N

N-cycle at the Ocean Atmosphere Interface

J. Martinez-Rey
Alessandro Tagliabue
Marion Gehlen
Laurent Bopp

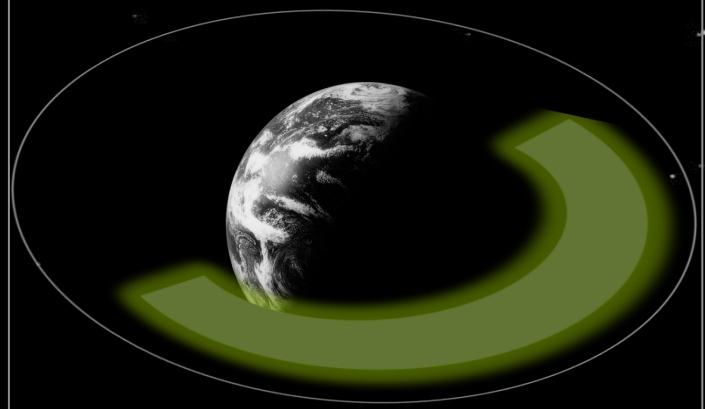
Laboratoire des Sciences du Climat et de l'Environnement

Nicolas Gruber

Institute of Biogeochemistry & Pollutant Dynamics
ETH Zurich, Switzerland

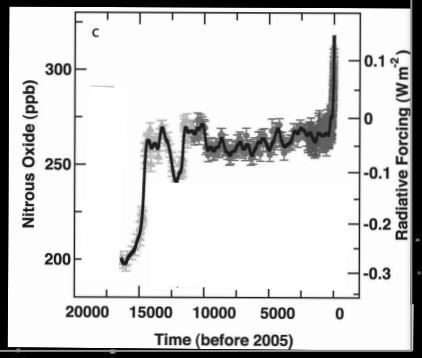
Greencycles II
Marie Curie Actions

N_2O GREENHOUSE GAS



3rd
radiative Forcing

18%
increase since 1850



IPCC Report, 2007

N_2O OZONE DEPLETION

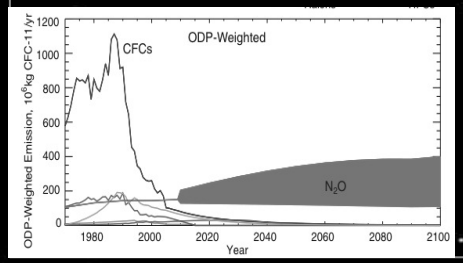
1st

O_3 depletion emission in the XXIst century

114 yr

of residence time in the atmosphere

Ravishankara et al., 2009



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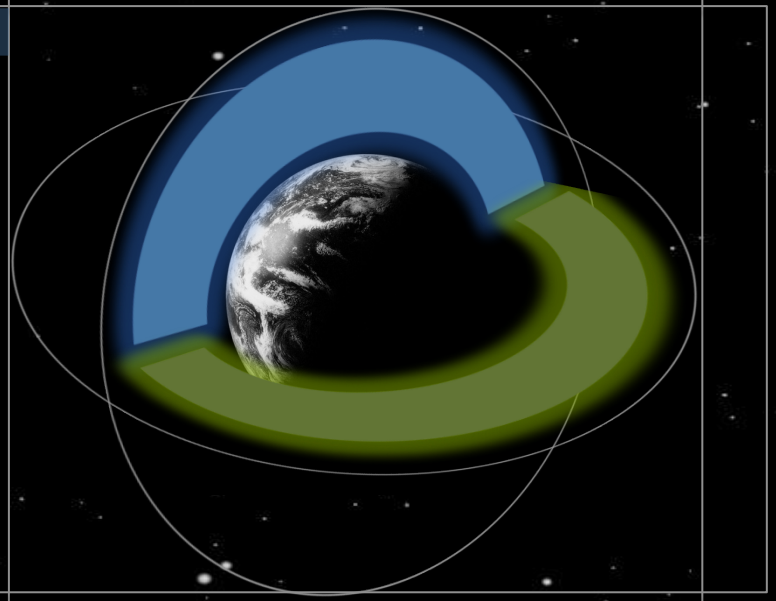

