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Assessment of CMIP climate models in simulating sea surface salinity

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The majority of the current generation models do not use "flux correction" and still maintain a very stable sea surface temperature. However, there is little work done on verifying the sea surface salinity produced by these models. Ocean salinity, along with temperature, determines the seawater density that drives the meridional overturning circulation. Ocean salinity is a key tracer for the hydrological cycle: fresh water evaporates from the oceans, rains out over the ocean as well as land and then runs back into the seas. It has been hypothesized that both the thermohaline circulation and the global hydrological cycle might have high sensitivity to anthropogenic forcing. Here we present the first assessment of eleven CMIP3 climate models in simulating the long-term mean sea surface salinity. Eight of the eleven models show a fresh water bias. The regional bias of sea surface salinity can be as high as 1.0~2.0 psu (practical salinity unit). The global mean absolute bias is on the order of 0.5 psu. These errors in simulating sea surface salinity are significant because they are comparable with, if not larger than, many of the natural climate variations including El Niño and La Nina. Some of these errors can be attributed to the model deficiencies in simulating the evaporation and precipitation. To the extent CMIP5 model output is available in a timely fashion, we will also analyze these data and provide a comparison to observations and to CMIP3 model fidelity.