OCEAN ACIDIFICATION IN THE ARCTIC OVER THE 21ST CENTURY

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About a quarter of the anthropogenic CO2 emitted into the atmosphere is currently taken up by the ocean and modifies ocean pH and saturation states of sea water with respect to calcium carbonate minerals. We investigate the natural variability and projected future changes in pH and in the saturation state of the mineral aragonite using the NCAR carbon-cycle climate model CSM1.4-carbon and high (A2) and low (B1) CO2 SRES emission scenarios. The simulated seasonal variability of the aragonite saturation state is small at high latitudes and in the tropics. Deviations from the annual mean in the mid-latitudes of the Northern Hemisphere are as large as 15 to 20% of the mean. The annual mean global surface pH drops from 8.17 to 7.77 by year 2100 in the A2 scenario, with the largest changes found in the Arctic Ocean (reduction of up to 0.50 pH units). Surface waters in the Arctic are projected to become undersaturated with respect to aragonite by year 2040 AD. The impact of climate change on ocean acidification is small in most regions, except for the Arctic Ocean and parts of the North Atlantic.