

The added value of high-resolution EURO-CORDEX simulations to describe daily wind speed over Europe



María O. Molina | João AM. Careto | Claudia Gutiérrez | Enrique Sánchez | Pedro MM. Soares
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Objective:

Assess the **added value** of high-resolution simulations relative to the driving lower resolution models with respect to the observed PDFs

Data:

- EURO-CORDEX** Hindcast and Historical (0.44° -0.11°)
- EURO-CORDEX GCMs and ERA-Interim reanalysis
- HadISD observations
- Variable: **wind speed** -Period: 1979-2018

Method:

Distribution Added Value, **DAVs** (Soares and Cardoso, 2018):

$$S = \sum_{i=1}^n \min(Z_m, Z_o) \quad DAV = 100 * \frac{S_{hr} - S_{lr}}{S_{lr}}$$

- Yearly and seasonal PDF (Probability Density Function)
- **Full PDF** and PDF section above the 95th percentile of the observations
- PRUDENCE regions analysis
- Conditionals:
 - Coast vs inland cells
 - Altitude

Results:

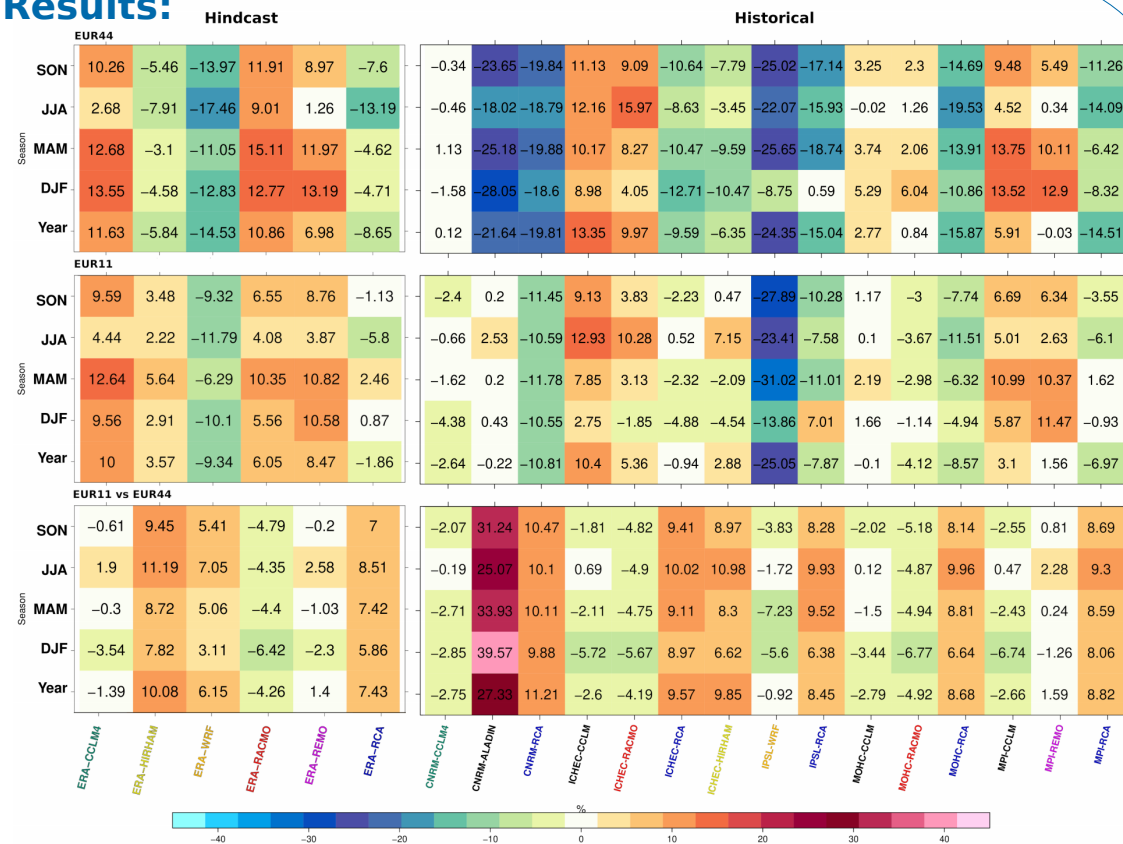


FIGURE 1: Seasonal and yearly DAV for daily wind speed PDFs of the EURO-CORDEX RCM hindcast and historical simulations. EUR44 and EUR11 measure the DAV between the RCM simulations at 0.44° and 0.11° resolution, respectively, and the forcing data: the ERA-Interim reanalysis (Hindcast) or the corresponding GCM (Historical). EUR11 vs EUR44 measures the DAV between the simulations at 0.11° resolution and the ones at 0.44° resolution. All these measures have the HadISD station observations as reference.

