

# Compound events in the Mediterranean Europe

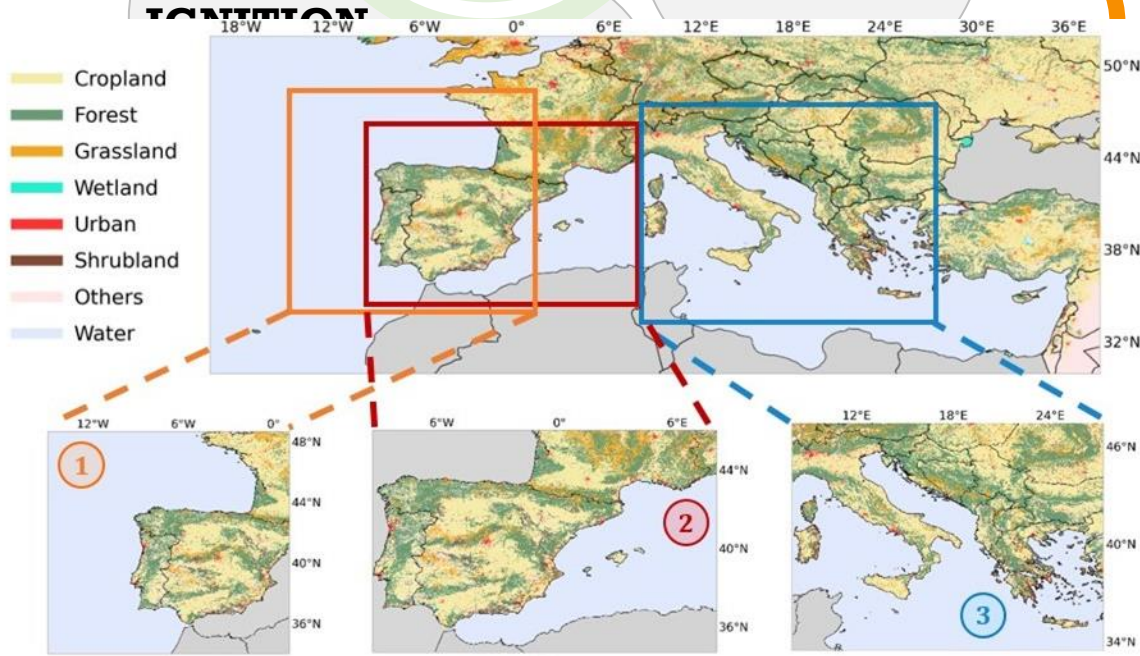
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AICLIMATE@EU & DHEFEUS 1st WORKSHOP  
13th November 2024



