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The representation of North Atlantic eddy-driven jet and the associated E-vectors in PRIMAVERA historical simulations and the effect of model resolution.

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The dynamics of midlatitude jets, determining their climatological state and variability thereof, have been studied extensively in the last decades. Synoptic eddy fluxes of heat and zonal momentum (represented by E-vectors) have a key role in forcing these jets, with the former being modulated by a number of processes at different timescales. The occurrence of blocking, for instance, dominantly affects the synoptic activity and the position of the North Atlantic eddy-driven jet. Therefore, the realistic simulation of the jet variability depends not only on the representation of the eddy fluxes themselves, but also on how the above-mentioned processes are represented by general circulation models, including feedbacks. Due to their limited complexity and spatial resolution, current climate models still exhibit various associated biases, which reflect strongly on the North Atlantic jet variability, the weather patterns and weather extremes over Europe. In this study, we assess the impact of increasing model resolution on representing the North Atlantic eddy-driven jet and the associated E-vectors. The preliminary results obtained so far for a number of state-of-the-art climate models (PRIMAVERA historical simulations following the HighResMIP protocol) indicate that solely increasing the model resolution in the atmosphere, in the ocean, or in both is not sufficient for eliminating the observed model biases associated with the jet (regarding its mean state and variability). Certain models perform significantly better than others with similar resolution, while biases in the representation of North Atlantic blocking and the respective stationary eddies appear to be key in understanding these differences. Thus, emphasis should be given to understanding the origins of the associated mean state biases.
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