Geophysical Research Abstracts,
Vol. 11, EGU2009-4689, 2009
EGU General Assembly 2009

Warming of Atlantic Water in the Arctic Ocean: myth or reality?

V.V. Ivanov (1), I.A. Repina (2), V.A. Alexeev (3), I.V. Polyakov (4), and I.A. Dmitrenko (5)

(1) Scottish Association for Marine Science, Oban, UK (Vladimir.Ivanov@sams.ac.uk), (2) Obukhov Institute of Atmospheric Physics, Moscow, Russia (iar.ifaran@gmail.com), (3) International Arctic Research Center, University of Alaska Fairbanks, USA (valexeev@iarc.uaf.edu), (4) International Arctic Research Center, University of Alaska Fairbanks, USA (igor@iarc.uaf.edu), (5) Leibniz Institute for Marine Studies, Kiel, Germany (idmitrenko@ifm-geomar.de)

Atlantic Water (AW) reaching the Arctic Ocean is considered to be the major heat source for the ocean interior. Under the progressing decay of the Arctic ice cap, potential effect of AW on this process is of high importance, particularly along with the currently observed temperature increase in AW layer. Multiple reports about substantial warming in the AW layer (1̃50-900 m) based on snap-shot CTD surveys, appeared in 1990s. Observations in 2000s, including long term mooring-based ones, have shown that after relatively short (several years) decrease of temperature, the general warming trend resumed culminating in summer 2007 – the year, which was, on average, warmer by 0.24oC than was the warming in the 1990s. However, mooring-based observations revealed another important fact: strong seasonal oscillations in the AW layer 'survive' transformation of this water mass from the surface current (in Fram Strait) into the intermediate water flow (in the Arctic Ocean interior). Although on the way of AW along Eurasian continental margin the range of seasonal oscillations reduces, it remains as high as 0.64oC in the East Siberian Sea(1̃500 miles away from Fram Strait). This necessarily poses the question: what is actually measured at snap-shot transects, long term warming/cooling trends, or different phases of seasonal signal? In seek for the answer we applied an analytical model based on a simplified 1-D transport-diffusion equation with prescribed horizontal speed and diffusion coefficient. Our results suggest that in order to distinguish between seasonal signal and long term trends the distance between sequential cross-slope transects may not exceed 2̃00 km, which is quite restrictive when the typical distance between cross-slope transects on Arctic cruises is taken into consideration.