EGU General Assembly 2022

IUSS Scuola Universitaria Superiore Pavia

Weather circulation patterns associated with extreme precipitation events over Italy

Vienna | Austria | 26 May 2022

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This presentation participates in OSPP

EGU

Outstanding Student & PhD candidate Presentation contest

Climate change impAct studies for RISk MAnagement
CARISMA

Why do we care about extreme precipitation in Italy?

Flooding in Calabria, Italy, 2020

https://floodlist.com/europe/italy-floods-calabria-november-2020

- Poses a threat to the society.
- May result in flooding and landslides.
- Negative impacts: economic loss, loss of lives
- Italy experiences a lot of extreme precipitation events.

What's the aim?

- Important to understand the drivers of extreme precipitation for improving prediction.
- Need to characterise extreme precipitation with regards to circulation patterns

Data and Methods

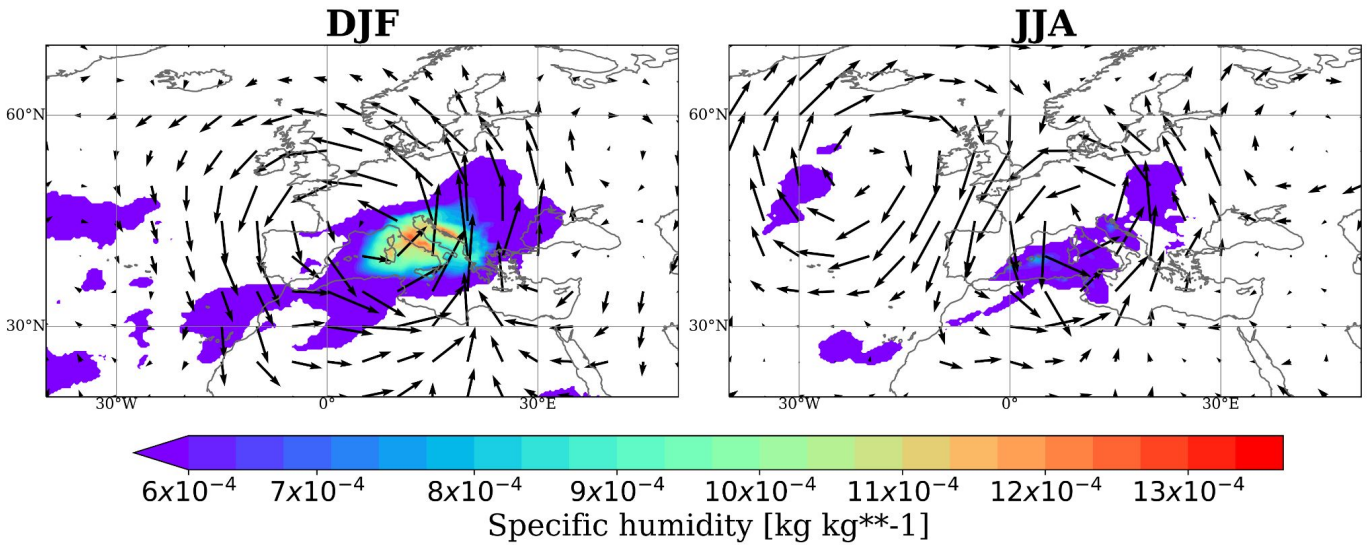
Data

- Precipitation Observational dataset - E-OBS
  - Gridded dataset
  - 0.25 by 0.25, daily resolution
- Reanalysis dataset - ERA5
  - 0.25 by 0.25, hourly resolution
  - Reference data used for analysing the circulation patterns

Method

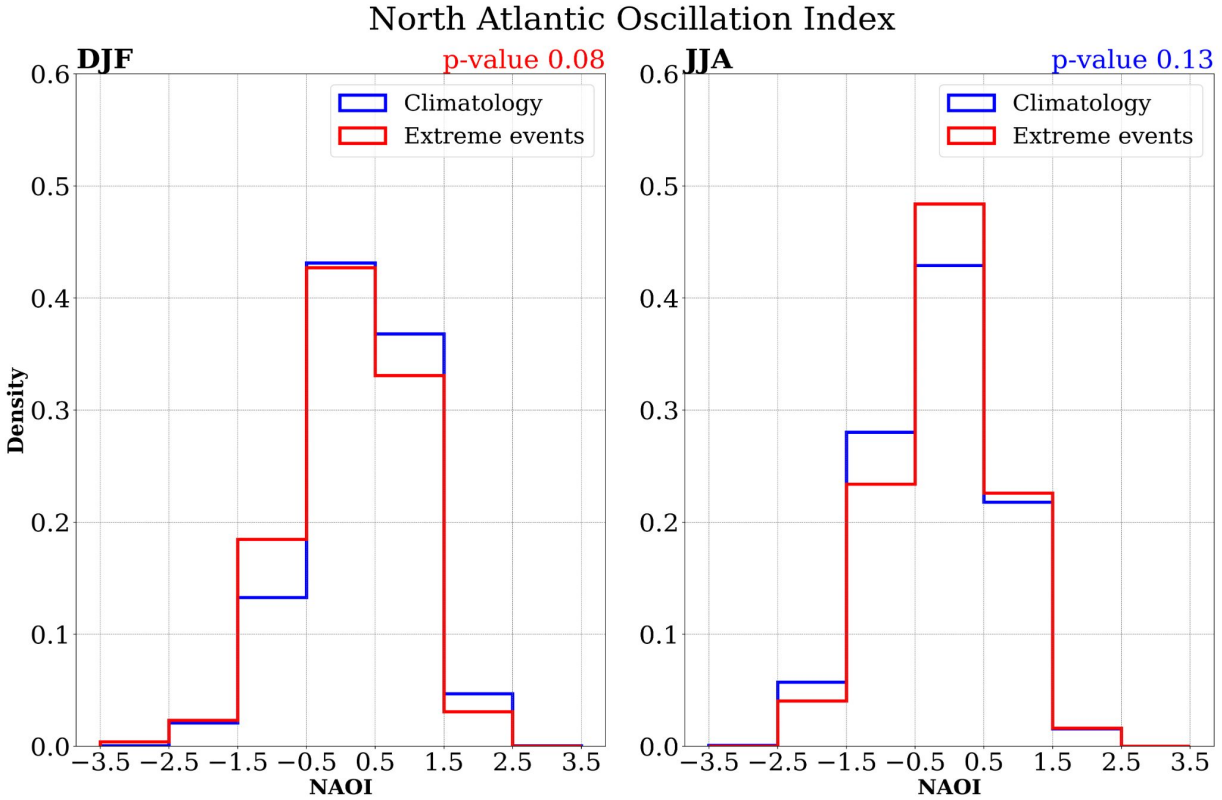
- Analysed :
  - Four (4) seasons
  - Extreme precipitation: Precipitation above 99th wet day percentile
  - Period 1990-2020

