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Relation of atmospheric blocking to regional andhemispheric modes of variability

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Persistent large-scale anomalies of the west-to-east flow in the midlatitudes with a weakening and meridional splitting of the jet are specified as atmospheric blocking. From a synoptic perspective blocking events are long-lived (up to several weeks) and therefore singular strong events can determine a (monthly) climate index value (e.g. NAOI).

Insight is sought here into the connection of the blocking phenomenon with the dominant regional and planetary-scale patterns of atmospheric variability. The investigation is based on a novel dynamcially-based blocking climatology derived from the ECMWF ERA40 data set (1958 - 2001).

The study focusses on two specific aspects: (i) A regional analysis of the Euro-Atlantic indicates a significant NAO-blocking relation that changes sign from the Atlantic to Europe. The result is astonishingly insensitive to the chosen time-scale (daily to seasonal) and robust w.r.t. different blocking indices. Higher order regional patterns are even more clearly modulated by blocking events. (ii) The spatio-temporal development is analysed of the blocking characteristics, their co-development with climate modes, and the evolution of the blocking trend pattern. The trend analysis reveals interesting spatial and seasonal differences between the Atlantic and the Pacific region.

Together the results provide further insight into the concomitant dynamics of blocking and modes of atmospheric variability.