



Estimates of oceanic nitrous-oxide emissions for the 1980-2015 period

Parvatha Suntharalingam and Erik Buitenhuis

University of East Anglia, School of Environmental Sciences, Norwich, United Kingdom (p.suntharalingam@uea.ac.uk)

The greenhouse gas nitrous-oxide (N₂O) is produced in the marine environment by nitrification and denitrification processes during the cycling of organic matter. The ocean currently provides about a third of the natural sources of N₂O to the atmosphere. In this analysis we present estimates of oceanic N₂O fluxes for recent decades (period 1980-2015) derived from a global ocean biogeochemistry model (NEMO-PlankTOM). We evaluate the sensitivity of model flux estimates to two alternative parameterizations of the oceanic N₂O production pathways. Specifically, we contrast empirically derived parameterizations (based on observed oceanic Excess N₂O/AOU correlations) with a newly-developed methodology which explicitly represents the primary nitrogen cycle pathways of N₂O production (nitrification and hypoxic denitrification) and N₂O consumption (suboxic denitrification). For this latter approach, we have optimized model process parameters using data on nitrification rates and oceanic distributions of ammonium and surface and water-column N₂O.