Geophysical Research Abstracts
Vol. 20, EGU2018-14422, 2018
EGU General Assembly 2018


# $N_2O$ budget related to the prevalence of agricultural landscape in Mediterranean reservoirs

Elizabeth León-Palmero, Rafael Morales-Baquero, and Isabel Reche
Universidad de Granada, Ecology Department and Instituto del Agua, Granada, Spain (eleonpalmero@ugr.es)

Human population growth has increased the need of water and energy promoting the construction of reservoirs for irrigation, consumption and hydroelectricity. However, there is an increasing concern about the magnitude of the greenhouse gas emissions from reservoirs. The emissions of $CH_4$ and $CO_2$, especially from tropical and boreal latitudes, have been explored, but our knowledge on the $N_2O$ budget is very limited particularly in the Mediterranean region where the presence and construction of reservoirs is preponderant. In this study, we determined $N_2O$ fluxes and water column concentration in twelve reservoirs located in the Mediterranean region during the stratification and mixing periods. The study reservoirs have a variable agricultural and forestry coverage in their watersheds. The fluxes were measured using a PICARRO Cavity Ring-Down Spectroscopy (CRDS) analyzer coupled to a floating chamber and water column concentrations with gas chromatography. Landscapes properties as agricultural and forestry areas were analyzed using GIS to connect the terrestrial and the aquatic systems. $N_2O$ fluxes ranged from -5.50 to 128.54 $\mu$mol $m^{-2}$ $d^{-1}$ during the stratification period and from -8.50 to 11.19 $\mu$mol $m^{-2}$ $d^{-1}$ during the mixing period. Water column $N_2O$ saturation varied from 37 to 24174 % during the stratification and from 91 to 392 % during the mixing period. We observed that for watersheds with forestry areas larger than 40% the $N_2O$ emissions are reduced drastically becoming $N_2O$ sinks. In addition, the ratio agricultural to forestry area in the watershed explained 27% of the $N_2O$ flux variance. Although, this explained variance improved up to 73% when only the stratification period is considered. This result suggests an important impact of agriculture coverage in the watershed on the $N_2O$ emissions. We suggest that these results can be relevant for reservoir management, especially considering future plans of increasing the number of reservoirs worldwide.