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Sources of frontogenesis in the Equatorial Atlantic Front

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The Equatorial Atlantic front is located along 1°N in the eastern equatorial Atlantic basin, at the northern boundary of the cold tongue. It separates the cold waters of the southern cold tongue from the warmest, tropical waters circulating in the Gulf of Guinea. This seasonal front appears every year from May to August, and is characterized by meridional SST gradients up to 2 to 3°C/20 km. It is thought to play an important role for the circulation in the marine atmospheric boundary layer and influence the coastal precipitation and the western African monsoon onset.

In this presentation the processes at the origin of the equatorial front were investigated. For that, diagnosis of the frontogenesis forcings were applied on a realistic high-resolution simulation of the equatorial Atlantic in 2006. It is found that the turbulent forcing term associated with the mixed layer turbulent heat fluxes is frontolitic (meaning a destruction of the front). However, a splitting of the turbulent forcing into its low and high-frequency (wavy) components, indicates that the low-frequency forcing may initiate the equatorial front, a forcing that is finally amplified and fully maintained by dynamical effects. Finally, the dynamic forcing has a leading frontogenetic role (meaning a reinforcement of the front) and is fully driven by the meridional convergence between the Guinea Current and the South Equatorial Current.