

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

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Pay attention to:

Only one table or one figure.

500 words max

Must contain the overview of the intent and purpose of the presentation, and the result of research or quality-related projects

References should be used sparingly

All abbreviations should be given in brackets after the first full use of the word

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 present communication deals with the use of the ERA-Interim reanalysis for the production of datasets of climate variables relevant to energy. The work took place within the European Climatic Energy Mixes (ECEM) project in the framework of the Copernicus Climate Change Service (C3S) Sectoral Information Service (SIS). ECEM is primarily focused on users in the energy sector who are interested in sub-daily and daily variability for the following variables at the near surface: air temperature, dewpoint temperature, precipitation, solar radiation, wind speed and relative humidity.

There are differences between estimates from the reanalysis and station observations. Bias adjustment is a process to adjust the reanalysis onto observational distributions. The aim of this communication is to present the construction of novel bias-adjusted datasets of the climate variables listed above.

ERA-Interim was compared against observations. The bias was computed as the mean of the differences (model minus observations). As the users in energy sector are much more interested in the extremes of the distribution, our approach is based on the adjustment of the whole ERA-Interim distribution, using a different statistical distribution for each variable. In other words, we have modified the parameters of different distributions (depending on the variable), altering those calculated from ERA-Interim to those based on gridded station or direct station observations. For wind speed, the two-parameter Weibull distribution computed from ERA-Interim was adjusted to that computed for each station contained in the HadISD dataset. The scale and shape parameters computed at stations were bi-linearly interpolated to each ERA-Interim grid box. A similar approach but with adjustment of means and standard deviations was used for the dewpoint contained in the HadISD dataset and for air temperature but with the E-OBS datasets. The relative humidity is computed from these two variables. For precipitation daily totals, E-OBS and gamma distribution were used. For surface solar irradiance, the statistical distribution of ERA-Interim is adjusted to that of the satellite-derived HelioClim-3v5 dataset. This is done on a so-called clearness index, which is the ratio of the

irradiation at ground level to that at the top of atmosphere. Once the clearness index adjusted, the adjusted irradiation is computed.

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>.