

MAR555: Problem Set for Lecture 5

1. When a warm-core ring is formed by a meander of the Gulf Stream, warm water is moved north. The opposite happens when a cold-core ring is formed. From information you have on the characteristics of rings, estimate their contributions to the northward heat and salt fluxes. Assume that the annually averaged oceanic heat flux in the North Atlantic Ocean is -2×10^{22} J. Are rings important contributors to the oceanic heat budget? Why? (Hint: the heat and salt fluxes are equal to $\rho C_p \bar{T} V$ and $\rho \bar{S} V$ where ρ is the water density given as 1.0275×10^6 g/m³; $C_p = 4.184$ J/g °C; \bar{T} and \bar{S} are the average temperature and salinity of a ring; and V is the volume of a ring.)