



Atmospheric blocking in the Climate SPHINX simulations: the role of orography and resolution

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The representation of atmospheric blocking in numerical simulations, especially over the Euro-Atlantic region, still represents a main concern for the climate modelling community. We here discuss the Northern Hemisphere winter atmospheric blocking representation in a set of 30-year simulations which has been performed in the framework of the PRACE project "Climate SPHINX". Simulations were run using the EC-Earth Global Climate Model with several ensemble members at 5 different horizontal resolutions (ranging from 125 km to 16 km). Results show that the negative bias in blocking frequency over Europe becomes negligible at resolutions of about 40 km and finer. However, the blocking duration is still underestimated by 1-2 days, suggesting that the correct blocking frequencies are achieved with an overestimation of the number of blocking onsets. The reasons leading to such improvements are then discussed, highlighting the role of orography in shaping the Atlantic jet stream: at higher resolution the jet is weaker and less penetrating over Europe, favoring the breaking of synoptic Rossby waves over the Atlantic stationary ridge and thus increasing the simulated blocking frequency.