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On the influence of atmospheric forcing fields on model results at the example of the Benguela upwelling system

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The upwelling on the shelf off Namibia depends mainly on the curl of the local wind stress. Driving a regional eddy resolving circulation model with data, which are defined at a relatively coarse grid as e.g. NCEP reanalysis data, important details of the local wind fields are missing. Alternatively, satellite borne wind speed data as the QUIKscat dataset can be used, which provide a much better horizontal resolution and are available for a period of several years. Comparison of simulations driven by NCEP and QUIKscat winds and analytical results as well show more realistic upwelling from the QUIKscat winds.

However, a spectral analysis of data from a moored current meter off Walvis Bay reveals a pronounced spectral peak corresponding to inertial waves. A similar analysis of the simulated currents in the same area shows, that these waves are completely missing in simulations driven by QUIKscat winds but have a realistic amplitude in the NCEP-wind driven model simulations.

A synthetic wind field derived from daily QUIKscat wind amplitudes combined with a 6 hour diurnal cycle derived from NCEP data is found as suitable to drive a regional model of the Benguela upwelling system.