

# Exploring a new methodology to quantify natural variability in conditional extreme event attribution.

#### Clara Naldesi

clara.naldesi@lsce.ipsl.fr

Supervisor: Co-supervisors: Mathieu Vrac (LSCE) Nathalie Bertrand (ASNR) Davide Faranda (LSCE-LML-LMD/IPSL)

#### 1. Context

Anthropogenic climate change (ACC) is affecting extreme events in every region across the globe. [IPCC AR6 SYR]





How was a **specific event** affected by ACC?



#### 2. ClimaMeter Understanding Extreme Weather in a Changing Climate



- rapid experimental framework
- contextualize extreme weather relative to climate change [Faranda et al., 2024]



It is based on the **Analogues Methodology** [Yiou, 2007; Faranda et al., 2022] for conditional extreme event attribution:

- 1. Event defined by its circulation state
- 2. Similar weather conditions identified in counterfactual and factual climates
- 3. Significant changes in msl pressure and associated hazards are assessed

How do we link these changes to Climate Change? What is the role of Natural Variability in determining these changes?



### 2. ClimaMeter: natural variability gauge

The role of natural variability is measured by a discrete gauge.



## 3. New methodology: definition

Modes weighting according to:

1. Correlation local hazard - natural variability mode





# 3. New methodology: definition

Modes weighting according to:

1. Correlation local hazard - natural variability mode



2. Difference between CF and F natural variability indices distributions







## 3. New methodology: test

ClimaMeter applied to one pre-industrial simulation of IPSL climate model.

Selection of 79 pre-industrial heat waves in the Paris region and evaluation of natural variability.





#### **Conclusion and perspectives**



#### Next steps:

- Test other combinations of the methodology
- Test robustness: ≠ events and regions,
  ≠ climate model
  experiments other than piControl





7