Geophysical Research Abstracts
Vol. 20, EGU2018-4301, 2018
EGU General Assembly 2018

Aspects of post-processing of long-range forecasts

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Weather forecasting beyond the medium range of two weeks have attracted the attention of the climate and weather community for many decades, triggered by a large demand for long-range forecasts from many societal sectors dealing with energy, health prevention, agriculture, or flooding and drought management. Numerous weather and climate centers have implemented operational long-range ensemble forecasting systems. We have reviewed the main methods proposed so far to post-process these long-range forecasts from seasonal up to decadal time scales including trend and drift corrections. This includes also an overview of the difficulties the long-term ensemble forecasts are facing and the statistical framework in which post-processing is envisaged and a description of the current methods of post-processing (multi-)model long-range forecasts is made. We emphasize recent techniques used for correcting ensemble forecasts (Member-by-Member approaches) which are applied in the context of a benchmark model, a low-order coupled ocean-atmosphere model and to seasonal forecasts of the European Center of Medium-range Weather Forecasting (ECMWF). It turns out that underlying hypothesis on the nature of the "weather noise" are crucial in order to get reliable ensemble forecasts.