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A Global Assessment of Heatwaves since 1850 in different Datasets

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EGU22-2728

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- Changes in the occurrence of heatwaves since the middle of the 20th century extensively studied

- research gap in analysing preindustrial heatwaves and heatwaves in the early 20th century using **oberservational data**

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- Changes in the occurrence of heatwaves since the middle of the 20th century extensively studied

- research gap in analysing preindustrial heatwaves and heatwaves in the early 20th century using **oberservational data**

investigate **summer heatwaves since 1850** to examine regional differences and potential drivers and to **contribute to a better understanding of past climate extremes**

Motivation

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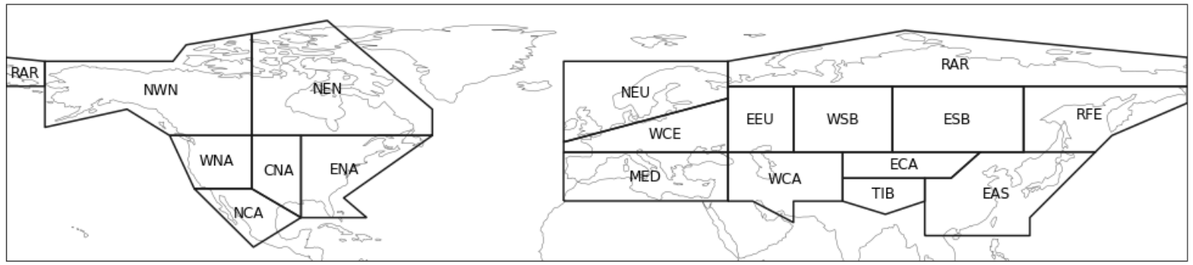
IPCC AR6 regions



Datasets

- **ModE-Sim** 36 member ensemble of historical atmospheric simulations with **prescribed SSTs and observed forcings over the period 1420-2009**
- **20th Century Reanalysis V3** ensemble mean daily mean temperature

Data & Methods

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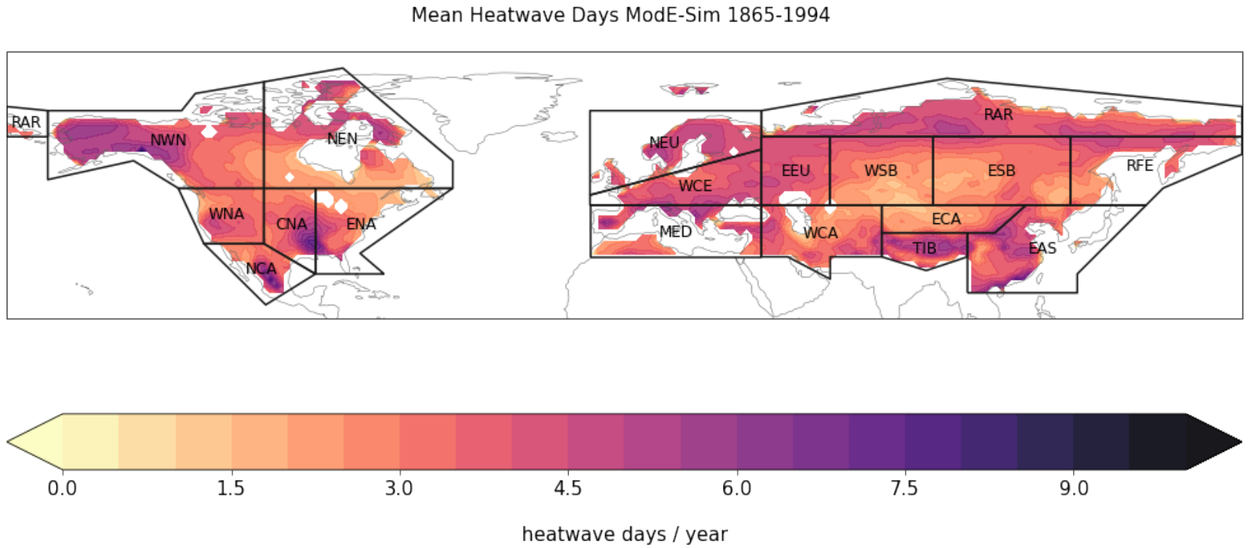

