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

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The Grantham Institute at Imperial College London

Motivation

An important strategic question for climate modelling centers 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 systematically improves 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 findings: 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).

The question of resolution is not only of academic interest but is central to inform policy makers. Indeed, "downscaling" of coarse climate models' prediction on timescales of a few years to decades is currently the main tool providing information to many countries. This workshop addresses the question: "can we do better?" and aims at finding new ways to reach this improvement without reducing ensemble size. In particular, we wish to discuss parameterizations of midlatitudes air-sea interactions on scales of ~10km as a way forward.

The workshop

A two-day format is considered for this workshop. It is envisioned to be made of an alternation of provocative talks and open discussions. The expected audience size is on the order of 40 people (room size/availability limits participation to 42) and will be composed of academics, PhD students, and postdocs from climate modelling centres and universities. The program aims at covering two overarching themes:

1- **"New physics"**: What are the midlatitude atmospheric motions emerging or strengthening when increasing model resolution from ~100km to ~10km? Why and how, is the ocean circulation most likely to impact these? Why and how will these motions affect the larger scale Jet Stream / storm-track system?

2- **So what?** (i) evidence of impact of high res modelling in pre-existing or on-going projects (e.g., PRIMAVERA, CHARISMA) (ii) alternative modelling strategies beyond the brute force increase in resolution (e.g., idealised experiments, new parameterisations for coarse atmospheric models)