# WEATHER CONDITIONS



pheric waves

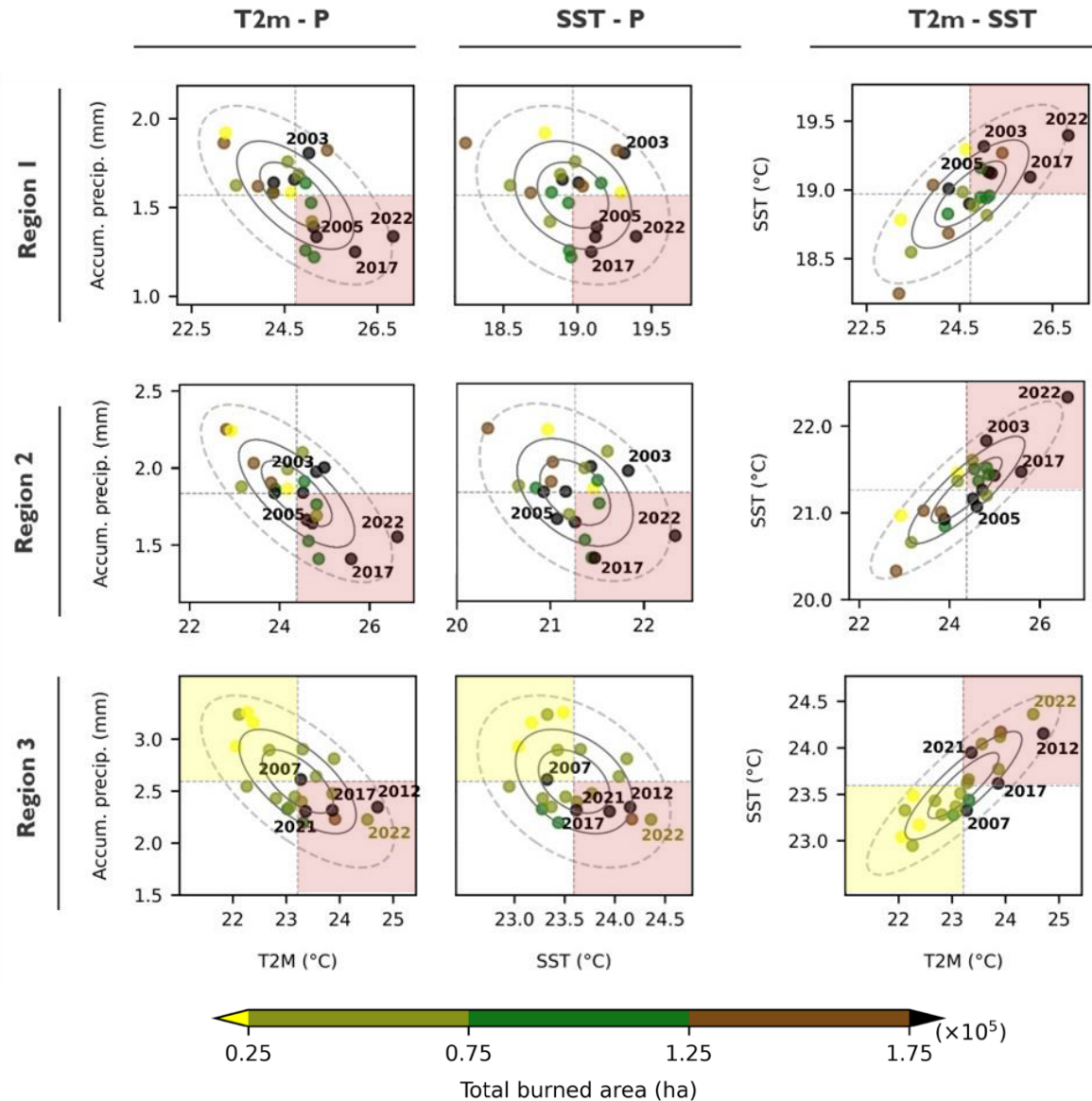
Droughts



Marine Heatwaves

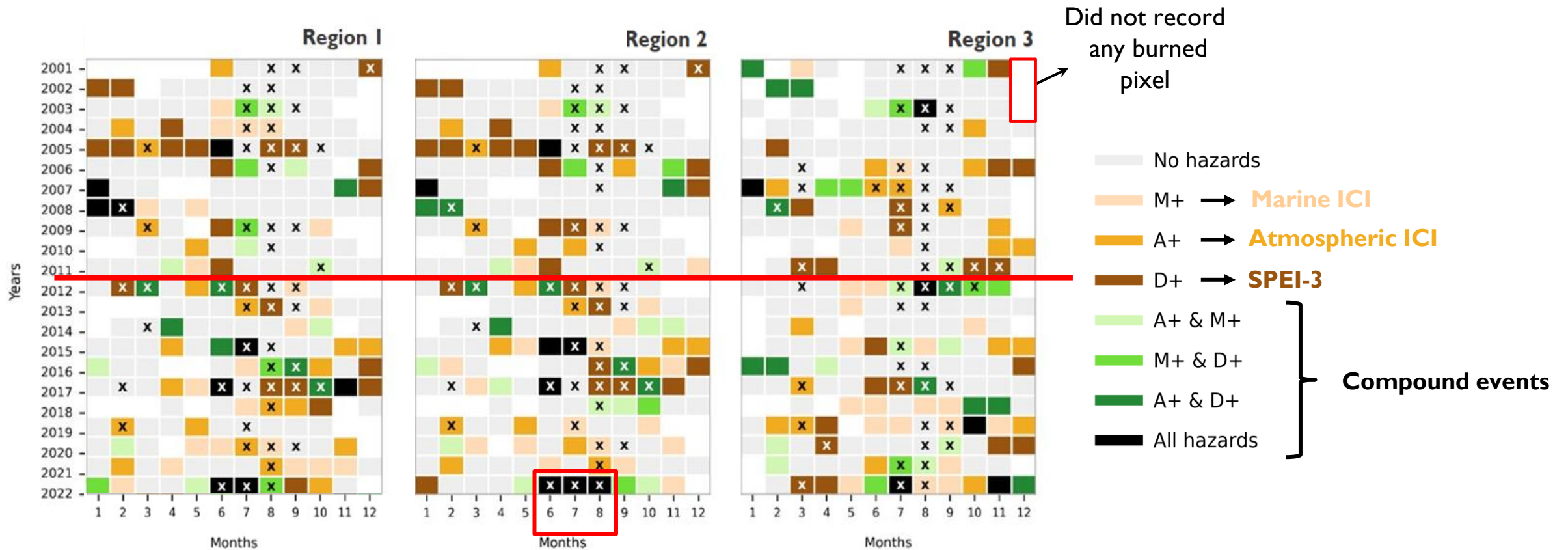


Bivariate Gaussian distributions and accumulated burned areas



Summers with the **most extensive burned areas** mostly appear associated **with dry and/or hot conditions.** These conditions extend beyond air temperatures to **encompass elevated sea temperatures as well.**

Most extreme months regarding the **cumulative intensity of heatwaves (marine ICI & atmospheric ICI)** and **drought conditions (SPEI-3)**, overlapping compound occurrences



x → Surpasses the 80<sup>th</sup> percentile of burned area

**Focus on compound extreme events rather than individual occurrences**

**Significance of incorporating marine warm conditions to the study of compound climatic episodes studies**

Article | [Open access](#) | Published: 20 August 2024

**Co-occurrence of marine and atmospheric heatwaves with drought conditions and fire activity in the Mediterranean region**