Heatwave Calculation

- **May-September** daily mean surface temperature above **90th percentile threshold** of a baseline climatology for at least **6 consecutive days**

- **moving 31-year baseline climatology** to compare heatwaves across different centuries

Data & Methods

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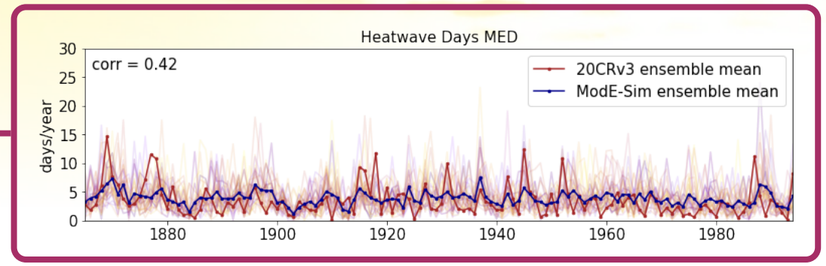

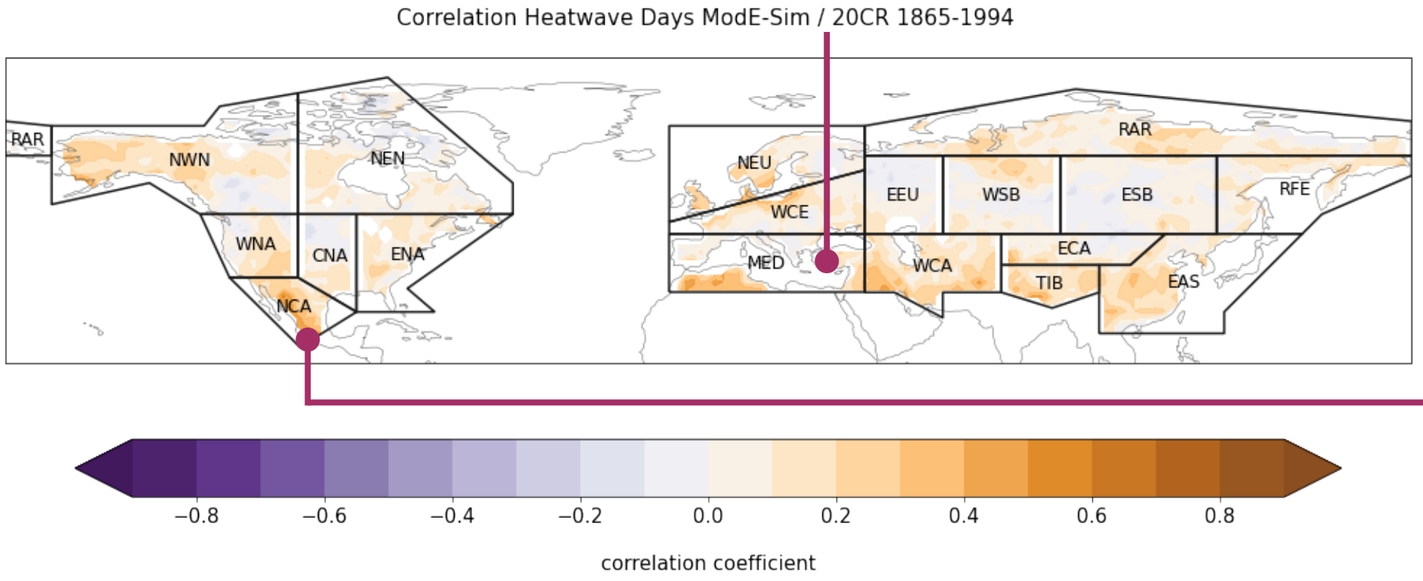

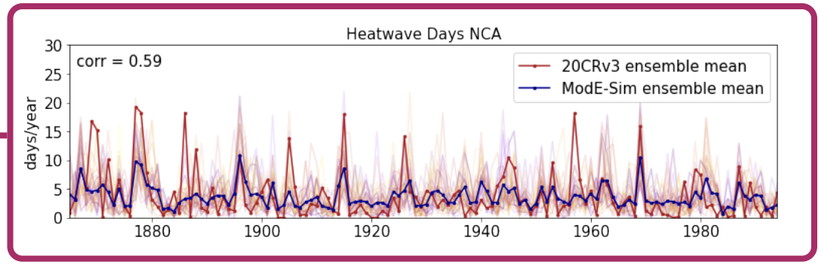

First Results

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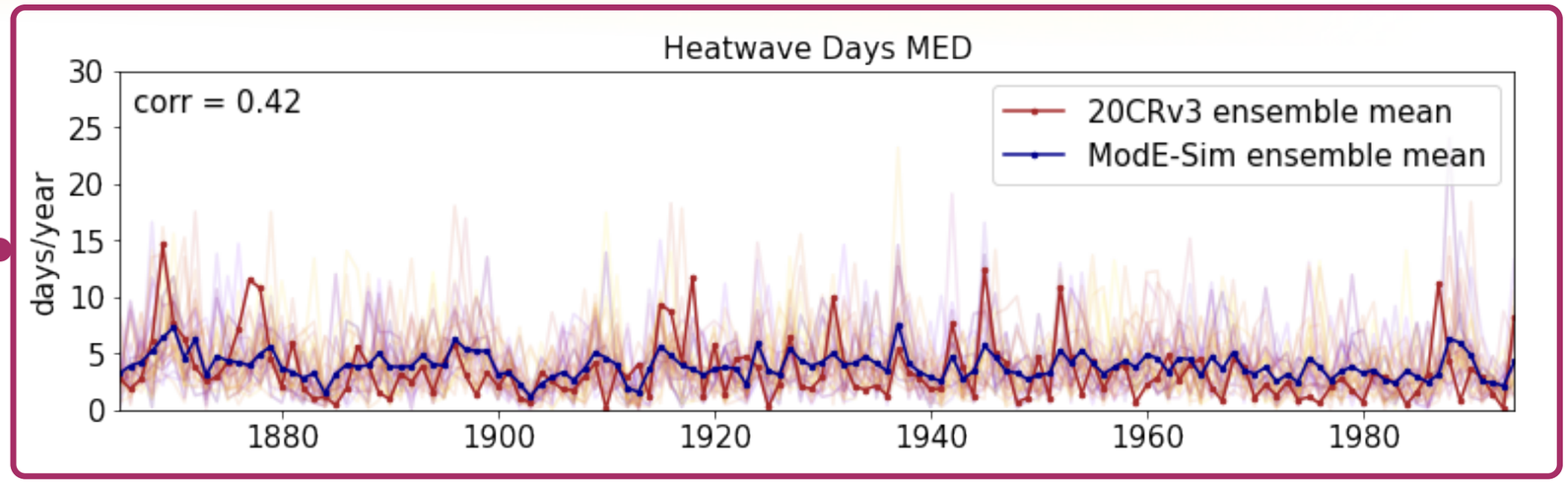

- significant correlation of ModE-Sim and 20CRv3 in the **Mediterranean (MED)**
- ensemble spread captures variability of 20CRv3, strong heatwave summers every 10-20 years