Anomaly patterns associated with extreme precipitation events



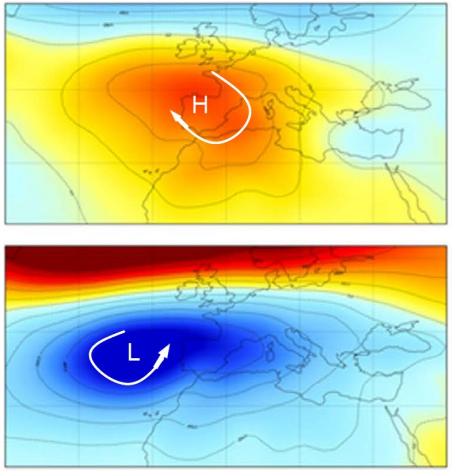
- Positive specific humidity anomaly values.
- In winter, moisture trail extends from North Atlantic to Mediterranean basin and to a lesser extent in summer.
- Moisture located near centre of cyclonic wind flow at 850 hPa.

Connection between NAO and extreme precipitation events



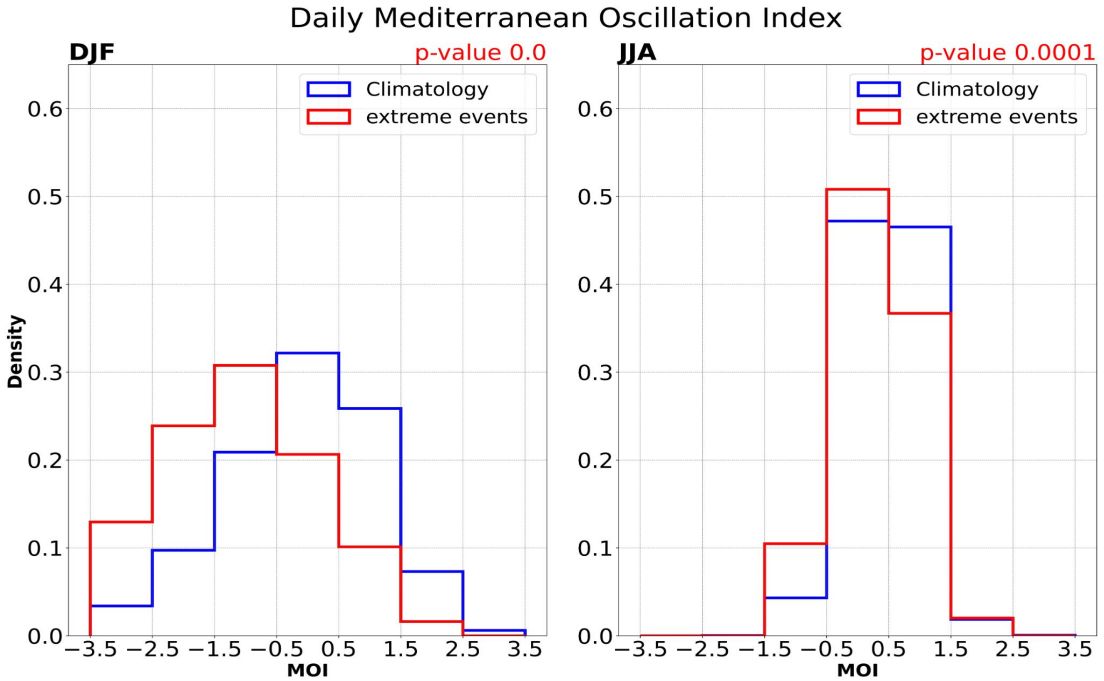
Small shift in winter towards negative values (negative NAO phase)

Connection between the Mediterranean Oscillation (MO) and extreme precipitation events



Adapted from Corella et al., 2016

- Pressure gradient between Algiers and Cairo



- ➢ MO correlates to extreme precipitation events in both seasons.
- ➢ There is a shift towards negative values (negative MO phase).
- ➢ Shift is strongest in winter and weakest in summer.

Key Takeaways

- Extreme precipitation events during
  - Winter
    - More associated with **large** scale circulation pattern.
  - Summer
    - More associated with **local** scale circulation pattern

- There is a clear signal between the negative phase of the Mediterranean oscillation and extreme precipitation events over Italy.

Thank you for your attention!