



Lagrangian Trajectory Analysis of the Pacific Subtropical Cell

J. F. Lübbecke (1) and K. Döös (2)

(1) IfM-Geomar, Leibniz-Institute for Marine Sciences, Kiel, Germany, (jluebbecke@ifm-geomar.de), (2) MISU, Department of Meteorology Stockholm University, Sweden

The Pacific Subtropical Cell (STC) is investigated by Lagrangian trajectories using time - dependent velocity and density fields simulated with the global ocean model ORCA05. The model captures the most important features of the pacific tropical - subtropical circulation including the overturning circulation as well as the zonal and western boundary currents. The analysis focus on the pathways of the water taking part in the northern Subtropical Cell.

Trajectory pathways show a circular flow consistent with the concept of the STCs both in the top view and in a vertical section indicating that the STCs are real cells that are not entirely open although they are linked to the global ocean circulation. Decomposing the STC into Lagrangian stream functions is used as a method to distinguish the equatorward return flow in the western boundary current from the one in the interior ocean. The Lagrangian meridional overturning stream function is calculated by summing up and integrate zonally over the transports associated with selected trajectories. The North Pacific STC of the model has an amplitude of 24 Sv in total of which 16.5 Sv can be explained by the circulation at the western boundary and 7.5 Sv by the one in the interior Pacific. Consistent with this the extension of the STC calculated from trajectories returning at the western boundary is larger regarding the subduction latitudes as well as the depth and the density range.