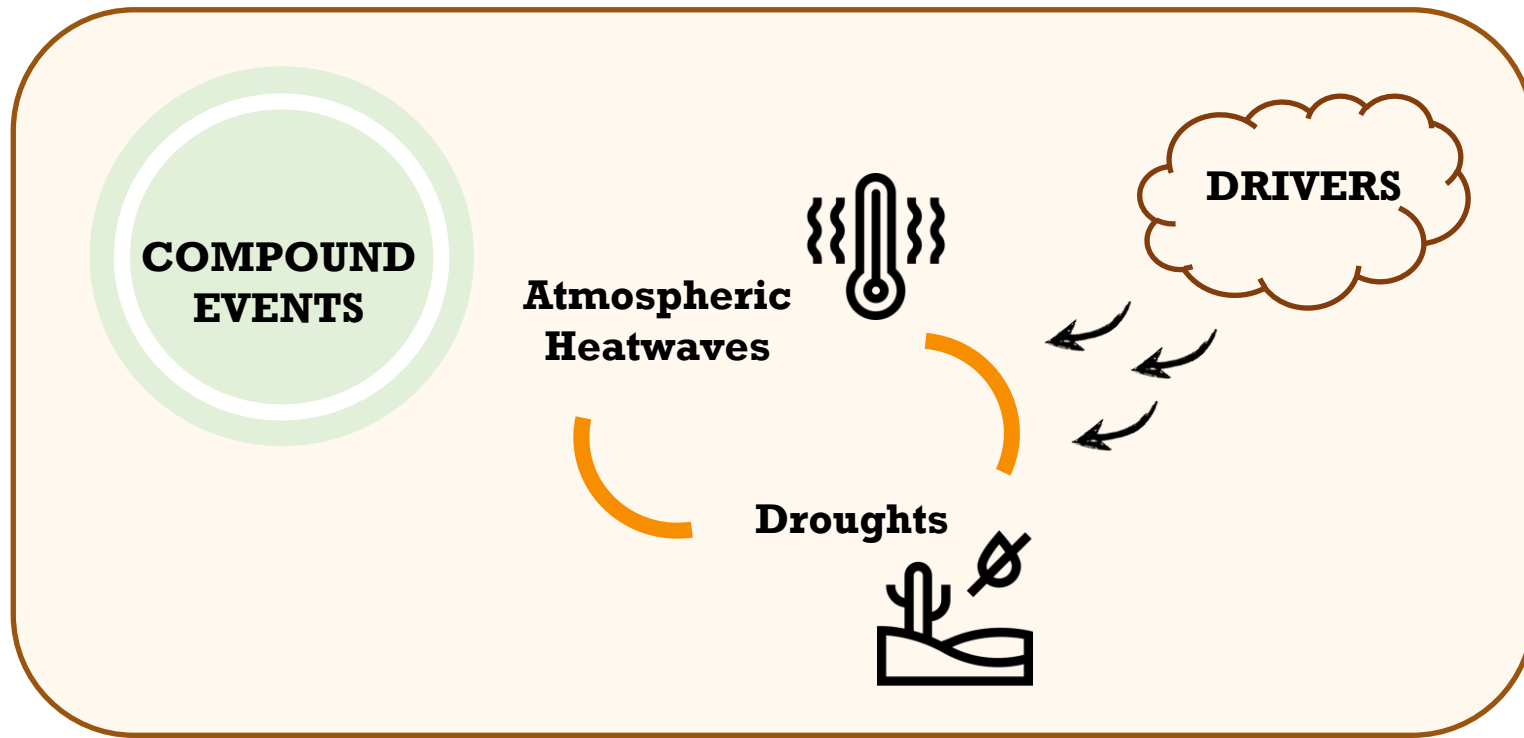
[Raquel Santos](#) , [Ana Russo](#) & [Célia M. Gouveia](#)

[Scientific Reports](#) **14**, Article number: 19233 (2024) | [Cite this article](#)

