Interannual Variability of Gulf Stream Dynamics from Atlimetry

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Abstract

Within the Gulf Stream jet-extension, the onset of turbulence leads to complex, transient behavior. For example, meanders grow in amplitude downstream from Cape Hatteras and eddies are generated through a mix of barotropic and baroclinic instability. The Gulf Stream transport, mean position and meandering path exhibit year-to-year variability.

We will explore the inter-annual variability of the statistics of dynamical properties in the Gulf Stream region using altimetry data. We will analyze the different statistical moments (mean, standard deviation, skewness, and kurtosis) of jet latitude and along-jet speed.

We will discuss their relationships to the underlying dynamics on interannual timescales and the role of instabilities in driving the flow. We will show that year-to-year statistics of jet latitude and along-jet speed are intimately related, specifically where the Gulf Stream destabilizes. The inter-annual variations of dynamics within the Gulf Stream can have significant impacts on the transport and mixing of heat and salinity, therefore affecting mid-latitude climate.

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