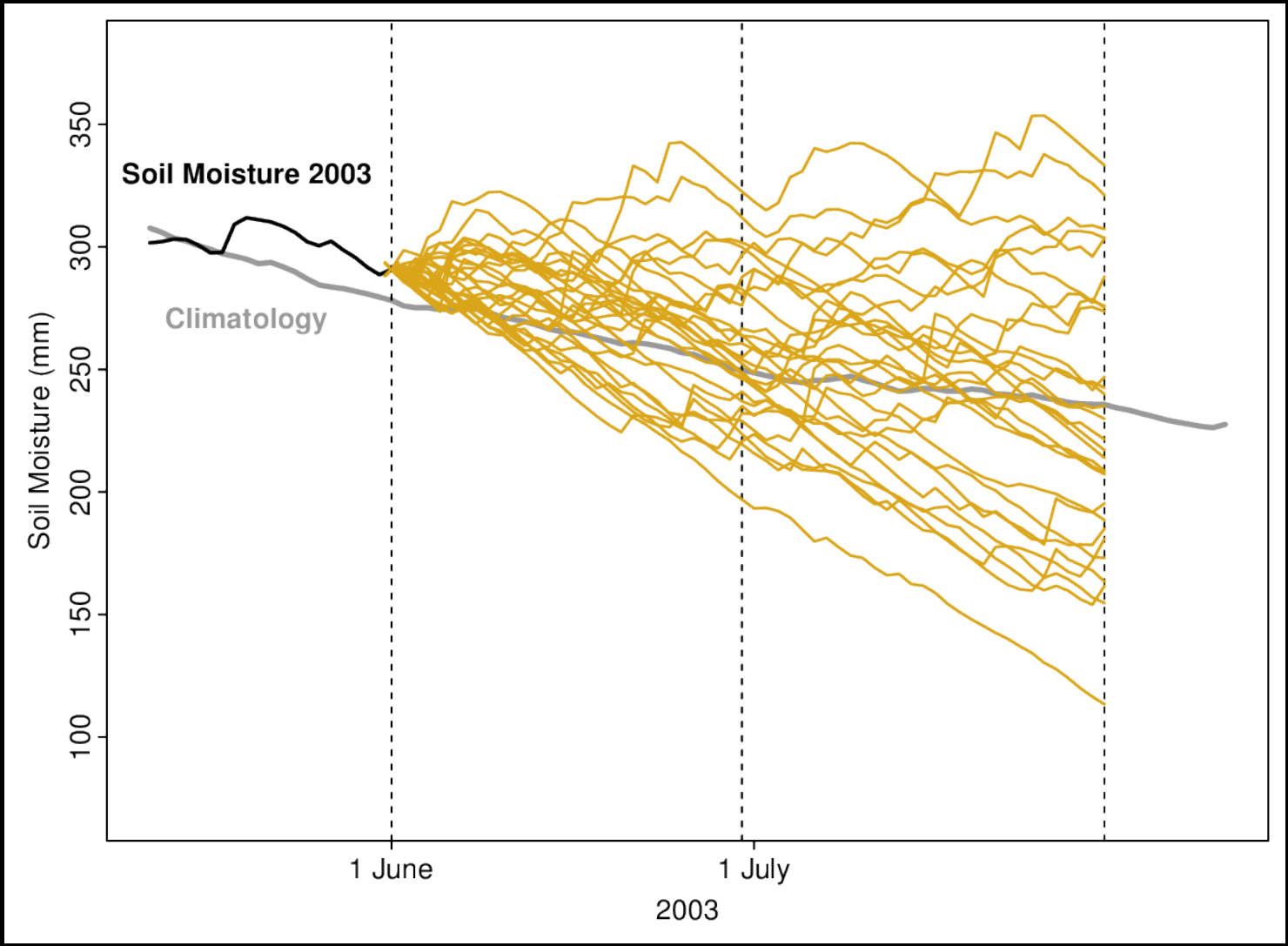

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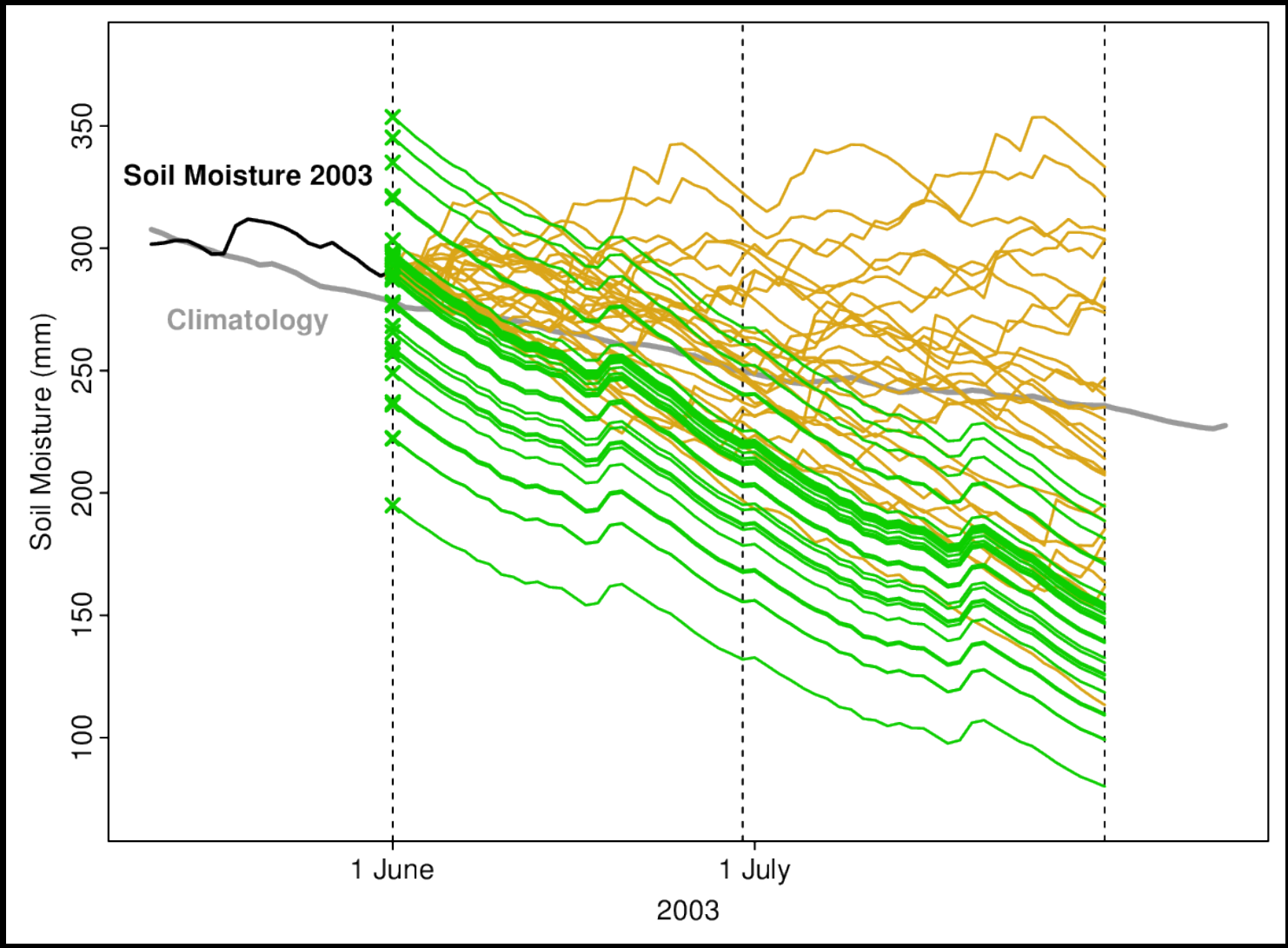

