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Bottom water structure and its temporal variability in the Equatorial and South Atlantic

A.N. Demidov (1), E.G. Morozov (2), S.A. Dobrolyubov (1)

(1) Department of Oceanology, Moscow State University , Russia , (2) P.P. Shirshov Institute of Oceanology

tuda@mail.ru

During the period from 2003 to 2006, a number of Russian expeditions worked in different regions of the Equatorial and South Atlantic within the framework of the Russian research program "Meridian-plus". The main objective of the research was investigation of the structure, transport, and variability of water properties in the layer of Antarctic Bottom water (AABW) in key regions of bottom water spreading: Vema and Romanche fracture zones, and Vema Channel. During the measurements in the Vema and Romanche fracture zones, warming was found in the AABW layer equal to 0.034 C è 0.027 C, respectively, while salinity changes were less significant. Transports of AABW were calculated on the basis of the LADCP direct measurements. They appeared smaller than the previous estimates. Our measurements resulted in 0.1-0.6 Sv transport in the Vema Fracture Zone and 0.1-0.8 Sv in the Romanche Fracture Zone. In the Vema channel, AABW propagates further to the North Atlantic and, in particular, to the Subpolar Atlantic. Variations in the properties of AABW influence the properties of deep waters in the North Atlantic. It was found that the propagation of the lower part of AABW in the Vema Channel occurs in the form of strongly mixed jet (or several jets). One core of the jet is displaced to the eastern part of the channel due to the Ekman friction, which agrees with the theory. Usually, the jet is mixed by vertical in the lower 100-150 m. Each year of observations demonstrates that the structure of the jet changes. In different years of observations, the propagation of AABW was observed in the form of several jets (1991, 2002, 2006), or the jet was displaced to the maximal depth in the middle of the channel (March 2005). Beginning from the

1970s, a gradual increase in the potential water temperature was observed in the Vema Channel. It was found that the tendency of temperature increase is absolutely not related to water sampling in different parts of the channel. Slight cooling and freshening of the core of the jet are observed according to the data of the Russian sections of November 2004, March 2005, and November 2006. In October 2005, temperature in the jet increased and reached the level of 2002. Warming of the core can be related to warming of waters in the Weddell Sea, which has been observed for 20 years already [Fahrbach et al., 2001], and in the Argentine Basin [Coles et al., 1996].