



Extension of the vegetation period of phytoplankton in the western Baltic Sea – response to climate change

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Phenology is a world-wide phenomenon related to climate change. Phenology of phytoplankton was investigated at a coastal station in the western Baltic Sea from 1989 to 2017 by means of microscopically determined biomass and chlorophyll a (chl_a) data. The prolongation of the vegetation period in this marine area is much stronger than that known from terrestrial areas. The vegetation period, defined by biomass and chl_a thresholds, increased by 126 or 128 days respectively within the 29-years period and extends recently from February to December. The spring bloom starts earlier with a rate of 1.4 days/year and the end of the autumn bloom delays with 3.1 days/year. The earlier start of the vegetation period is correlated with a slight increase in sunshine duration during spring whereas the later end of the vegetation period is correlated with a strong increase in water temperature in autumn. The period with sea surface temperature (SST) > 10°C shifts towards the end of November. Correlations of the duration of the vegetation period with the phosphate and nitrate concentrations are probably not causative. The shifts in the spring and autumn blooms lead to a prolongation of the summer biomass minimum. The earlier spring bloom is, besides others, caused by the shift of the biomass maximum of the dominant diatom *Skeletonema marinoi* from May to February/March. The delay in the autumn bloom is induced by a retardation of dominant dinoflagellates and diatoms, such as *Ceratium* spp. and *Dactyliosolen fragilissimus*.