Geophysical Research Abstracts, Vol. 9, 01817, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01817


# Evolution of the Gulf Stream structure, transport, and vertical coherence from the Straits of Florida to the Southeast Newfoundland Ridge

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The Gulf Stream represents both the western boundary current for the wind-driven subtropical gyre in the North Atlantic and the primary pathway for the near-surface limb of the North Atlantic thermohaline circulation. Along the length of the current the flow changes from a narrowly constricted jet through the Straits of Florida to a free oceanic jet across the Mid-Atlantic Bight and finally into a topographically controlled jet flowing along the boundary north of the Southeast Newfoundland Ridge. Data from Pegasus velocity profilers, current meters, inverted echo sounders, bottom pressure gauges, and hydrographic sections are all used to demonstrate that in all three locations the barotropic and baroclinic (relative to the bottom) components of the Gulf Stream flow are essentially uncorrelated with one another at time scales ranging from weeks to months. This has implications both for sampling and measurement strategies as well as for dynamical understanding of flow variations. The mean transport estimates along the path of the Gulf Stream are combined to give bulk estimates of the inflow and outflow associated with the recirculation cells, and these values are compared to the available observations of cross-stream flow. These estimates suggest that the largest recirculation cells on either side of the Gulf Stream are stronger than previously believed and they have a weak baroclinic component (perhaps 10% of the total).