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Sensitivity of the recent tropical sea surface salinity evolution to variability modes and teleconnections

Lola Corre and Laurent Terray
Cerfacs-CNRS, Toulouse, France (corre@cerfacs.fr)

Over the 1970-1999 period, observations of Sea Surface Salinity (SSS) exhibit marked and contrasted trends in the tropical oceans. The Atlantic and Pacific oceans become saltier and fresher, respectively. As the SSS is climatologically higher in the Atlantic than in the Pacific basin, we are tempted to interpret the increasing SSS gradient between the two basins as a manifestation of the rich get richer paradigm, expected under global warming conditions. Nevertheless, CMIP3 simulations without anthropogenic forcing also show fluctuations of the SSS gradient between the two tropical basins. This suggests an influence of the climate natural variability associated with modes such El Nino Southern Oscillation, or at lower frequency the Pacific Decadal Oscillation and the North Atlantic Oscillation. The CMIP3 models ability to represent those modes, as well as teleconnections between extra-tropical and tropical regions, are examined in term of impacts on SSS variability. In particular, we try to highlight a possible modulation of the SSS gradient between the Atlantic and Pacific tropical oceans by the variability modes. The observed increasing SSS gradient between the two basins seems to testify of an evolution of the fresh water fluxes at tropical latitudes, in the way of an anomalous humidity transport from the Atlantic to the Pacific, which could be due to anomalous low-level circulation and/or moisture atmospheric content.