Abiotic and biotic control of phytoplankton development in dynamic side-arms of the River Danube

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With 6 figures and 3 tables in the text

Abstract: Phytoplankton diversity was studied in a floodplain section of the River Danube over one seasonal cycle. In addition to seasonal patterns, changes in phytoplankton community structure were mainly controlled by water age in the side-arm, in that short residence times during flood events had direct impacts on algal cells through dilution and flushing. Moreover, the inflow of species-poor river water, which mainly contained diatoms, resulted in low phytoplankton diversity. During intermediate retention times and phases of isolation various biotic and environmental variables that correlate significantly with water age determined species richness: at intermediate water age zooplankton biomass increased, coinciding with a substantial grazing pressure on easily-edible algal species. These biotic interactions may prevent interspecific competition among the phytoplankton and therefore favour diversity. During isolation phases nutrient concentrations decreased, whereas the ratio of Si to P tended to increase. This favoured the development of diatoms, which dominated the phytoplankton community at high water ages and led to low diversity. Only during winter, which is characterized by low water levels, did the overwhelming effect of temperature influence blooms of centric diatoms and lead to low diversity, independent of water age.

Key words: floodplain, hydrology, water age, phytoplankton diversity.

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