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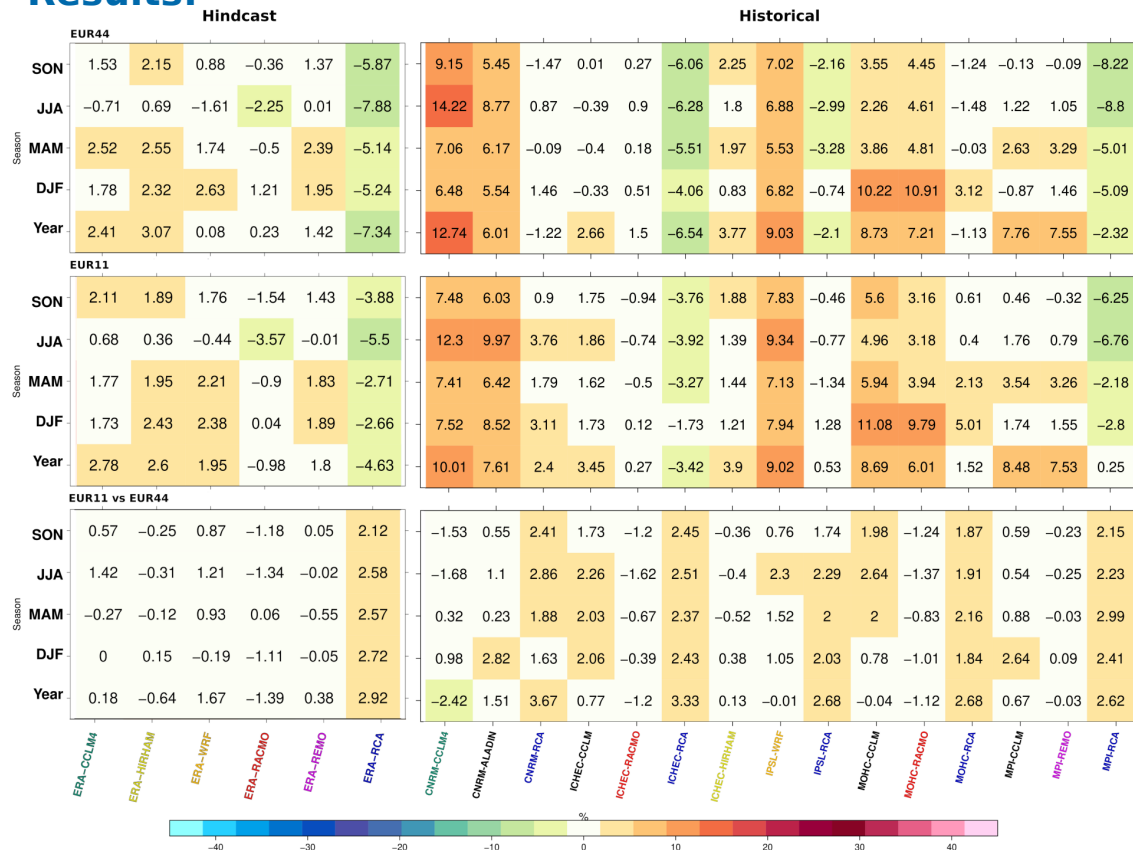


FIGURE 2: As Figure 1, for the wind speed partial PDF regarding the wind speed bins above the 95th percentile.

