



Dense water formation and overturning: what is the connection?

F. Straneo

Woods Hole Oceanographic Inst.

Open-ocean convection regions, such as the Nordic Seas or the Labrador Sea, are generally thought of as the 'sinking' regions of the ocean's overturning circulation. In practice, however, dynamical constraints are such that no net sinking (i.e. vertical mass flux) occurs in the open-ocean regions where the bulk of the dense water formation occurs. To the extent that it occurs, any sinking must take place at the topographic boundaries that surround the convection region. Also flowing around these boundaries is the boundary current responsible for the advection of buoyant water into the convective region, and the removal of the dense water formed. Using a simplified two layer model, and data from the Labrador Sea, it is shown that the amount of dense water formed and the amount of water that sinks are distinct quantities. Explicitly, I will present cases when the amount of sinking can vary while the amount of dense water formed remains unvaried. These results have important implications with regards to the variability of the overturning circulation observed in models and from data.