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# Temporal variations and trends of CFC11 and CFC12 surface-water saturations in Antarctic marginal seas: Results of a regional ocean circulation model

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A knowledge of chlorofluorocarbon (CFC11, CFC12) concentrations in ocean surface waters is a prerequisite for deriving formation rates of, and water mass ages in, deep and bottom waters on the basis of CFC data. In the Antarctic coastal region, surface-layer data are sparse in time and space, primarily due to the limited accessibility of the region. To help filling this gap, we carried out CFC simulations using a regional ocean general circulation model (OGCM) for the Southern Ocean, which includes the ocean-ice shelf interaction.

Here we present simulated long-term trends and seasonal variations of surface-layer saturation, i.e. the actual surface concentrations relative to solubility-equilibrium values, at Southern Ocean deep and bottom water formation sites and other key regions. The amplitudes of the seasonal saturation cycle range from 22% to 66% and their long-term trends amount to rises of 0.1%/year to 0.9%/year. The seasonal saturation maximum lags the ice cover minimum by 2 months. We show that ignoring the trends and using instead the saturations actually observed can lead to systematic errors in deduced inventory-based formation rates.