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The transient atmospheric response to midlatitude SST anomalies in a coupled system.

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Ferreira and Frankignoul (2005) recently investigated the transient atmospheric response to prescribed SST anomalies in midlatitudes. They observed that the atmospheric adjustment time, which varies from one month to up to 4 months, is comparable to the persistence of extratropical SST anomalies and the seasonal scale. This suggests that a more realistic assessment of the atmospheric response to SST anomalies should include two elements 1) a two-way interaction where SST anomalies are allowed to respond to air-sea exchanges and 2) seasonally varying conditions. Here, we extend the work of Ferreira and Frankignoul (2005) by taking into account point 1).

As diagnosed from a coupled calculation in perpetual winter conditions, the first two modes of SST variability are forced by the model North Atlantic Oscillation (NAO) and East Atlantic Pattern (EAP). The two SST anomaly patterns are then prescribed as anomalous initial conditions for the SST in the coupled model and the transient atmospheric responses are established from a large ensemble of simulations.

Similarities and differences between the fixed SST anomaly (uncoupled) case and interactive SST anomaly (coupled) case will be presented and discussed. In particular, the atmospheric response develops in the same way in the coupled and uncoupled cases and is associated with a positive feedback onto the NAO and the EAP. However, the amplitude of this feedback is substantially reduced in the coupled set-up.