



## **Atmospheric response to SST anomalies in the Southern Ocean**

**G. Maze** (1,2), F. D'Andrea (2) and A. Colin De Verdiere (1)

(1) LPO-IFREMER, Brest, FRANCE (2) LMD-ENS, Paris, FRANCE

The stationary atmospheric response to an idealised SST anomaly (SSTa) is studied in a simple model of the Southern Hemisphere. The atmospheric model used is quasi-geostrophic and three dimensional, forced by the Southern Ocean through surface heat fluxes. Sensitivity of the stationary atmospheric response to the SSTa location is determined. Differentiating the barotropic from the baroclinic responses, it was found that for extratropical SSTa, the baroclinic atmospheric response is independent of the SSTa longitude whereas the barotropic response can take two different patterns.

The SSTa induces a warm air anomaly through the thermal wind balance, which gives a baroclinic response that creates a trough 45 degrees eastward. This response is simply due to the advection of the SSTa induced anomalous vortex stretching by quasi-stationary westerlies. Baroclinic transient eddies were found to have a dissipative role.

The barotropic response consists of midlatitudes troughs and South Pole ridge for SSTa localised from the western Atlantic to the eastern Indian ocean; and of South Pole trough for SSTa localised from the Australo-Antarctic basin to the center of the Pacific ocean.

The barotropic responses have a similar eddy component. The difference in the response pattern is selected by the zonally symmetric component, which is similar to opposite phases of the Southern Annular Mode (SAM). These SAM-like responses are driven by the anomalous advection of relative vorticity which in turn depends on the position of the SSTa relatively to the geopotential quasi-stationary wave mean field of the model.