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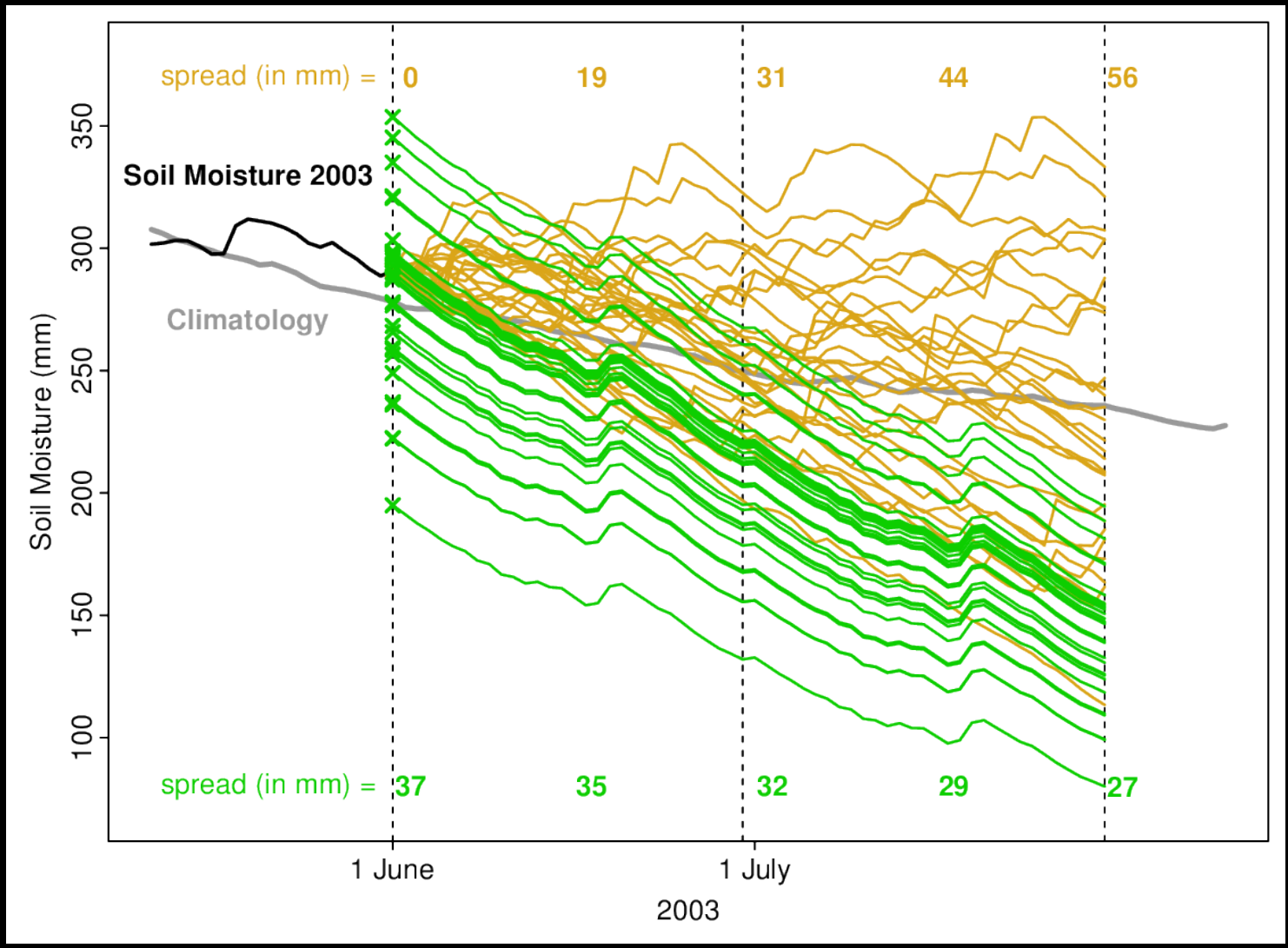
