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A Ventilated Middepth Circulation Model for the Eastern North Atlantic

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ABSTRACT

A mechanism is proposed, based on the assumption of ventilation, to explain the middepth northward flow observed in the North Atlantic. The main feature of the solution is that the outcropping line of an intermediate layer at high latitudes is uniquely specified by the condition that the middepth waters of the subtropical gyre may be “sucked up” by the positive Ekman pumping of the subpolar gyre.

This model is consistent with several characteristic features of the circulation in that region such as its vertical structure, the greater northward extension of the warm waters in the eastern ocean and the shape of the large scale Mediterranean water plume. In a variation of the model, the observed isopycnal slopes along the eastern coast are included in the analysis; this implies the existence of eastern boundary layers.

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