Novel datasets of energy-relevant climate variables based on ERA-Interim reanalysis

**Rationales**

- Meteorological reanalysis datasets are being widely used in a number of studies relating to the climate impact on energy.
- Reanalyses have the specific advantage of being complete through the process of physical/dynamic representation of the climate system which provides internally consistent fields across most surface atmospheric variables as well as in the atmospheric column up to the stratosphere.
- The European Climatic Energy Mixes (ECEM) project is primarily focused on users in the energy sector.
- Interest in sub-daily and daily variability of near surface variables: air temperature, dewpoint temperature, precipitation, solar radiation, wind speed and relative humidity.

**Reanalysis outputs differ from station observations**

There are differences between estimates from the reanalysis and station observations. Bias adjustment is a process to adjust the reanalysis onto observational distributions

**Correction of bias**

Interest of users in energy sector is in the extremes of the distribution. Hence, the whole ERA-Interim distribution is adjusted onto observations in the HadISD or E-OBs or HelioClim-3v5 datasets, using a different statistical distribution for each variable.

- Wind speed: adjust the two-parameter Weibull distribution
- Dewpoint and air temperature: adjust means and standard deviations (relative humidity is computed from these two quantities)
- Precipitation daily totals: adjust gamma distribution
- Surface solar irradiance: adjust the whole distribution of the clearness index (quantile mapping)

**Comparing bias-adjusted datasets to observations**

Kirkwall, Northern Scotland (lat: 58.25°, lon: 3.75°)

Wind speed – Air temperature

Examples of differences in scale and shape parameters of the Weibull distribution between

- left: between ERA-Interim and HadISD station observations for wind speed at 10 m, hourly
- right: between bias-adjusted ERA-Interim and HadISD

Based on all 6 h data for January 1981-2010

Bias for ERA-Interim vs ground observations of daily mean of surface solar irradiance for 55 stations:
- circles: -5 < bias < 5 W m⁻²
- ▼ downward triangles: bias < -5 W m⁻²
- ▲ upward triangles: bias > 5 W m⁻²
- Size increases with increasing absolute value of the bias.

Bias is improved for daily mean of surface solar irradiance between Interim and bias-adjusted data against station observations and gridded observation products has demonstrated the benefit of performing bias-adjustment and has provided an assessment of the quality of the novel datasets.

**Conclusion**

The comparison between initial and bias-adjusted data against station observations and gridded observation products has demonstrated the benefit of performing bias-adjustment and has provided an assessment of the quality of the novel datasets.

These datasets are available to anyone this ftp site: ftp://ecem.climate.copernicus.eu.