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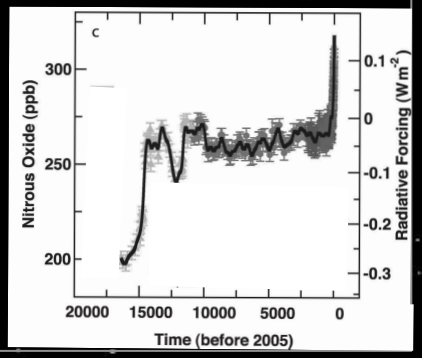
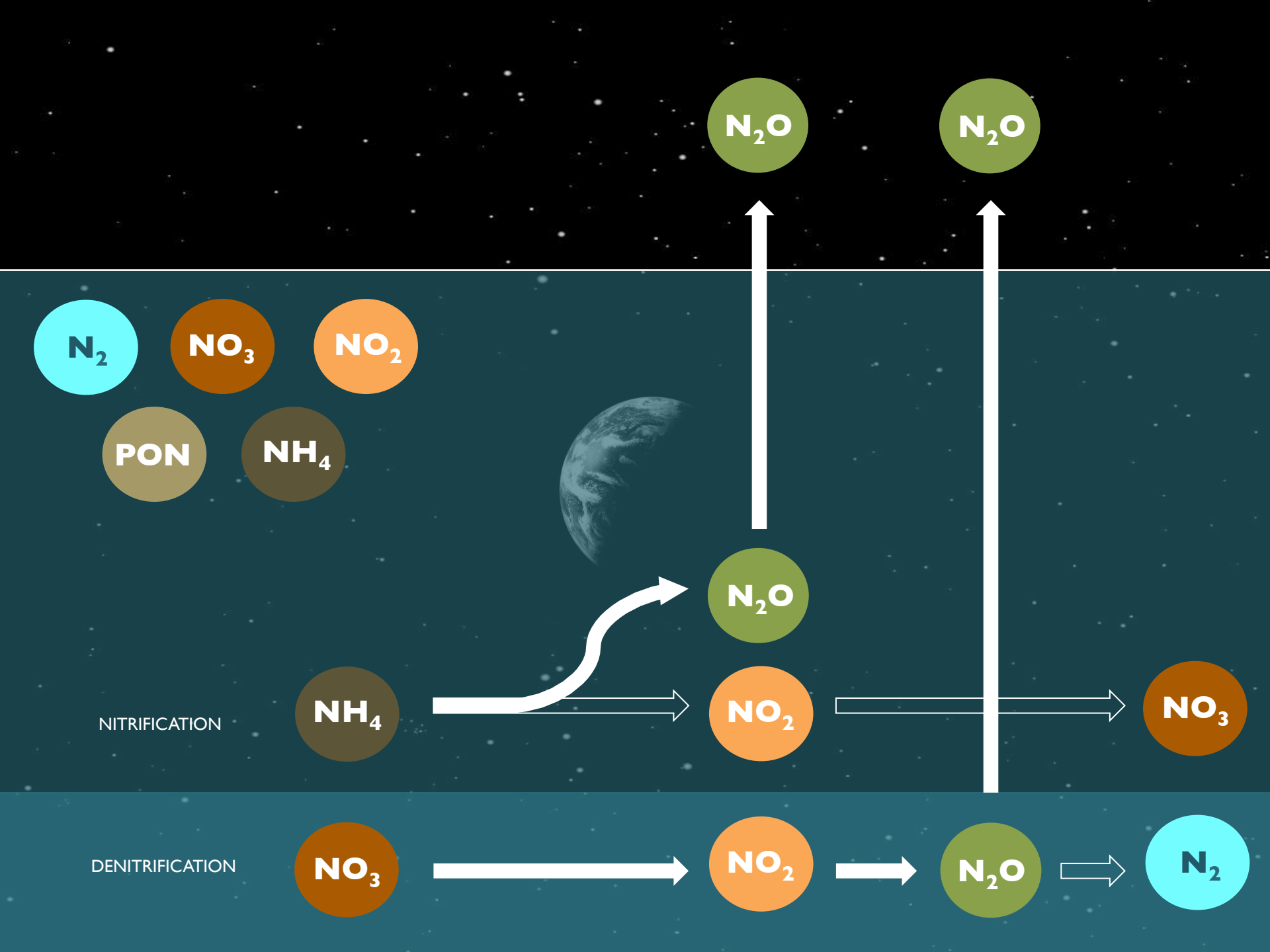
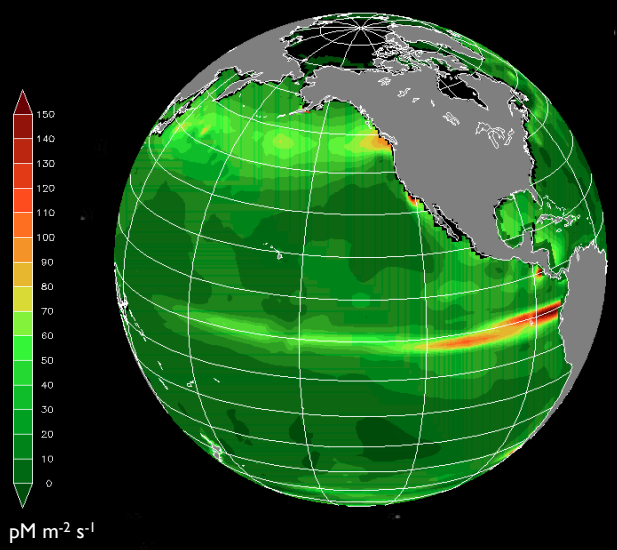