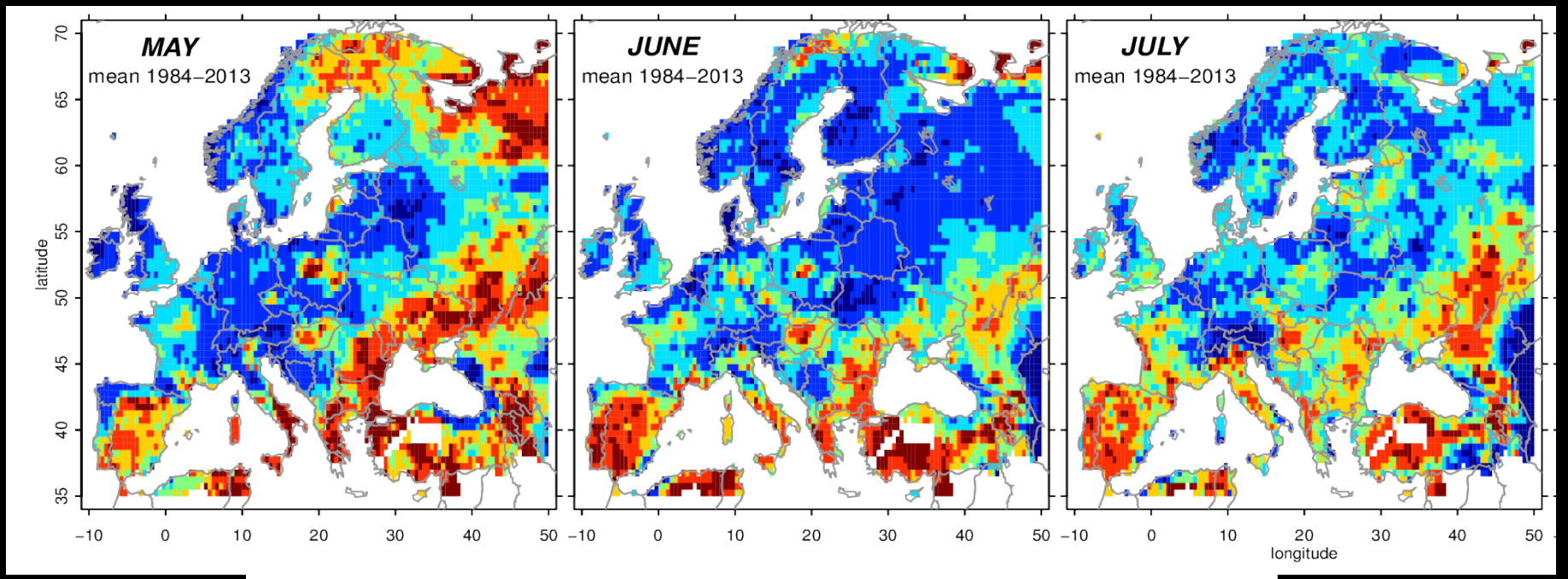
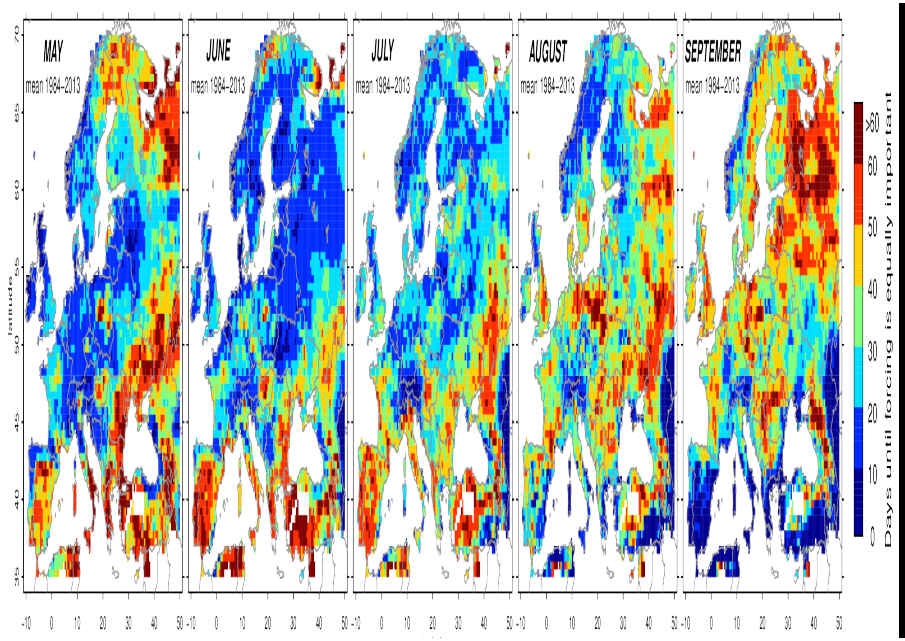