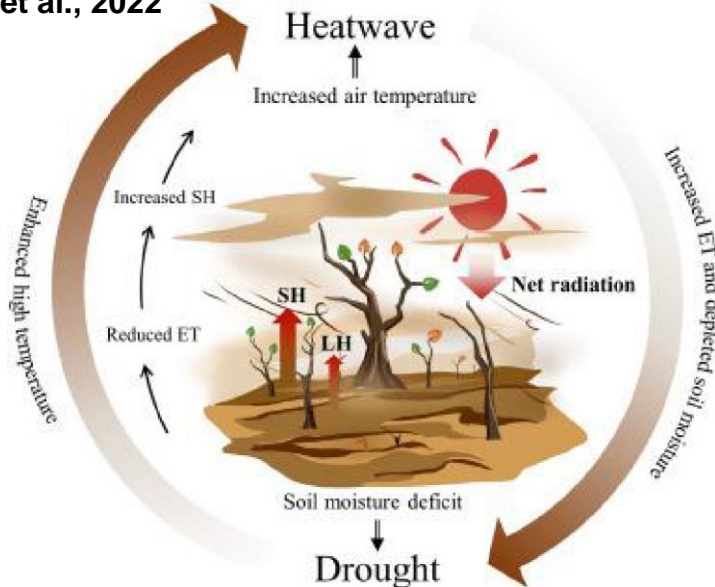


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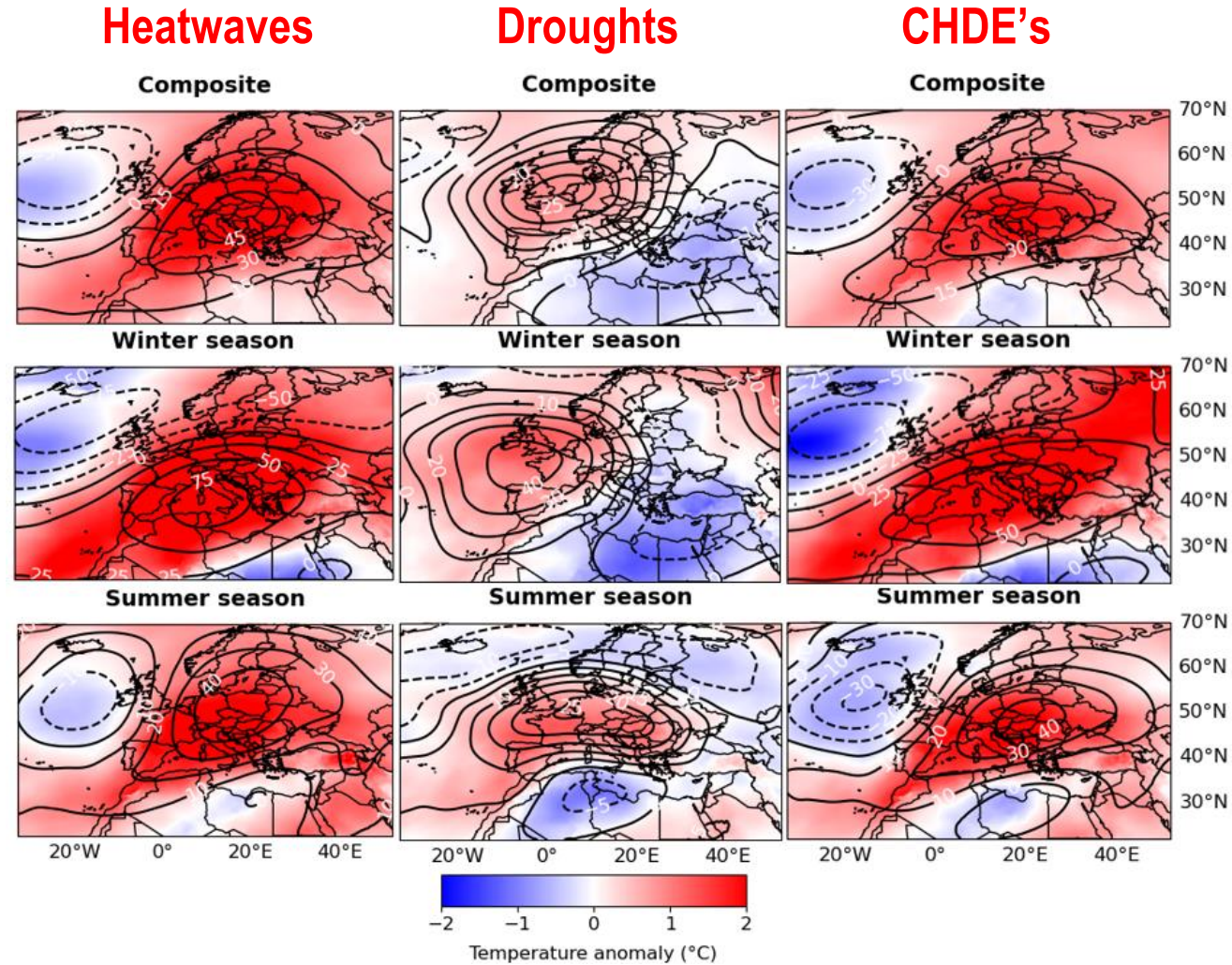


Hao et al., 2022



1. Identify the mechanisms that drive the development of heatwaves, droughts and CHDE's and how they have changed in the recent past;