IPCC Report, 2007


N_2O
N_2O
N_2
NO_3
NO_2
PON
NH_4
N_2O
NITRIFICATION
NH_4
NO_2
NO_3
DENITRIFICATION
NO_3
NO_2
N_2O
N_2

N_2O Sea-to-air flux

Nevison et al., 2003



Sources of N_2O		Tg N/yr
Anthropogenic		6.7
Natural		11.0
Soils	6.6 ± 3.3	
Ocean	**3.8 ± 2.0**	
Atmospheric	0.6 ± 0.4	
	Total	**17.7**

N_2O Sea-to-air flux

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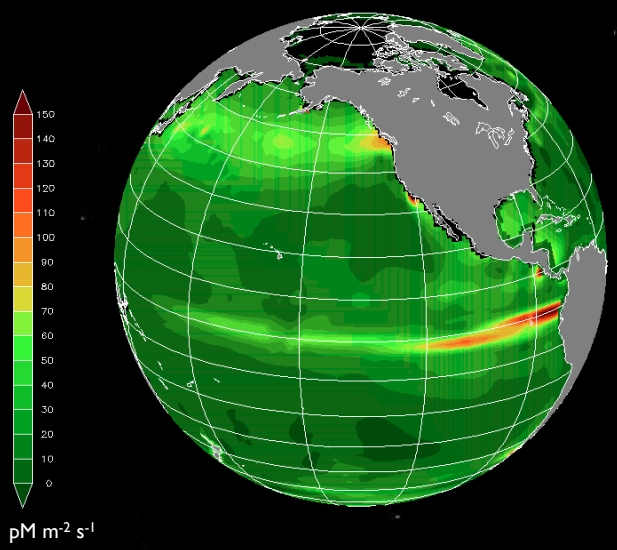

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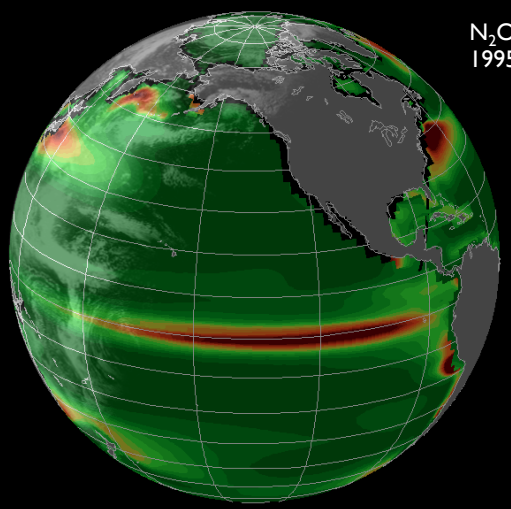
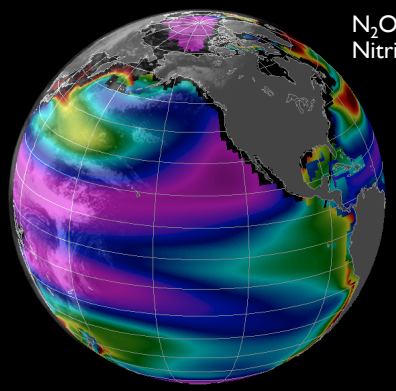
N.A. on CMIP5

NEMO-PISCES_3.2





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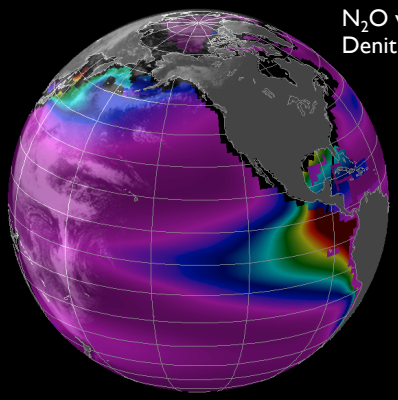
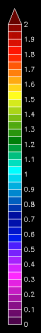