Results for Europe (part 1)





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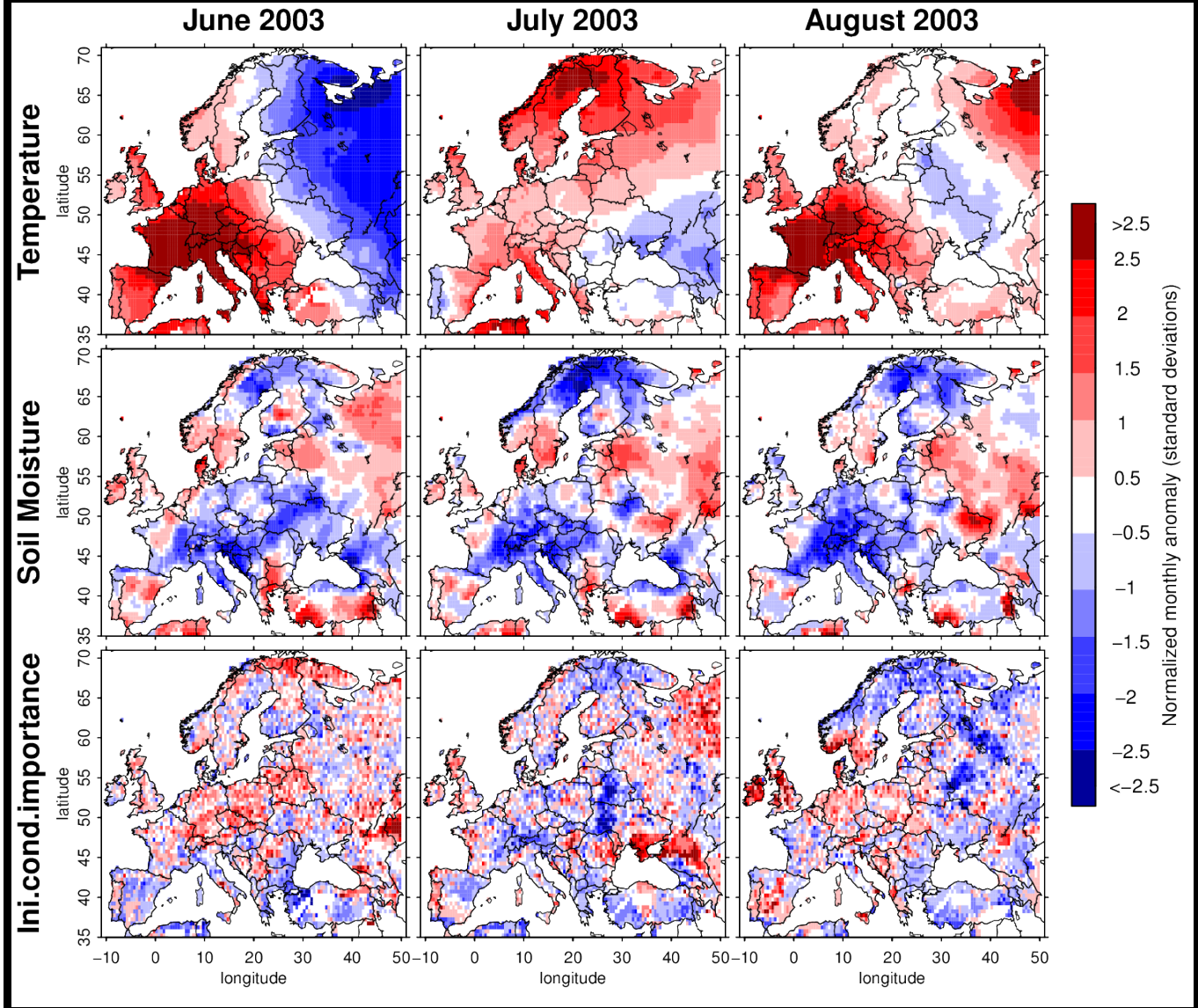

