

EGU23-1187, updated on 20 Apr 2024

<https://doi.org/10.5194/egusphere-egu23-1187>

EGU General Assembly 2023

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



Deep-learning-based monthly precipitation forecast for Europe

Ramon Fuentes-Franco and Klaus Zimmermann

SMHI, Rosaby Centre, Norrköping, Sweden (ramon.fuentesfranco@smhi.se)

We implement deep neural networks to forecast monthly precipitation over Europe. This architecture conformed by several convolutional layers and fully connected layers uses four different variables (surface temperature, west-east wind at 200 hPa, precipitation and sea level pressure) coming from seven different operational forecast systems (1. ECCC 2. MeteoFrance 3. DWD 4. JMA 5. NCEP 6. ECMWF 7. CMCC). The neural network is trained using observations from E-OBS, a gridded land-only observational dataset covering the whole European continent. This convolutional neural network is trained using the period 1993-2012 and the validation period is 2013-2016, which is the range that is available for all operational forecast systems.

Comparing with precipitation from observations we show that forecasted precipitation from this Deep-Learning model shows small biases in the whole European continent when forecasting monthly precipitation, especially over Sweden (with a small overestimation of less than 0.2 mm/day). With some higher negative biases over Southern Europe (<-1 mm/day). In turn, the representation of the mean precipitation over specific months and seasons was also assessed, showing that during the validation period this method is able to reproduce properly the spatial features of mean precipitation over Europe and its intensity.