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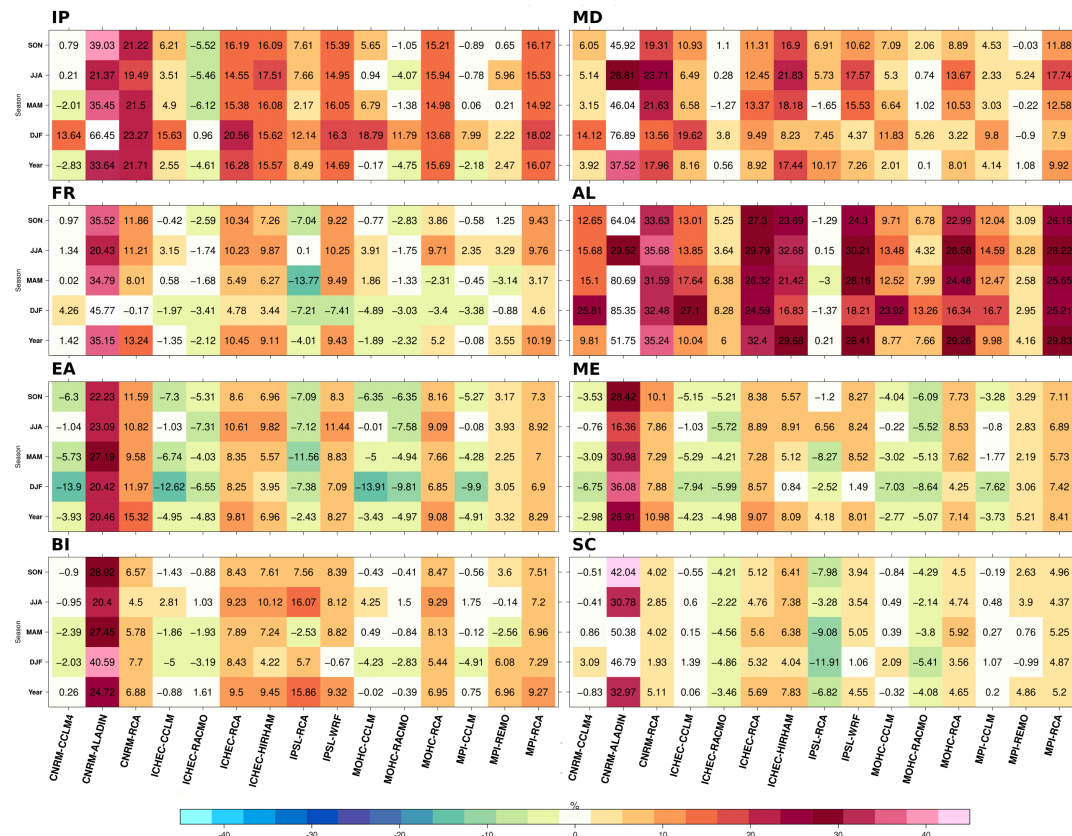


FIGURE 3: Regional DAVs for the full wind speed PDF of the EURO-CORDEX RCM historical simulations for 0.11° versus 0.44° resolution. Each individual panel represents the yearly and seasonal DAVs of a region: Scandinavia (SC), British Isles (BI), mid-Europe (ME), east Europe (EA), France (FR), Alps (AL), Iberian Peninsula (IP) and Mediterranean (MD).

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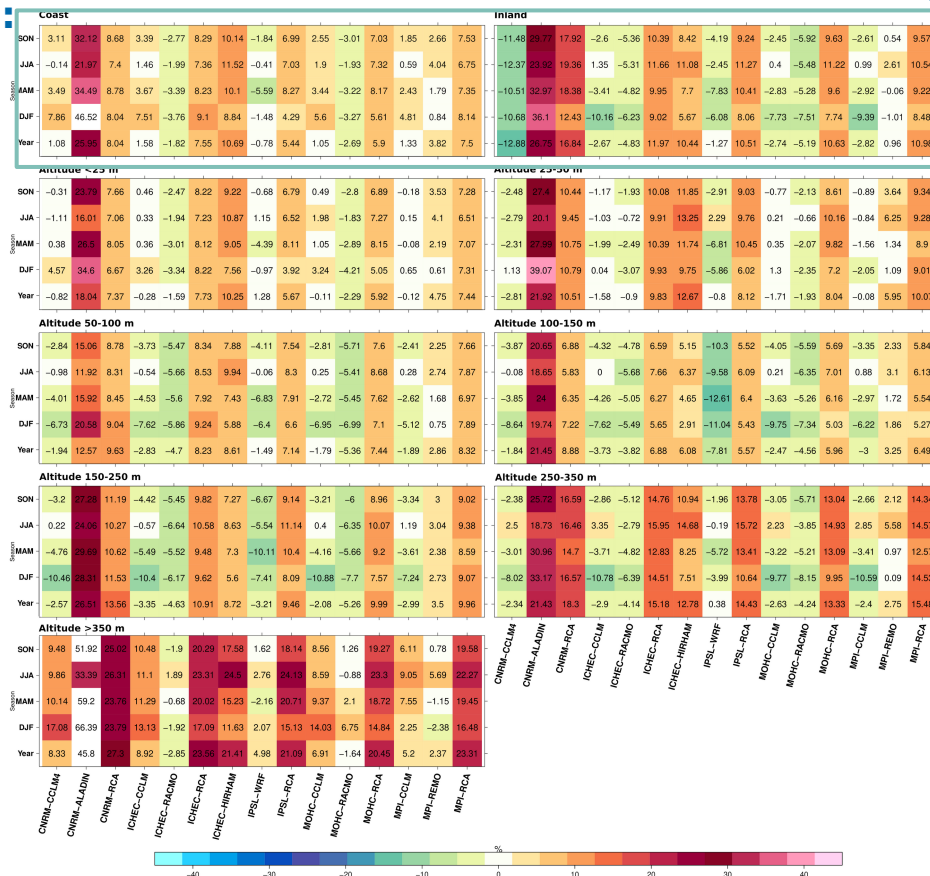


