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Effect of mesoscale oceanic eddies on mid-latitude storm-tracks.

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Sharp sea surface temperature (SST) gradients associated with oceanic western boundary currents (WBC) exert an influence on the position and intensity of mid-latitude storm-tracks. This occurs through strong surface baroclinicity maintained by cross frontal SST gradient and deep vertical atmospheric motion due to convection on the warm flank of the WBC. However the additional role of mesoscale oceanic structures (30-300km) has not yet been explored although they have a non-negligible influence on surface heat fluxes.

Using the Weather Research and Forecasting model, we investigate the potential role of these oceanic eddies in the case of an idealized atmospheric mid-latitude storm track forced by a mesoscale oceanic eddy field superposed with a large-scale SST gradient.

Surface latent and sensible fluxes are shown to react with a non-linear response to the SST variations, providing additional heat and moisture supply at large scales. The atmospheric response is not restricted to the boundary layer but reaches the free troposphere, especially through increased water vapor vertical transport and latent heat release. This additional heating in presence of eddies is balanced by a shift of the storm-track and its poleward heat flux toward high latitudes, with amplitude depending on atmospheric configuration and eddies amplitude. We also explore how this displacement of perturbations changes the position and structure of the mid-latitude jet through eddy momentum fluxes.