Geophysical Research Abstracts
Vol. 16, EGU2014-11976, 2014
EGU General Assembly 2014

Air-water greenhouse gases exchange in two coastal systems in Cadiz Bay (SW Spain)

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Coastal areas are subject to a great anthropogenic pressure because more than half of the world's population lives in its vicinity, causing organic matter inputs, which intensifies greenhouse gas emissions into the atmosphere. Water surface greenhouse gas concentrations (CH4 and N2O) have been estimated in two aquatic systems of Cadiz Bay Natural Park: Rio San Pedro Creek and Sancti Petri Channel
Water renewal in Rio San Pedro Creek is tidally controlled. Due to its little freshwater input, the Creek is essentially a marine system. Several fish farms are distributed on its banks discharging effluents without previous treatment. Nine sampling stations are distributed along this system 12 Km length. Sancti Petri Channel is a flow channel-ebb tides extending from the inner Cadiz Bay to the Atlantic Ocean along 17 Km. Organic matter pollution sources in this environment are straggly. There exist anthropogenic inputs such as aquaculture effluents and sewage discharges coming through the Iro River, which flows into the Channel central part. In addition there are natural organic matter inputs from surrounding marshes. It has been established 11 sampling stations crossing this system.
Sampling was conducted seasonally during 2013. CH4 and N2O concentrations were obtained though a gas chromatograph connected to an equilibration system.
Greenhouse gas values vary between 24 and 295 nM and 16 and 27 nM for CH4 and N2O, respectively. Gas concentrations increase close to the fish farm effluent in Rio San Pedro Creek, and next to Iro River's mouth in Sancti Petri tidal Channel. Both environments act as greenhouse gas sources into the atmosphere, showing seasonal variations. It has been estimated mean fluxes of 75.3 μmol m-2 d-1 of CH4 and 31.9 μmol m-2 d-1 of N2O for both systems.