

Analysis of wind resource under heat wave conditions in southern Europe

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1. Introduction

Energy system:

+ Renewables -> + weather dependence

+ Heat waves -> + Demand Southern European countries

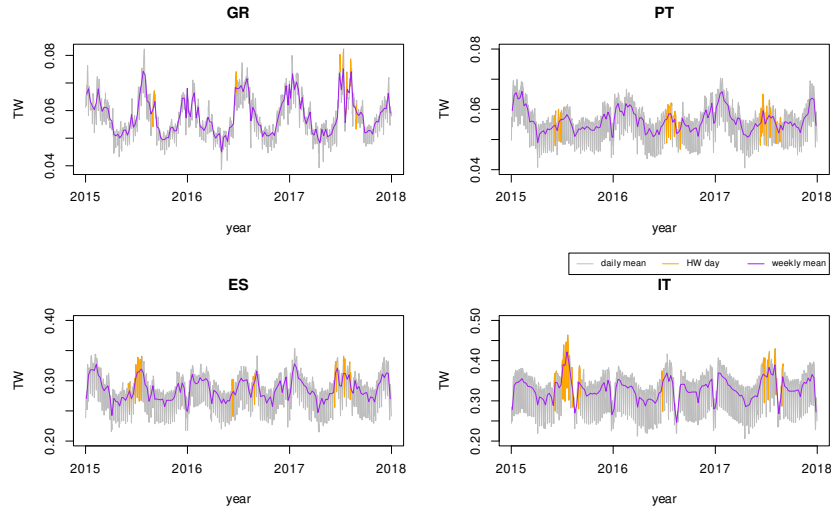


Fig. 1. ENTSO-E, European Network of Transmission System Operators for Electricity, daily load data (2015-2018) is shown in gray lines color for Greece (GR), Portugal (PT), Spain (ES) and Italy (IT) countries. Purple color indicates the weekly load mean and orange color indicates the heat wave days.

Increase of energy demand in heat wave days

2. Objective

Study wind power production in present climate in episodes of heat waves and their associated atmospheric patterns in summer

3. Method

3.1. **Heat wave** days from EOB-S tasmax (1971-2019)

3 consecutive days above p90 of tasmax (1971-2000)
>30% territory of each country

3.2. **Wind power** modeled from u and v ERA5 reanalysis at 100m (1989-2019)

3.3. Composites of daily SLP anomalies (ERA5) in summer (JJA, 1989-2019)
EOF analysis + k-means clustering → weather regime (WR)

4. Results

Anomalies in wind energy production on HW days depend on the WR and the country

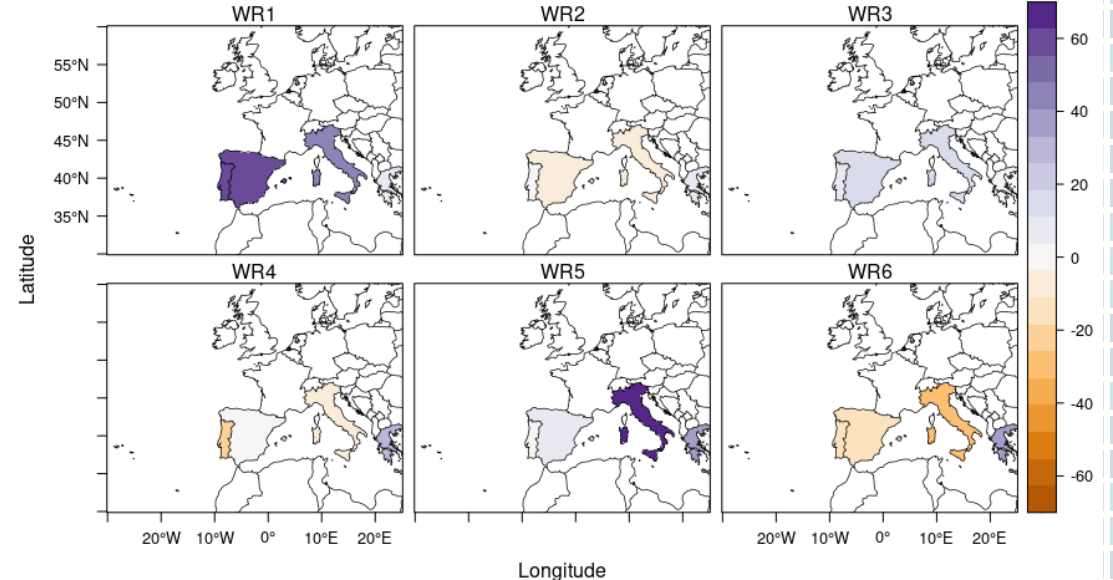


Fig. 2. Cluster centroids of the weather regimes (WRs) derived from the ERA5 reanalysis for the JJA months of the 1989–2019 period. Colors show wind energy generation anomaly in heat wave days in percentage.