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Variability of water mass characteristics, mass and heat transport in the North Atlantic based on "Meridian" project hydrographic sections at 60N

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In June-July 2004 cruise of RV "Akademik Ioffe" repeated transatlantic section along 60N from the European shelf to the Greenland. Previously this section was completed 5 times including Russian WOCE cruise of RV "Professor Shtockman" in 1997 and "Meridian" project cruises of RV "Akademik Keldysh" in 2002 and RV "Akademik Ioffe" in 2003. In the early 1990s the intensive formation of the Labrador Sea water (LSW was more colder, fresher and denser), the decrease of the southward deep water transport and northward surface water transport were observed. Meridional overturning cell (MOC) with 3 layers was formed with a decreased intensity of meridional heat and mass transport at 60?N. Analysis of "Meridian" project data of 2002-2003 revealed transformation of the MOC structure with a continuous destruction of the dense lower LSW core and an appearance of the newly formed upper LSW core. The role of the LSW in the MOC was decreased, while the transport in the upper and deep layers was enhanced. In 2004 large volumes of the LSW with rather low oxygen concentration were observed in the Iceland and Irminger basins. Transport of the Denmark Strait Overflow water was intensified and caused freshening of this water by 0.04 psu. Due to intensification of the LSW transport concentration of silicates in the Iceland-Shetland Overflow water layer was decreased with increasing oxygen content. Mass and heat transport at 60N was computed by the method described in (Hall, Bryden, 1982), Ekman transport was estimated from satellite data, barotropic component in the western boundary current was chosen with constant value of 15 Sv (Krauss, 1985). Interannual variability of the meridional heat transport (MHT) was negligible, the MHT varied from 0.29 to 0.35 PWt with error estimates of order 0.08 PWt. More than a half of the MHT value was determined by the meridional overturning cell, while

the MHT variability resulted chiefly from changes in horizontal gyre recirculation.