First Results

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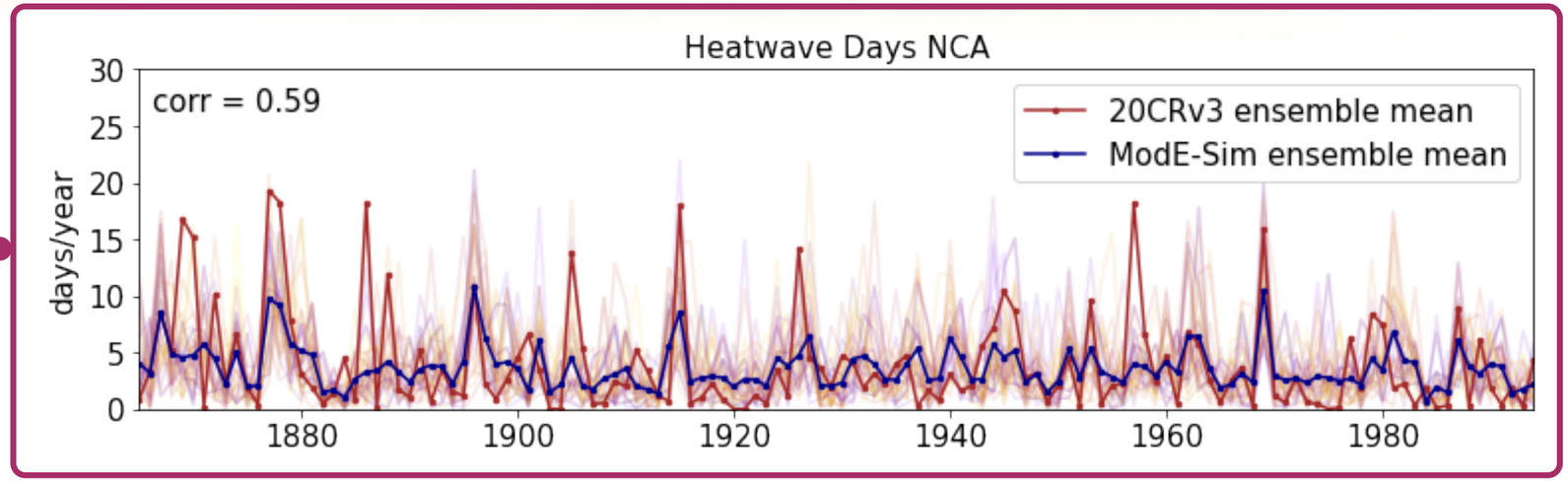

- in **North Central America (NCA)** the peaks match strong El Nino Events
- influences high correlation between ModE-Sim ensemble mean and 20CRv3

First Results

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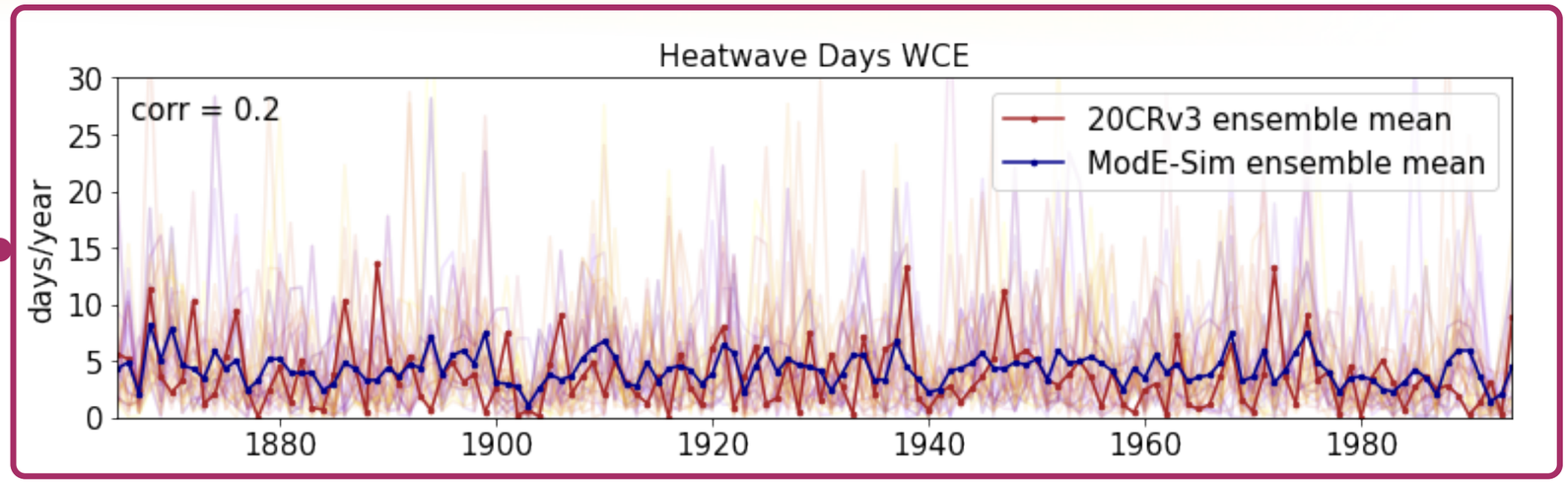
Extra Slide for Display Material



