Assessment of Northern hemisphere summer jet teleconnections

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The upper tropospheric jet stream has been documented to act as a waveguide (Hoskins and Ambrizzi, 1993) and supporting quasi-stationary Rossby waves (Schubert et al. 2011). These have been associated with remote effects in surface level weather such as rainfall anomalies in the East Asian Summer Monsoon as well as extreme temperature events. The goal of this work was to analyse the intraseasonal to interannual upper level boreal summer jet variability and its coupling with low level atmospheric dynamics within the Met Office Unified Model using climate runs. Using the Wallace and Gutzler (1981) proposed approach to find teleconnection patterns on the 200 hPa level wind, lead-lag correlation and Empirical Orthogonal Function analysis on the upper-level jet and relating the results with surface weather variables as well as dynamical variables, it was found that the model presents too strong jet variability, particularly in the tropical region and. In addition, the model presents high teleconnectivity hotspots with higher importance in areas such as the Mediterranean and Caspian Sea which are important source areas for Rossby Waves. Further to this, the model was found to produce an area of teleconnectivity between the tropical Atlantic and western Africa which is not observed in the reanalysis but coexists with long lasting precipitation biases. As comparison for the model results, ERA-Interim circulation and wind data and the TRMM precipitation dataset were used. In order to assess the relative importance of relevant model parameters in the biases and process errors, work is currently underway using perturbed model parameter ensembles.

References

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