Geophysical Research Abstracts
Vol. 19, EGU2017-13432-1, 2017
EGU General Assembly 2017

Decadal Changes in Ventilation and Anthropogenic Carbon in the Intermediate Depths of the Arctic Ocean

Balamuralli Rajasakaren (1), Emil Jeansson (1), Are Olsen (2), Toste Tanhua (3), and Truls Johannessen (2)

(1) Uni Research Climate, Bjerknes Centre for Climate Research, Nygårdsgaten 112, 5007 Bergen, Norway, (2) Geophysical Institute, University of Bergen and Bjerknes Centre for Climate Research, Allégaten 70, 5007 Bergen, Norway, (3) GEOMAR Helmholtz Centre for Ocean Research Kiel, Düsternbrooker Weg 20, 24105 Kiel, Germany

We use transient tracer (CFC-12) observations from the GLODAPv2 data product to investigate the decadal evolution of mean age and the amount of anthropogenic carbon (C_{ant}) in the intermediate depths (200 – 2000 m) of the Arctic Ocean. Applying the transit time distribution (TTD) method, we find that ventilation has deepened in the upper 1600 m in the Eurasian Basin and Amerasian Basin from the 1990s to the 2000s. Ventilation in the Eurasian Basin mainly takes place via advection of upper Polar Deep Water (uPDW) and dense Atlantic Water (dAW) at about 500 – 1500 m. The ventilation during the studies period may be connected to an observed increased inflow of Atlantic Water, particularly from the Barents Sea Branch. Ventilation in the intermediate depths of the Amerasian Basin is mainly in the Arctic Atlantic Water (AAW) and dense Arctic Atlantic Water (dAAW) in both the Makarov and South Canadian Basins and uPDW in the South Canadian Basin, while the West Canadian Basin is more in a steady state. As a consequence of the ventilation in the Eurasian Basin, C_{ant} has increased by about 4-7 μmol kg^{-1} from 1987 to the 1990s, and by about 6-9 μmol kg^{-1} from the 1990s to the 2000s. There is also an increase in anthropogenic carbon in the upper 1750 m in the Amerasian Basin of about 10 μmol kg^{-1} from the 1990s to the 2000s. The Arctic Ocean C_{ant} inventory for the intermediate waters has significantly increased from the 1990s to the 2000s and the inventory for the 2000s is calculated to be about 2 Gt-C (specific inventory $\approx$ 40 mol C m^{-2}).