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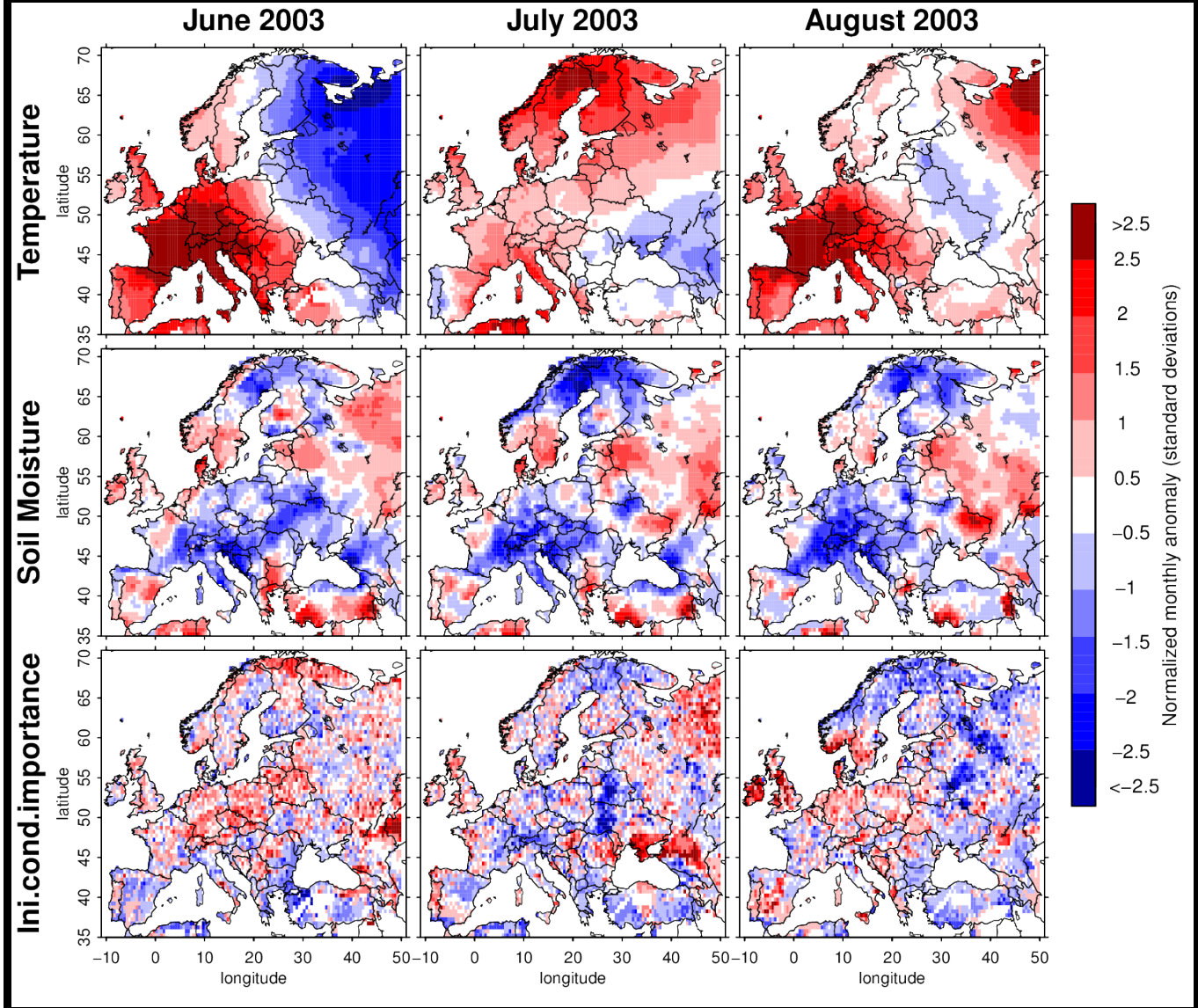