Production in High-O_2

70%

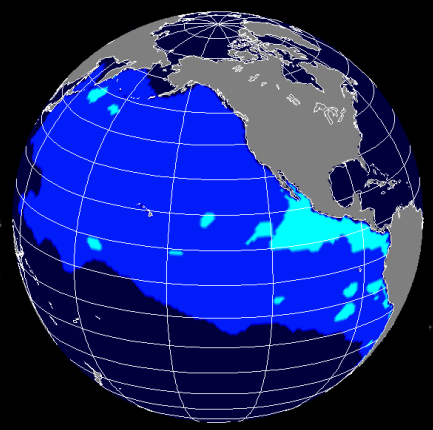
Production in Low-O_2

30%

O_2 Dissolved Oxygen

CMIP5

Bianchi et al., 2012



Hypoxia
< 60 uM

Suboxia
< 5 uM

World Ocean Atlas 2005*

80.9
1.9

Volume
(10^{15} km^3)
LOW LAT, Z < 2k

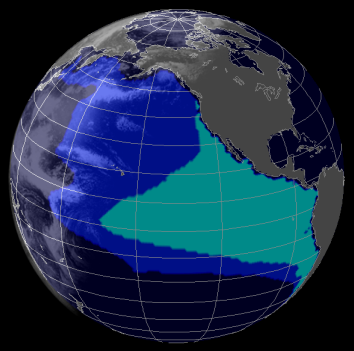
CMIP5 Models

IPSL – LR

31.8
0.3

HadGEM2

24.7
0.3



MPI - ESM

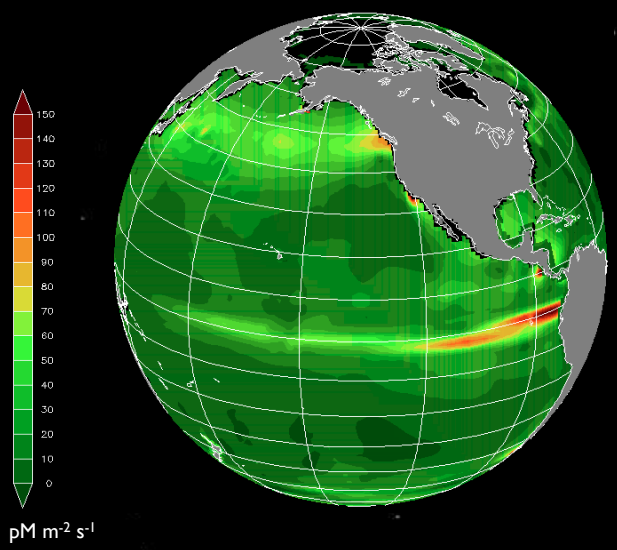
117.8
50.4

NOAA – GFDL

105.0
32.0

N_2O Sea-to-air flux

Nevison et al., 2003



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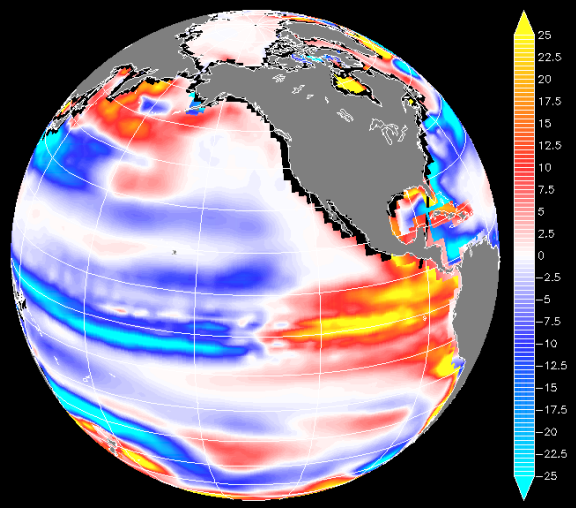
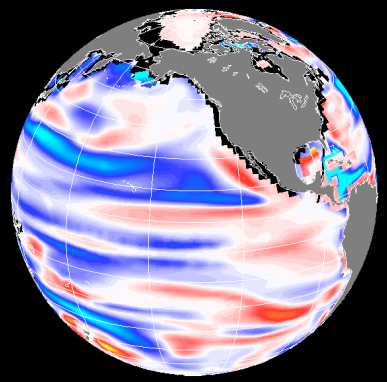
NEMO-PISCES_3.2
RCP8.5 Scenario (2100 – 2005)



ΔN_2O Flux

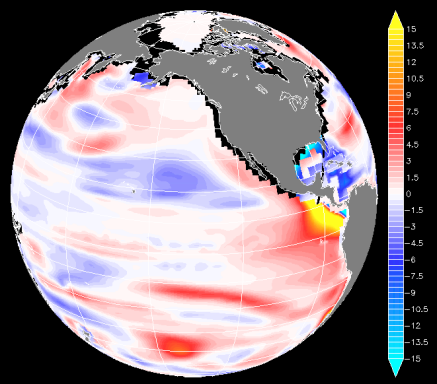
- 6 %



ΔN_2O via Nitrification

- 8 %

Production in High-O_2



ΔN_2O via Denitrification

+ 15 %

Production in Low-O_2


THANK
YOU
CCCP