2. To analyze a case study - the year 2022 – one of the most extreme in history.



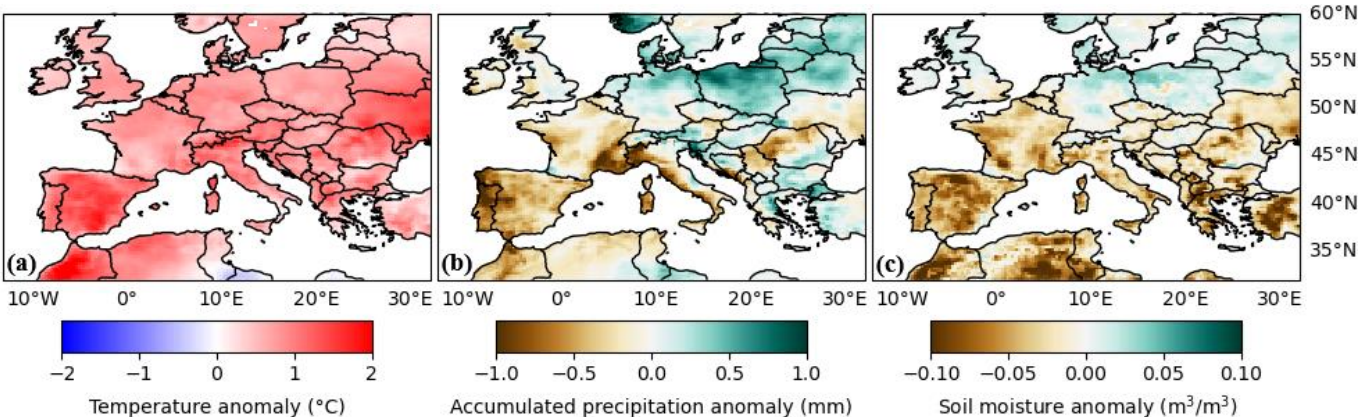
T anomaly at 850hPa & geopotential height at 500hPa