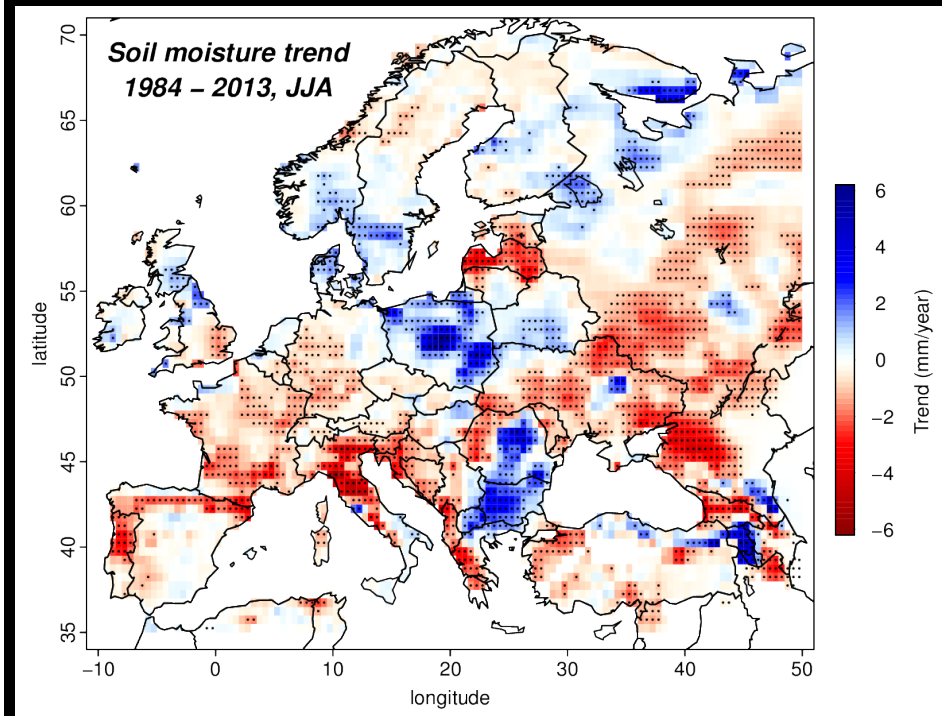
Questions:

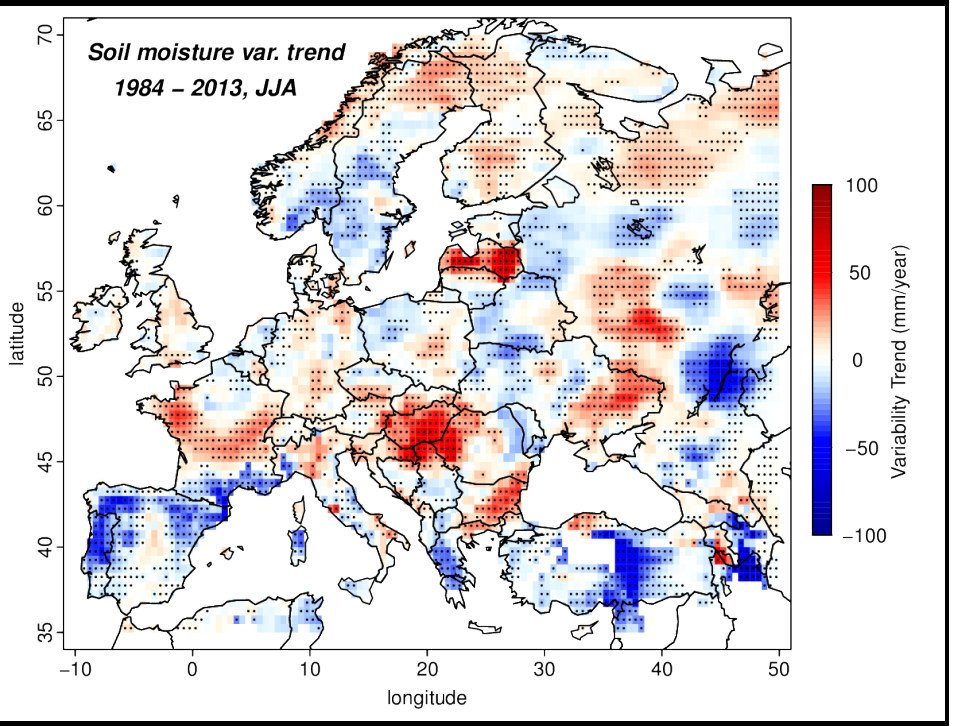
What is the role of the initial soil moisture conditions in North America?

What are the controls of initial condition importance?

How and why does initial condition importance change during drought?

