Geophysical Research Abstracts
Vol. 20, EGU2018-7650, 2018
EGU General Assembly 2018

In situ-observations of environmental conditions during the 2015 cyanobacteria bloom in the Northern Baltic Sea

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Detection of Harmful Algal Blooms (HAB) and understanding factors causing HABs are important to decrease societal risks (e.g. human health, economics of aquaculture), for ecological purposes and to answer policy requirements such as the Marine Strategy Framework Directive.

Phytoplankton blooms can be detected by a variety of observation methods including remote sensing and direct in-situ measurements. Traditionally phytoplankton is monitored by collecting water samples and analyzing them manually using microscopy. Since end of 20th century automated measurements of the phytoplankton has progressed and they are frequently integrated in Ferrybox (FB) systems, providing information along the periodic ferries routes.

Our work focuses on cyanobacterial HAB observed in the Baltic Sea in 2015 with objective to investigate influence of associated environmental conditions on blooms. We utilize the following observations: i) spatio-temporal hydrographic and chlorophyll-a and phycocyanin fluorescence data from ferry M/S Silja Serenade (part of the Baltic Sea Alg@line network) operating on the route Helsinki-Mariehamn-Stockholm; ii) fixed point data acquired on Utö Atmospheric and Marine Research Station located at the outer edge of the Archipelago Sea, Baltic Sea towards the Baltic Sea Proper, with additional supporting meteorological data from the marine meteorological stations along the ship route. Silja Senerade and Utö station belong to JERICO-RI Research Infrastructure and the Finnish Marine Research Infrastructure FINMARI.

To study the relations between biology and physics parameter we mainly apply the wavelets analysis, including the wavelet coherence transform, to each data transect, or route of the ferry. As a result we observe the timing and location of the most energetic signals of the observed frequencies (in power density spectrum) and coherence and the relations.