Geophysical Research Abstracts
Vol. 21, EGU2019-12746, 2019
EGU General Assembly 2019


# Carbon cycling in different aquatic compartments of the Danube Delta

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The Danube delta, at the border of the Black Sea in Romania, is Europe's second largest river delta. It is a heterogeneous assemblage of shallow lakes, channels and main river branches surrounded by vast wetland areas. Such systems have the potential to release large amounts of greenhouse gases to the atmosphere. However, estimating $CO_2$ and $CH_4$ emissions from the delta's freshwater systems and identifying the controlling processes is challenging due to the delta's spatial complexity and seasonal dynamics.

To disentangle the Deltas complex carbon cycling, we monitored $CO_2$ and $CH_4$ concentrations and fluxes, together with other biogeochemical parameters of interest. Our two-year monitoring had a monthly time resolution and covered 19 sampling stations in different aquatic systems (main river branches, channels, lakes). We complemented the study by spatially resolved measurements of dissolved gases using a portable Membrane inlet mass spectrometer in spring and autumn 2017.

Our data revealed a strong seasonal variability of dissolved gas concentrations (10 to 21000 $\mu$atm $CO_2$ and 20 to 5000 $\mu$atm $CH_4$) with maxima in summer and minima in winter. The aquatic compartments showed characteristic differences, which could be attributed to varying dominance of controlling processes. High-resolution data indicated that wetland hydrology controlled the emergence of "emission hot spots" in small channels, which contributed disproportionally to the overall greenhouse gas emissions of the delta.