Results for Europe (part 2)





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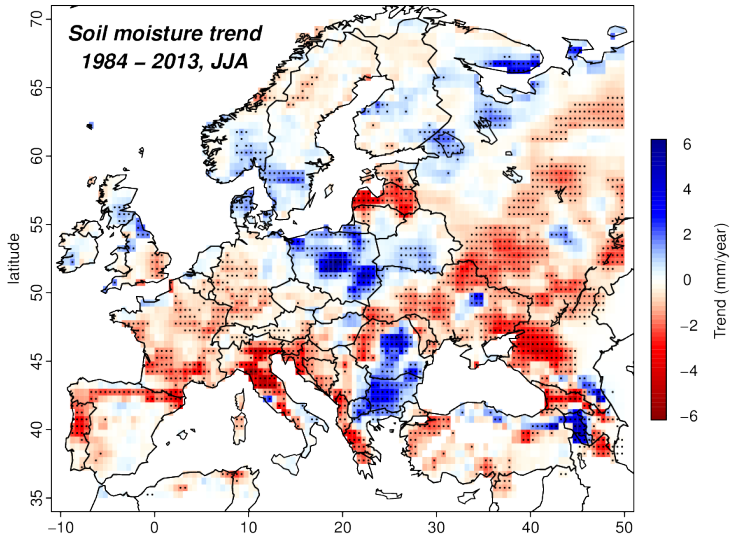

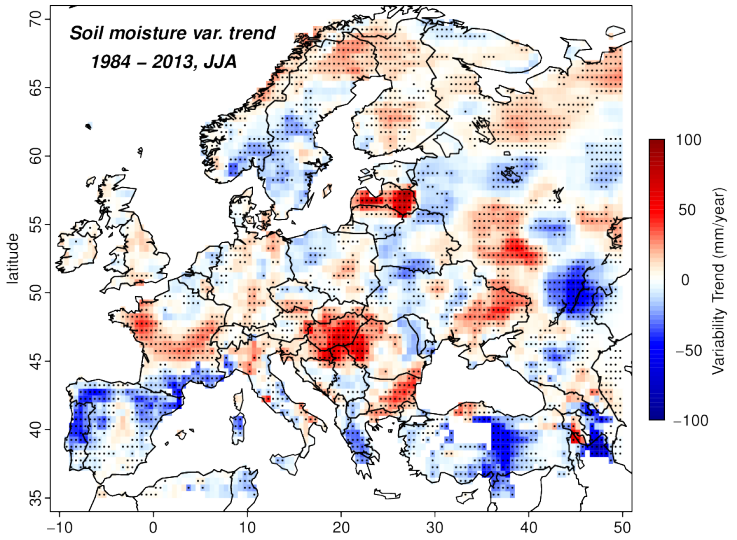

Occurrence probability in
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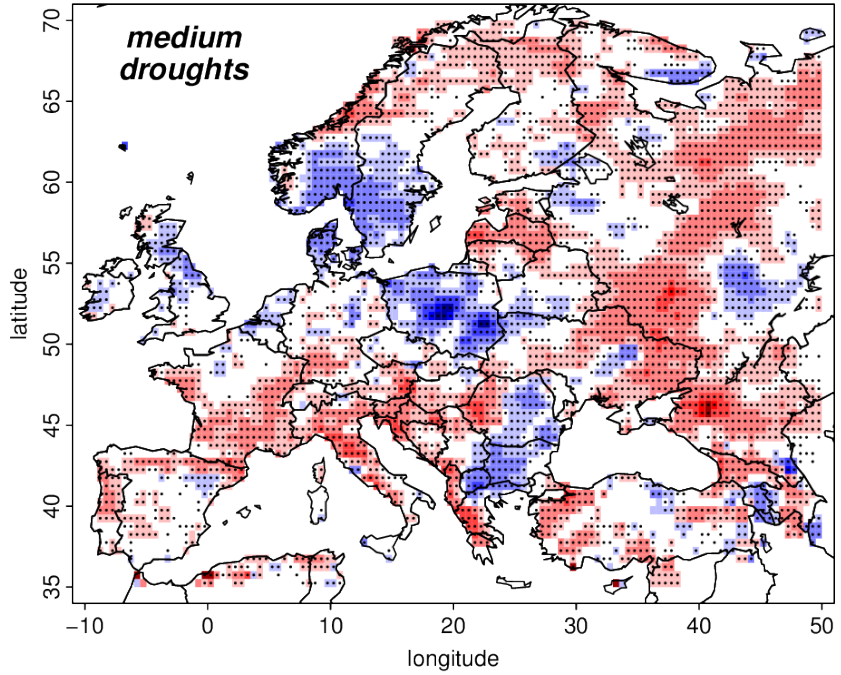

