VERTICAL DISTRIBUTION OF CDOM PHOTOBLEACHING ACTION SPECTRA UNDER NATURAL ILLUMINATION CONDITIONS IN DISTINCT WATER BODIES OF ATLANTIC OCEAN

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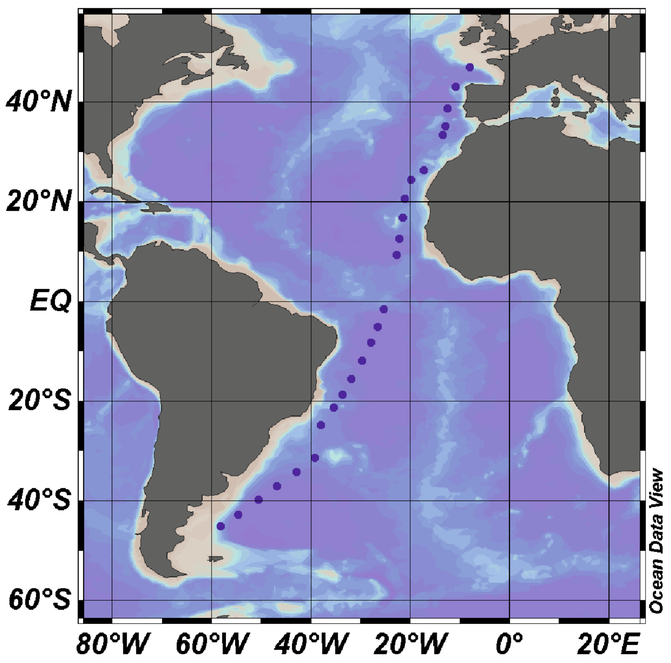

Fig.1 Sampling grid duirng ANT-XXVIII/5 cruise on board r/v Polarstern

This study is based on field measurements of Inherent and Apparent Optical properties measured in April and May 2012 during r/v Polarstern ANT-XXVIII/5 expedition. The empirical data were used to model vertical distribution of CDOM photobleaching action spectra in distinct water bodies of Atlantic Ocean: South Subtropical Atlantic, South Tropical Atlantic, North Tropical Atlantic, and North Atlantic at western European Shelf. The underwater spectral irradiance profiles measured at 12 spectral wavebands in UV and visible spectral region were used to calculate underwater light field. The vertical distributions of inherent optical properties acquired with use of the ac-9 spectrophotometer were used to estimate the vertical distribution of CDOM. The CDOM spectral absorption properties measured in discrete water samples were used to derive empirical relationships between CDOM absorption coefficient and CDOM absorption spectrum slope coefficient. This relationship and the exponential model of CDOM absorption enabled us to reconstruct the CDOM absorption spectrum at each depth. The CDOM absorbed quanta were calculated as a product of two matrices: depth distribution of CDOM absorption spectra and underwater light field in the same spectral and depth ranges. Preliminary results demonstrated that intensity of CDOM photobleaching is rather limited by Mixed Layer Depth than penetration of the ultraviolet light into deeper layers.

