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Simulating midlatitude circulation changes: what might we gain from high resolution modelling of air-sea interactions?

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An important strategic question for climate modelling centres worldwide is to decide whether or not to invest in costly high resolution coupled (ocean+atmosphere) modelling. It is indeed not clear at present that this would systematically improve the representation of climate phenomena (see for example the persistent issues with blocking over Northern Europe) and it is also in conflict with the need to increase statistical confidence via an increase in the size of the ensemble used for predictions. Nevertheless, missing physics owing to poor resolution of air-sea interactions over the midlatitude oceans is emerging as a possible candidate to explain recent exciting discoveries: that variations in the Jet Stream path are more predictable in nature than in models (Dunstone et. al., 2016); and that models systematically underestimate the multi-decadal variability of weather patterns in the Atlantic sector (Simpson et al., 2018).

In this talk I will critically review the progresses made on the impact of midlatitude SST anomalies on the Jet Stream – storm track system since the review published in 2002 by Kushnir et al., with an emphasis on the North Atlantic sector. I will highlight the development of parameterizations of midlatitudes air-sea interactions on scales of $\sim$10km as a most needed and exciting new area of research for climate modelling.