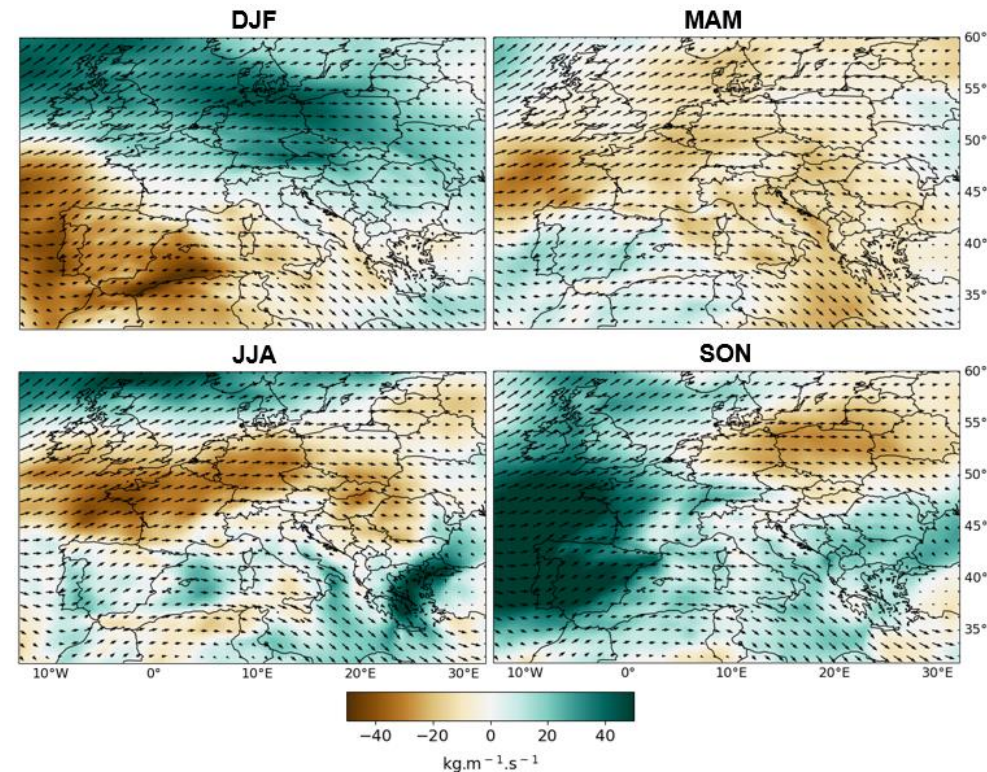
T anomaly

P anomaly

SM anomaly



IVT anomaly (seasonal)

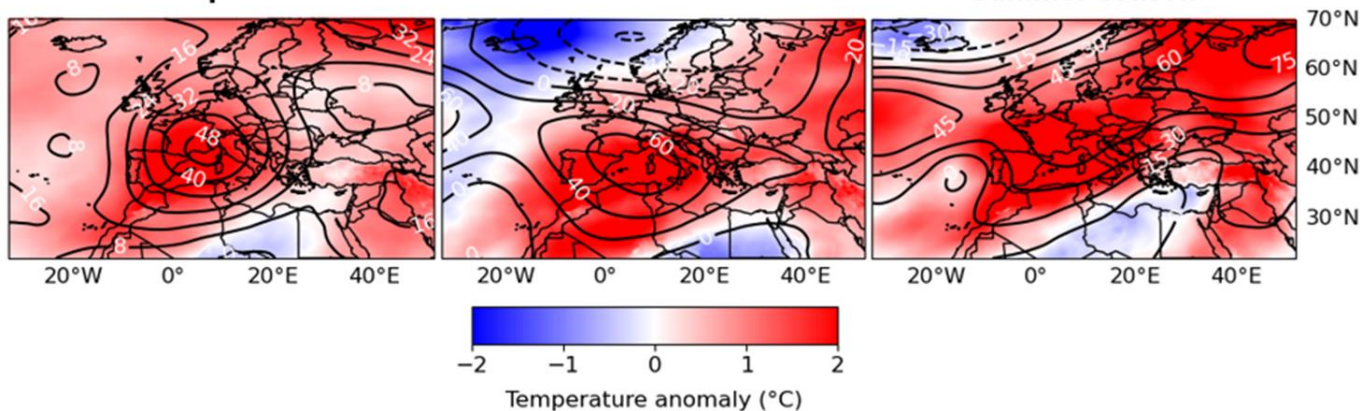


T anomaly at 850hPa & geopotential height at 500hPa

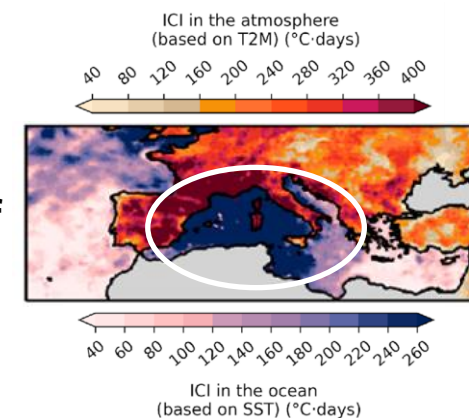
Composite

Winter season

Summer season



Cumulative intensity of heatwaves





**High pressure centers positioned over central Europe are identified as the predominant atmospheric configuration during the most extreme heat wave events and CDHEs.**

**The 2022 CDHE was characterized by unusually very hot and very dry conditions due to the prevalence of anticyclonic conditions in central Europe and negative IVT anomalies which caused a moisture deficit in the region.**

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Compound dry and hot extreme events in  
the Mediterranean region

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Mestrado em Ciências Geofísicas

Versão Provisória

Dissertação orientada por:  
Doutora Ana Russo  
Doutor Virgílio Bento

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DOM LUIZ



OSLOMET

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