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Influence of an SST front on the position and strength of the atmospheric jet

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To understand the atmospheric response to a mid-latitude oceanic front, this paper uses a quasi-geostrophic (QG) model with moist processes. A well-known, three-level QG model on the sphere has been modified to include such processes.
Its response is analyzed in terms of the upper-level atmospheric jet for sea surface temperature (SST) fronts of different profiles and located at different latitudes.

When the SST front is sufficiently strong, it tends to anchor the mean atmospheric jet, suggesting that the jet's spatial location and pattern is mainly affected by the latitude of the SST front. Changes in the jet's pattern are studied in term of surface sensible heat flux and moist effects (through latent heat release). It is found that latent heat release due to moist processes is modified when the SST front is changed, and this is responsible of the meridional displacement of the jet. Moreover both latent heat release and surface sensible heat flux contribute to the jet strengthening.