ECV IN BRIEF

Domain: Ocean
Subdomain: Biogeochemical
Scientific Area: Carbon Cycle and other GHGs
Products: Interior ocean N_2O;
N_2O air-sea flux

Nitrous Oxide

Nitrous oxide (N_2O) is an important climate-relevant trace gas in the Earth's atmosphere. In the troposphere it acts as a strong greenhouse gas and in the stratosphere it acts as an ozone depleting substance because it is the precursor of ozone depleting nitric oxide radicals. The ocean - including its coastal areas such as continental shelves, estuaries and upwelling areas - contribute about 30% to the atmospheric N_2O budget.

ECV Product[1]

PRODUCT	DEFINITION	REQUIREMENTS				
		FREQUENCY	RESOLUTION	REQUIRED MEASUREMENT UNCERTAINTY	STABILITY	STANDARDS/ REFERENCES
INTERIOR OCEAN N_2O	**Concentration of N2O gas in the water column** [nmol kg^{-1}]	Annual to decadal	Every 20°	discrete samples: ~±5%;	Not specified	See EOV Specification Sheets: www.goosocean.org/eov
N_2O AIR-SEA FLUX	**Amount of N_2O per area per year [µmol m^{-2} yr^{-1}]**	Annual to decadal	Every 20°	cont. sampling: <±1%	Not specified	www.goosocean.org/eov

Data Sources[2]

- MarinE MethanE and NiTrous Oxide (MEMENTO) database
  https://memento.geomar.de

[1] Current Products and Requirements as in the Implementation Plan 2016 (GCOS-200). GCOS is reviewing and will update the requirements until 2022. More information on: gcos.wmo.int and climatedata.wmo.int.

[2] This list provides sources for openly accessible data sets with worldwide coverage for which metadata is available. It is curated by the respective GCOS ECV Steward(s). The list does not claim to be complete. Anyone with a suitable dataset who would like it to be added to this list should contact GCOS.

N_2O concentration and flux in the ocean

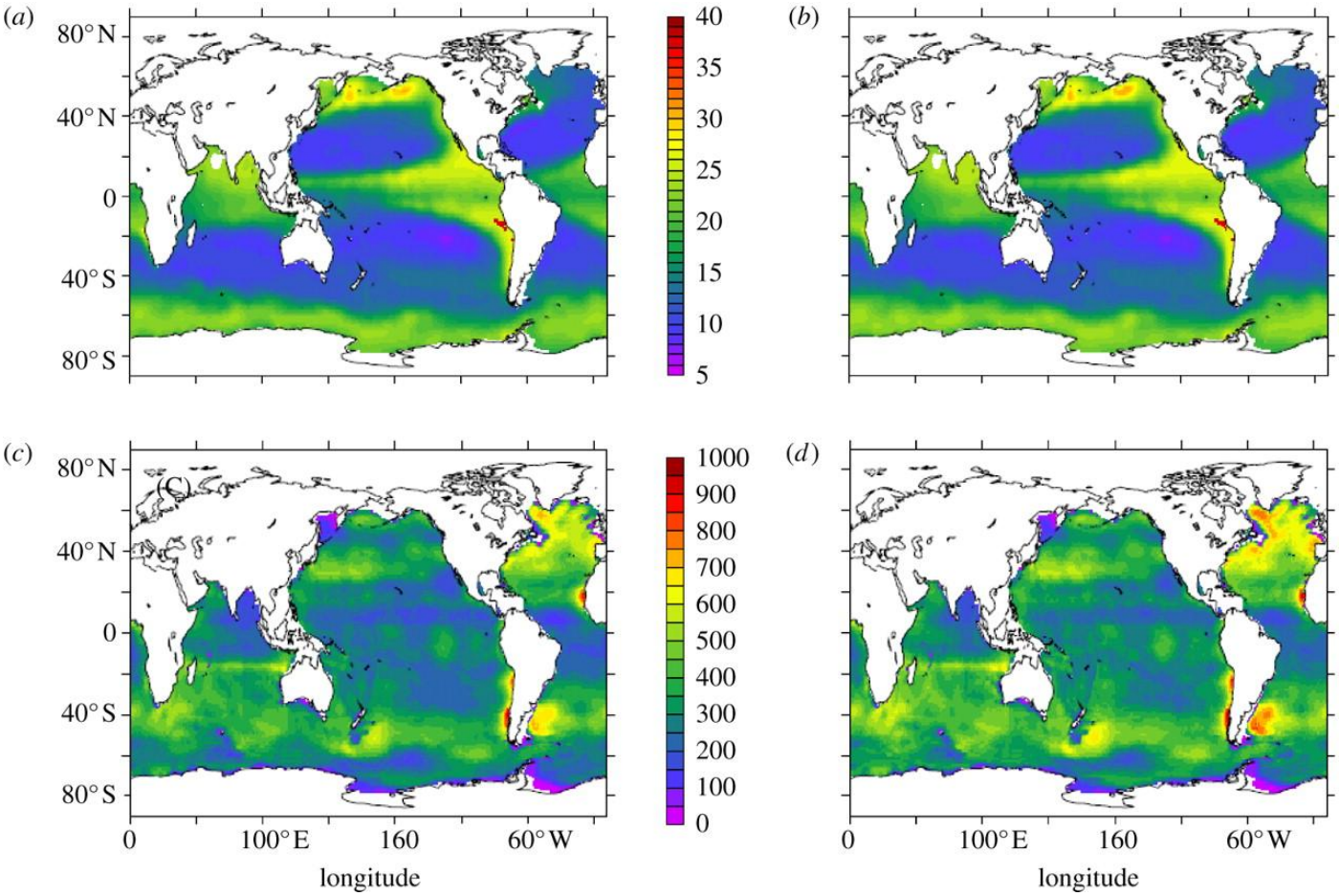

Figure: Global N2O (nmol kg–1) distribution in 200 m depth estimated using depth/AOUR-depending N2O production rates (a) and using temperature/AOUR-depending N2O production rates (AOUR = apparent oxygen uitilization rate) (b). (a,b) White areas in the Arabian Sea represent concentrations exceeding 40 nmol kg–1. Annual N2O production (µmol m–2 yr–1) via nitrification integrated over the water column estimated using (c) depth/AOUR relationship and (d) temperature/AOUR relationship.

Reference: Freing, A., Wallace, D. W. R., and Bange, H. W. (2012): Global oceanic production of nitrous oxide, Philosophical Transactions of the Royal Society B-Biological Sciences, 367, 1245-1255, 10.1098/rstb.2011.0360.