Global ocean salinity changing due to anthropogenic climate change

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Rising sea surface temperatures, climbing sea levels, and ocean acidification are the most commonly discussed consequences of anthropogenic climate change for the global oceans. They are not, however, the only potentially important shifts observed over recent decades. Drawing on observations from 1955 to 2004, Pierce et al. find that the oceans' salinity changed throughout the study period, that the changes were independent of known natural variability, and that the shifts were consistent with the expected effects of anthropogenic climate change.

The authors analyzed 50 years of salinity and temperature observations drawn from the National Oceanographic Data Center's records. The observations spanned the top 700 meters (2,300 feet) of the water column from 60 degrees North to 60 degrees South. Using 20 global general circulation models, they assessed whether the observed changes in ocean salinity and temperature could be explained by known natural cycles: the El Niño-Southern Oscillation, the Pacific Decadal Oscillation, the effects of volcanic eruptions, and changes in solar activity. They find that the observed trends, which varied regionally, did not relate to any of these forcings. However, the observed trends are consistent with model estimates of the effects of human-caused climate change.

The slowly shifting global salinity field is known to be affected by changes in the hydrological cycle, including changes in evaporation and precipitation rates, ocean currents, river discharge, and other forces. As such, the authors suggest that the observed human-driven trends in the global salinity field demonstrate an ongoing, long-term shift in the global hydrological cycle that is likely to continue into the future.

More information: The fingerprint of human-induced changes in the ocean's salinity and temperature fields, Geophysical Research Letters, doi:10.1029/2012GL053389, 2012

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