

Sea surface conditions, ocean gateways, and global ocean conveyor

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Sensitivity of global ocean circulation to details of sea surface boundary conditions has been revisited in a set of numerical experiments. The focus is on the role of sea surface salinity asymmetries between different ocean basins. Another issue is the role of the change of water transport through major ocean gateways linked to the changes in sea surface conditions, especially in inter-basin sea surface salinity contrasts. The results indicate that the basin-wide inter-basin salinity contrasts are the key elements of success for ocean models to realistically mirror ocean circulation despite strongly simplified sea surface conditions. We suggest that exact knowledge of the spatial distribution of sea surface salinity may not be crucial to the simulation of the thermohaline ocean circulation in many process-oriented climate studies. Therefore, simulations based on limited sea surface data, for example in paleoclimate studies, can yield acceptable circulation patterns, as long as the inter-basin surface salinity contrasts are retained. Possible feedbacks of both concurrent northern and southern freshwater impacts and the building up inter-basin sea surface salinity contrasts are discussed along with the role of major gateways providing different return paths for the global conveyor.

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