ID: W2616108284

TITLE: Constraints on global oceanic emissions of N₂O from observations and models

AUTHOR: ['Erik T. Buitenhuis', 'Parvadha Suntharalingam', 'Corinne Le Quéré']

ABSTRACT:

Abstract. We estimate the global ocean N2O flux to the atmosphere and its confidence interval using a statistical method based on model perturbation simulations and their fit to a database of ?pN2O (n = 6136). We evaluate two submodels of N2O production. The first submodel splits N2O production into oxic and hypoxic pathways following previous publications. The second submodel explicitly represents the redox transformations of N that lead to N2O production (nitrification and hypoxic denitrification) and N2O consumption (suboxic denitrification), and is presented here for the first time. We perturb both submodels by modifying the key parameters of the N2O cycling pathways (nitrification rates; NH4+ uptake; N2O yields under oxic, hypoxic and suboxic conditions) and determine a set of optimal model parameters by minimisation of a cost function against four databases of N cycle observations. Our estimate of the global oceanic N2O flux resulting from this cost function minimisation derived from observed and model ?pN2O concentrations is 2.4 ± 0.8 and 2.5 ± 0.8 Tg N yr?1 for the two N2O submodels. These estimates suggest that the currently available observational data of surface ?pN2O constrain the global N2O flux to a narrower range relative to the large range of results presented in the latest IPCC report.

SOURCE: Biogeosciences

PDF URL: https://www.biogeosciences.net/15/2161/2018/bg-15-2161-2018.pdf

CITED BY COUNT: 40

PUBLICATION YEAR: 2018

TYPE: article

CONCEPTS: ['Denitrification', 'Nitrification', 'Environmental science', 'Flux (metallurgy)', 'Nitrogen', 'Atmospheric sciences', 'Chemistry', 'Physics', 'Organic chemistry']