

SESSION: (B1) Mechanisms of S2D predictability

(B1-17)

The northern hemisphere circumglobal teleconnection in a seasonal forecast model and its relationship to European summer forecast skill

Beverley, Jonathan (1), Woolnough, Steven (2), Baker, Laura (2), Johnson, Stephanie (3), Weisheimer, Antje (3, 4)

Department of Meteorology, University of Reading, UK (1), NCAS, University of Reading, UK (2), ECMWF, UK (3), NCAS, University of Oxford, UK (4)

Recent research has led to improvements in European winter seasonal forecasts, however there has been less of a focus on the summer season and summer forecast skill remains relatively low. The European climate is affected by a large range of influences, which include influences from tropical regions, and better understanding of the mechanisms behind these tropical-extratropical teleconnections can inform our evaluation of seasonal forecast systems and priorities for model development.

One potential source of predictability for Europe is the Indian summer monsoon (ISM), which can affect European weather via a global wave train known as the "Circumglobal Teleconnection" (CGT, Ding and Wang 2005). Here we assess the ability of the ECMWF coupled seasonal forecast model to represent this teleconnection mechanism. We use seasonal hindcasts for JJA which are initialised on the 1st May, with 25 ensemble members, for the period 1981-2014. We show that the representation of the CGT wave pattern in the model is weaker than observed, particularly in August when the observed CGT wavetrain is the strongest, and the model has errors in forecasting geopotential height in several key regions ("centres of action") for the teleconnection mechanism. Several possible causes of these errors will be shown. First, model variance in geopotential height in west-central Asia (an important region for the maintenance of the CGT) is lower than observed in July and August, associated with a poor representation of the link between this region and Indian monsoon precipitation. Second, analysis of the Rossby wave source shows that the source associated with monsoon heating is both too strong and displaced to the northeast in the model. This is related to errors in monsoon precipitation over the Bay of Bengal and Arabian Sea, where the model has more precipitation than is observed. Third, the model jet is systematically shifted northwards by several degrees latitude over large parts of the northern hemisphere, which may affect the propagation characteristics of Rossby waves in the model. In order to further understand how these errors are related to errors in summer predictability over Europe, we will present results from several relaxation experiments, including relaxing regions over west-central Asia and northwest Europe. These experiments have been designed to identify possible causes of errors in the teleconnection pathway, and to explore how improving the representation of the CGT impacts on European Summer forecast skill.