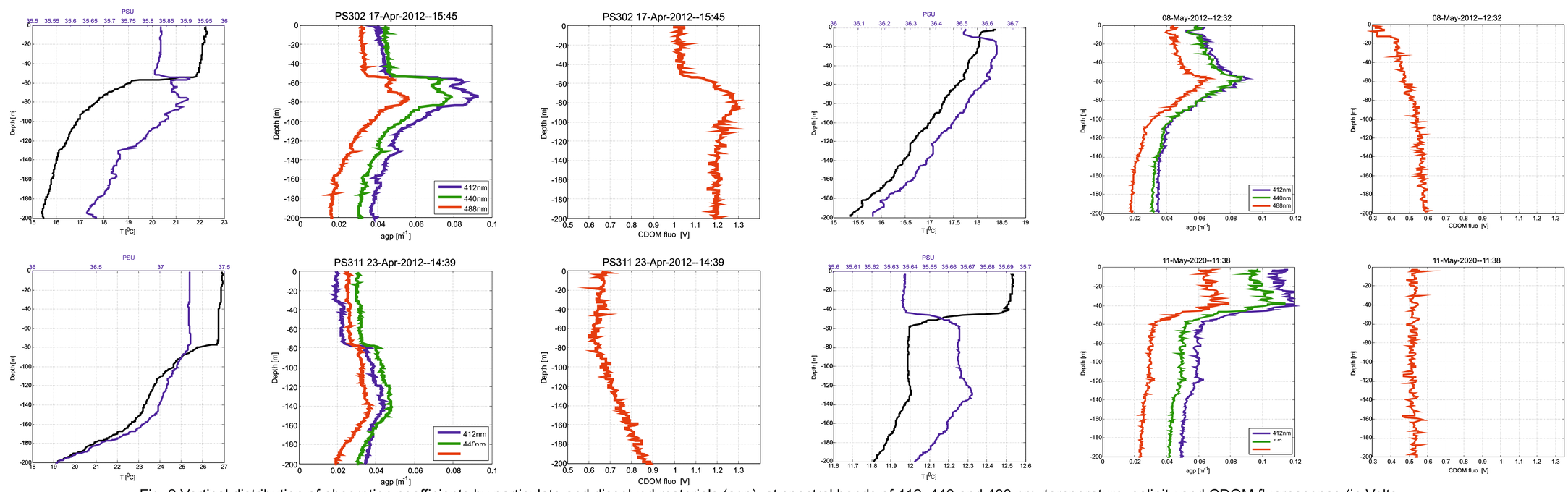

Fig. 2 Vertical distribution of absorption coefficients by particulate and dissolved materials (agp), at spectral bands of 412, 440 and 488 nm, temperature, salinity and CDOM fluorescence (in Volts, for range 0-5V) on selected stations of the ANT-XXVII/5 cruise.

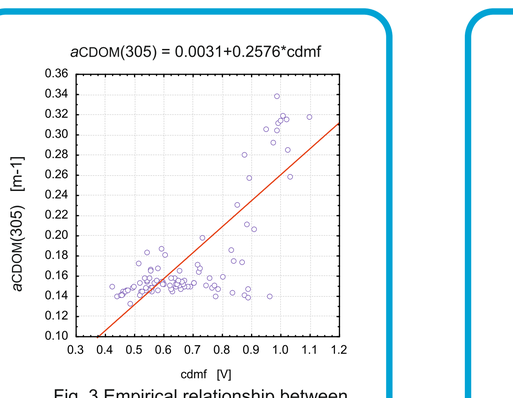

Fig. 3 Empirical relationship between CDOM fluorescence (relative units) and CDOM absorption coefficient: r = 0.8192; r2 = 0.671; p<0.001

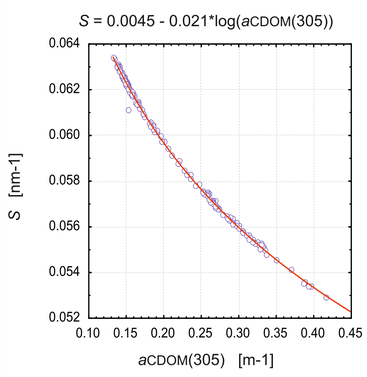

Fig. 4 Empirical relationship between CDOM absorption coefficient and CDOM absorption spectrumm slope coefficient : r = 0.9924; r2 = 0.985; p<0.001

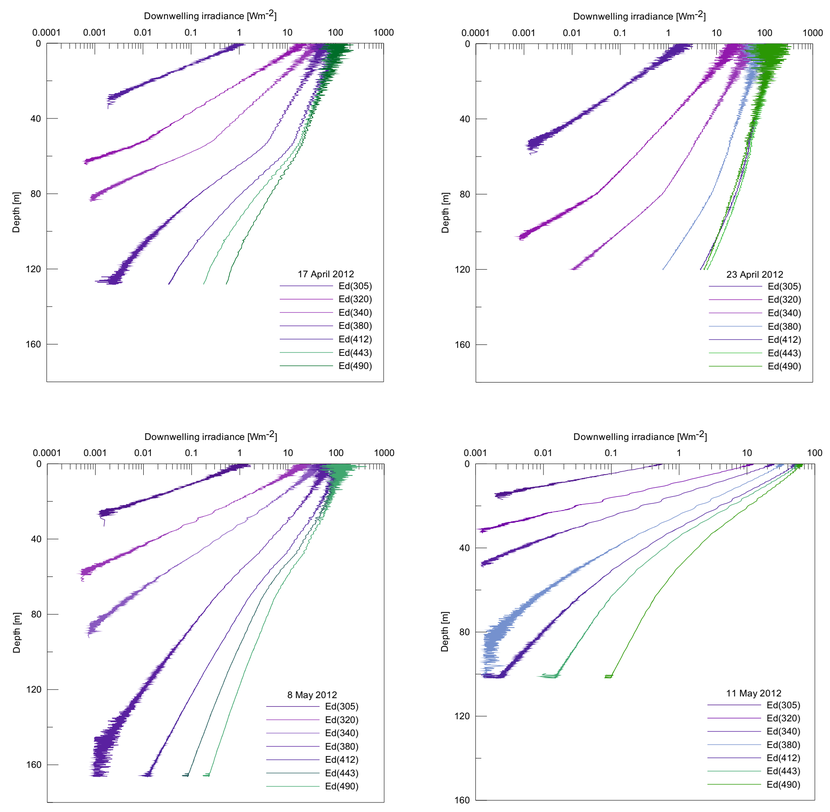

Fig. 5 Depth profiles of downwelling spectral irradiance in the function of depth in 7 spectral channels: 305, 320, 340, 380, 412, 443 and 490 on selected stations of the ANT-XXVII/5 cruise.

