

GLOBAL N CYCLE: FLUXES AND N₂O MIXING RATIOS ORIGINATING FROM HUMAN ACTIVITY

Summary:

Nitrogen is a major nutrient in terrestrial ecosystems and an important catalyst in tropospheric photochemistry. Over the last century human activities have dramatically increased inputs of reactive nitrogen (Nr, the combination of oxidized, reduced and organically bound nitrogen) to the Earth system. Nitrogen cycle perturbations have compromised air quality and human health, acidified ecosystems, and degraded and eutrophied lakes and coastal estuaries [Vitousek et al., 1997a, 1997b; Rabalais, 2002; Howarth et al., 2003; Townsend et al., 2003; Galloway et al., 2004].

To begin to quantify the changes to the global N cycle, we have assembled key flux data and N₂O mixing ratios from various sources. The data assembled from different sources include fertilizer production from 1920-2004; manure production from 1860-2004; crop N fixation estimated for three time points, 1860, 1900, 1995; tropospheric N₂O mixing ratios from ice core and firn measurements; and tropospheric concentrations to cover the time period 1756-2004. The changing N₂O concentrations provide an independent index of changes to the global N cycle in much the same way that changing carbon dioxide concentrations provide an important constraint on the global carbon cycle. The changes to the global N cycle are driven by industrialization, as indicated by fossil fuel NO_x emission, and by the intensification of agriculture, as indicated by fertilizer and manure production and crop N₂ fixation.

The data set and the science it reflects are by nature interdisciplinary. Making the data set available through the ORNL DAAC is an attempt to make the data set available to the considerable interdisciplinary community studying the N cycle.

Data Citation:

Cite this data set as follows:

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More information can be found at

ftp://daac.ornl.gov/data/global_climate/global_N_cycle/comp/global_N_perturbations.pdf.

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Data Format

Data Access:

This data is available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC) or the EOS Data Gateway.

Data Archive Center:

Contact for Data Center Access Information:

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Product Availability:

Requested data can be provided electronically on the ORNL DAAC's anonymous FTP site or on CD-ROM or DVD.

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