FIGURE 4: Seasonal and yearly DAVs for daily wind speed PDFs of the EURO-CORDEX RCM historical simulations at 0.11° versus 0.44° resolution. Different conditions are applied to the wind speed observation stations: near the coast, inland, below 25m height, between 25-50 m, between 50-100 m, between 100-150 m, between 150-250 m, between 250-300 m and higher than 350 m.

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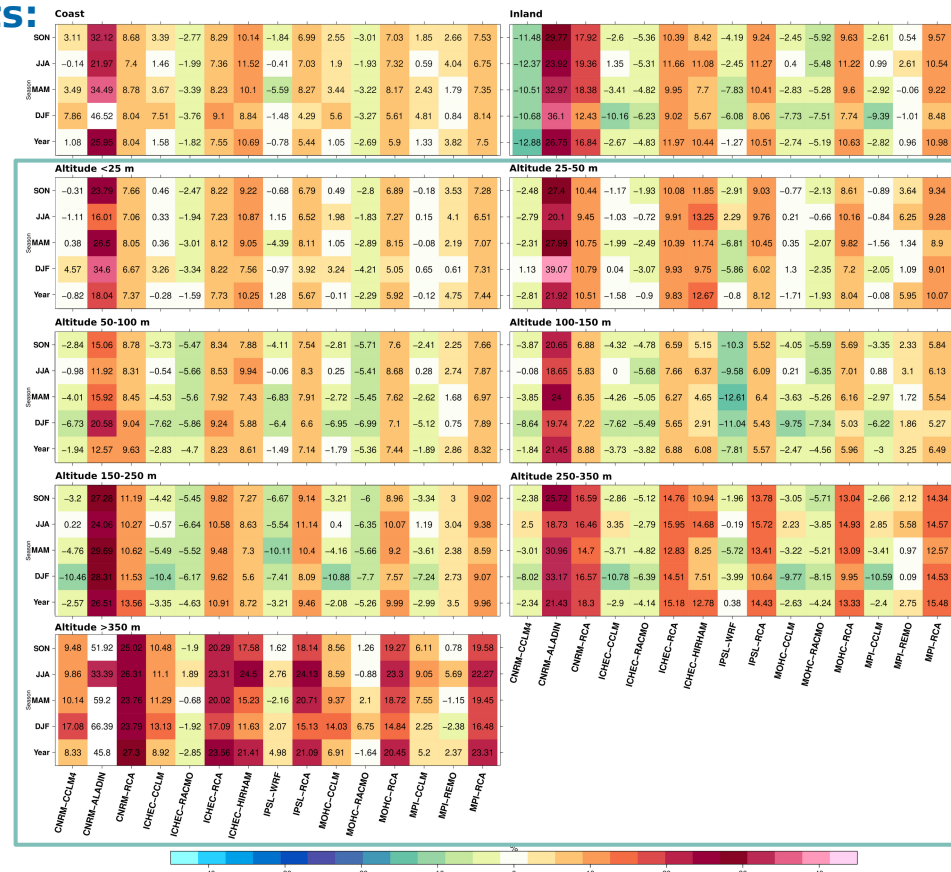


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