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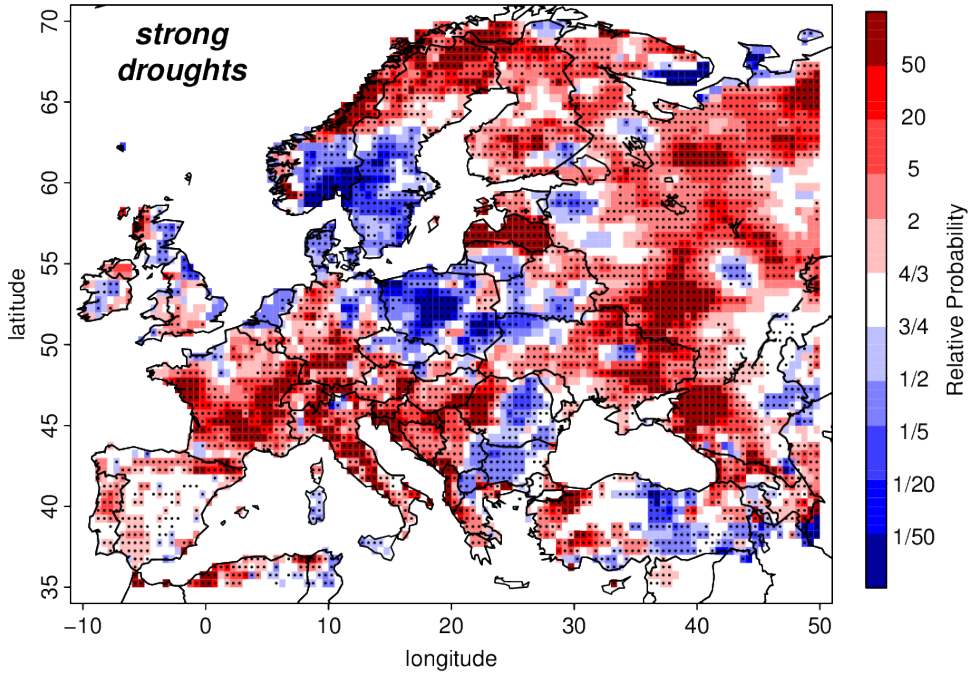

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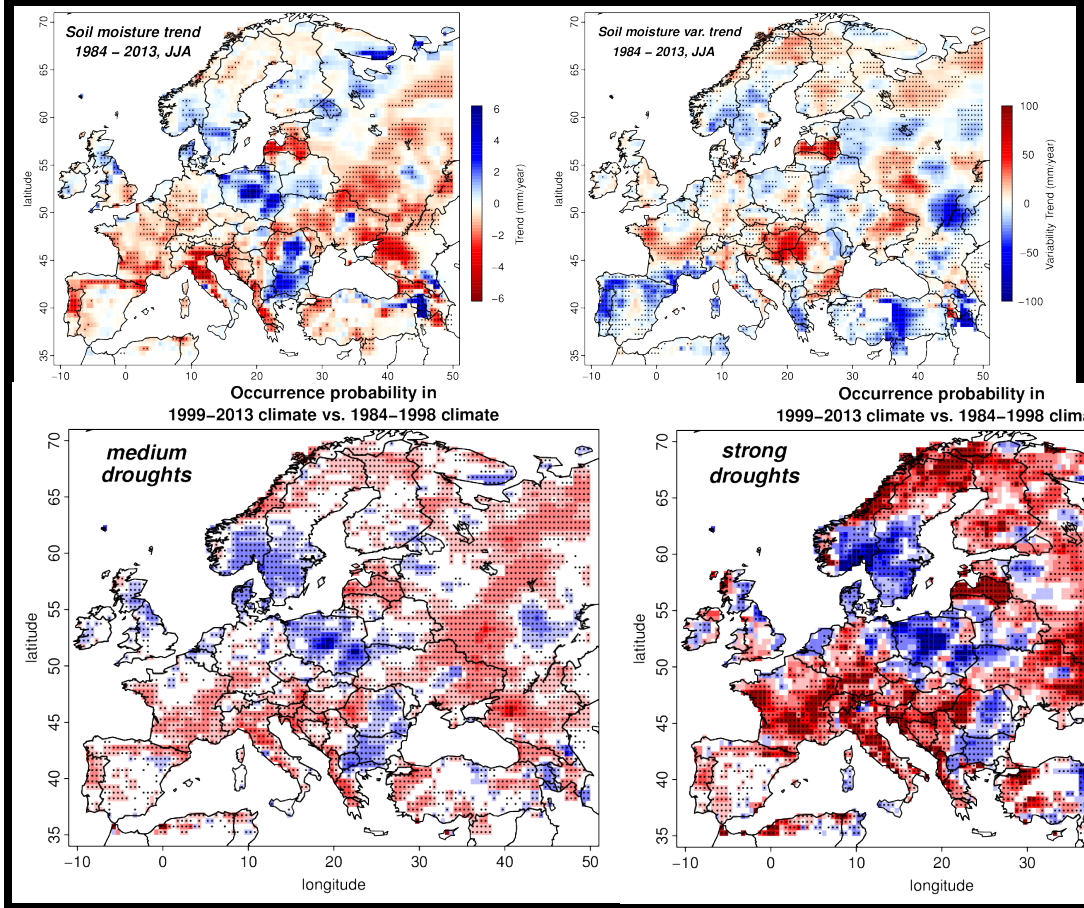

Questions:

Are the trends in soil moisture and its variability in North America?

If yes, how can we translate these trends into changes in occurrence probability?