- **Western Central Europe (WCE)** high internal variability in ModE-Sim ensemble
- low correlation between 20CRv3 and ModE-Sim ensemble mean

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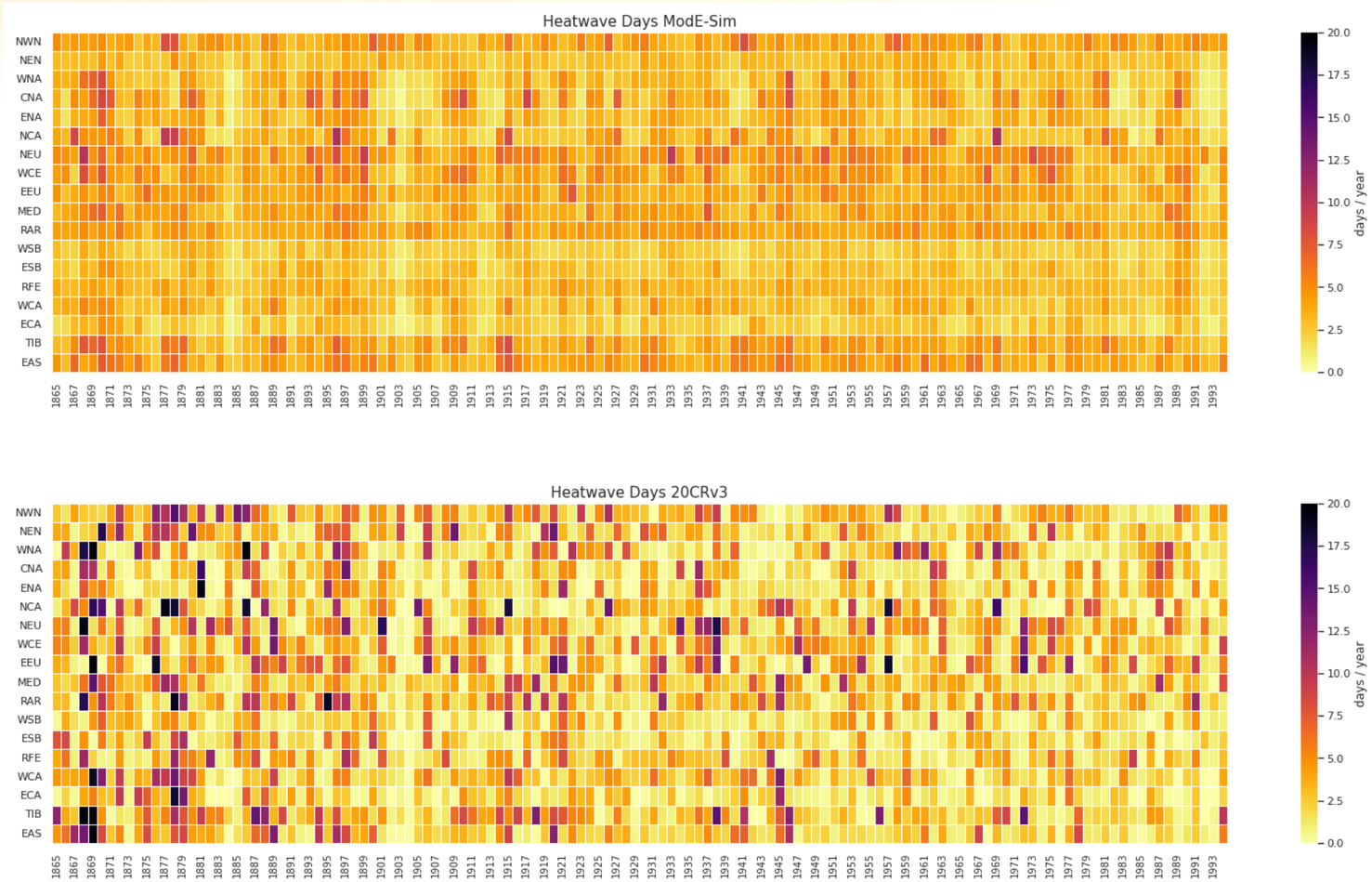