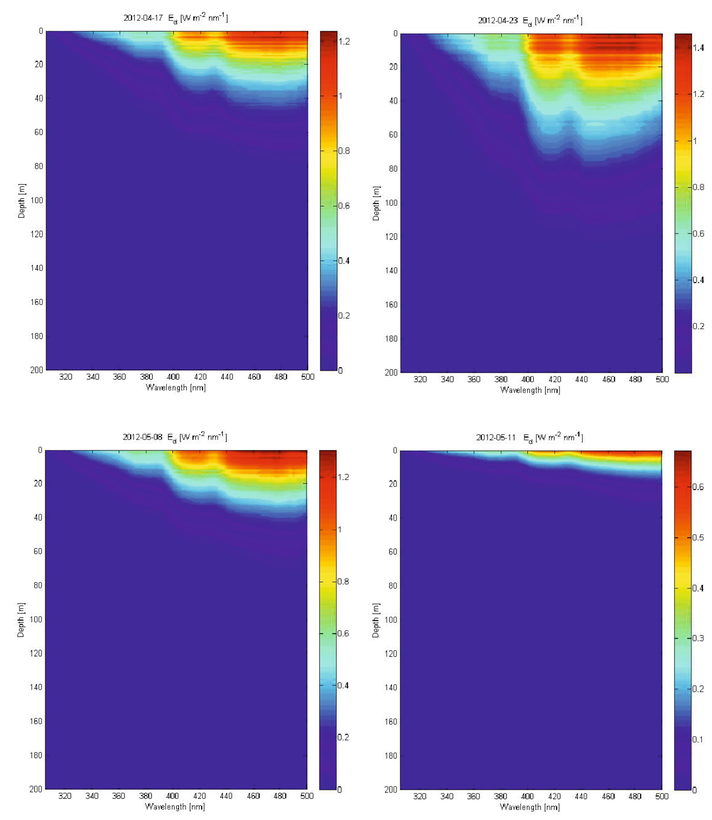

Fig. 6 Underwater light field on selected stations of the ANT-XXVII/5 cruise.

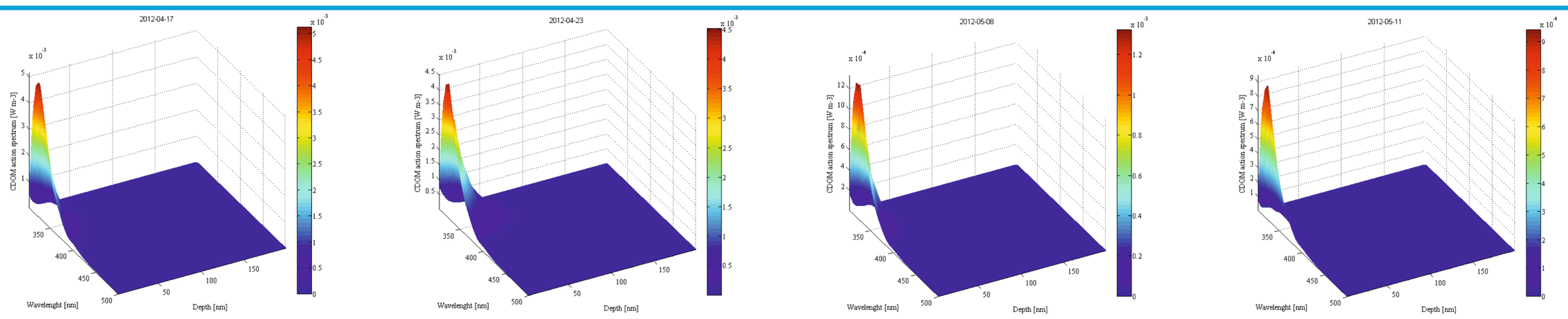

Fig. 7 CDOM absorption action spectra on selected stations during the ANT-XXVIII/5 cruise.

Acknowledgements: This study was supported by FP7 Project EUROFLEETS grant agreement no. 228344 and the research grant no. 546/N-AMT-CDOM/2009/0 awarded to **PK** by the Polish Ministry of Science and Higher Education. **SS** was supported by the research project N N306 141038 funded by the Polish National Science Centre. **MD** and **MZ** was supported by the SatBałtyk project funded by the European Union through the European Regional Development Fund, (contract No. POIG.01.01.02-22-011/09 entitled 'The Satellite Monitoring of the Baltic Sea Environment').