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Atlantic Water pathways and transport in the Fram Strait during summer

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Institute of Oceanology Polish Academy of Sciences (IOPAS) has been investigating Nordic Seas since 1989. Data collected by the IOPAS during cruises of the R.V. "Oceania" into the Barents, Norwegian and Greenland Seas gave interesting information about the Atlantic Water (AW) pathways and transport by the West Spitsbergen Current (WSC). Presented horizontal distributions of water properties and calculated baroclinic currents show multi-pathways structure of AW transport. However only using the modern techniques that allow direct vessel-based measurements of the sea currents in entire water column, enabled to observe vertical and horizontal structure of the West Spitsbergen Current, as well as short-term variability of transports. Lowered Acoustic Doppler Current Profiler (LADCP) has been used during 2003 and 2004 summer cruises of R.V. 'Oceania', conducted in frames of the ASOF-N project. Spatial current structure, volume and heat transports based on the LADCP observations are compared with results calculated from hydrological data and vessel mounted ADCP measurements. Structure of calculated baroclinic currents was similar to those observed by means of LADCP. However high barotropic component of the observed flows caused that measured volume transport was much higher than calculated from geostrophy. Also observed short-term variability of the volume and heat transports was very high. A rapid increase and decrease of the WSC volume transport, even changes of the flow direction, seems to be correlated to the local wind conditions. Observed in summer 2004 transports across the 130 km long section of the WSC at latitude 78deg 45' N changed from 9.9 Sv to -10.1 Sv and back to 0.7 Sv during 7 days. Supposed mechanism generating so high transport's temporal variability was varying flow's barotropic component due to changes of the sea surface tilt. The shelf break and Spitsbergen archipelago interaction cause that dynamics of investigated region is

sensitive to the local wind conditions; changes of the wind direction may generate on or off-coast Ekman transport and create eastward or westward sea level tilt, which induces northward or southward barotropic flow.