ModE-Sim ensemble mean

20CRv3 ensemble mean

First Results

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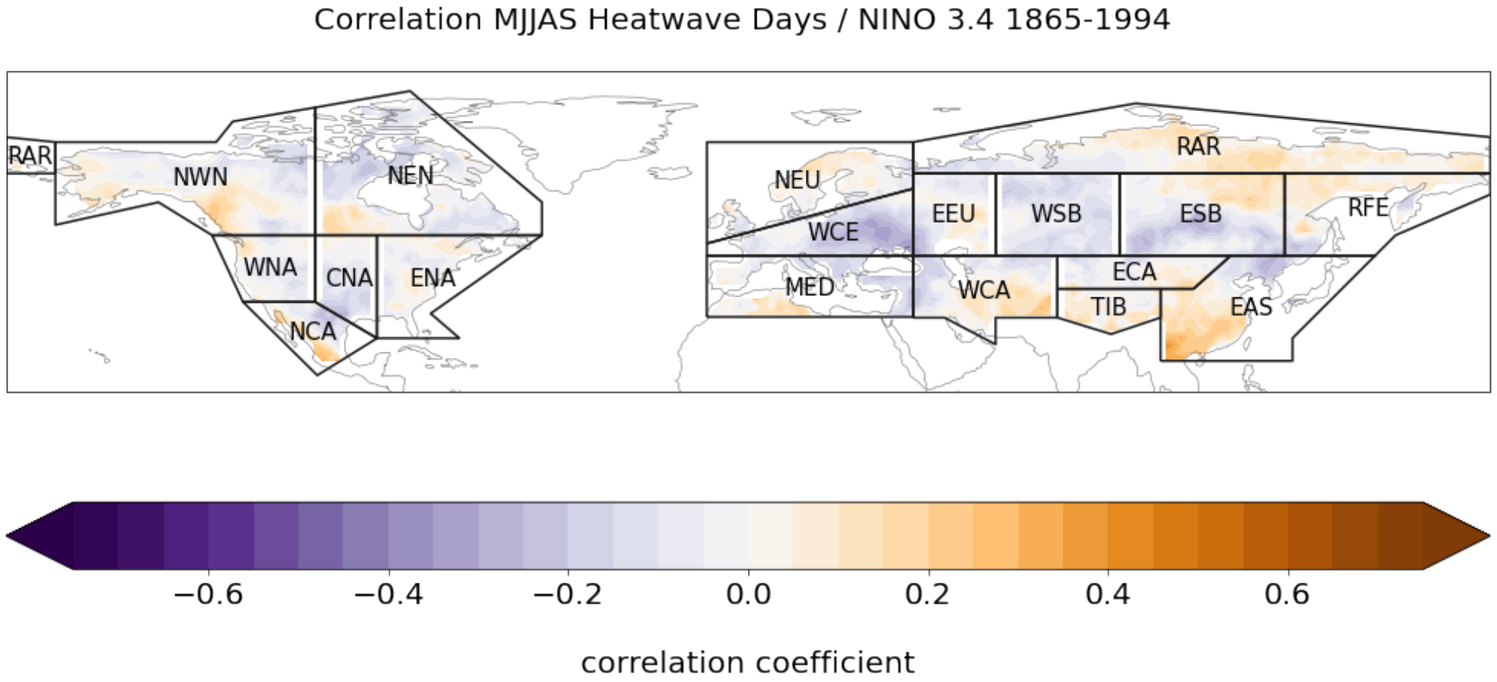

- ModE-Sim correlation of MJJAS Heatwave Days with **MJJAS NINO 3.4 Index**
- first step towards a more detailed analysis of climate modes and preindustrial heatwaves

First Results - ENSO

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- **regional differences in heatwave distribution and correlation** (influence of forced signal)
- ModE-Sim **ensemble spread capturing variability** of 20CRv3 allows to use ModE-Sim for analysis beyond 1850
- **links to climate modes** will be examined further to investigate regional differences of potential drivers of preindustrial heatwaves and their change over time