PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B BIOLOGICAL SCIENCES

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Nitrous oxide: the forgotten greenhouse gas

Organised and edited by AJ Thomson, E Baggs and DJ Richardson

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Nitrous oxide (N_2O) is a powerful atmospheric greenhouse gas and cause of ozone-layer depletion. Global emissions continue to rise; more than two thirds of these emissions arise from bacterial and fungal denitrification and nitrification processes in soils, largely as a result of the application of nitrogenous fertilisers.

This issue derives from an interdisciplinary meeting held at the Kavli Royal Society International Centre in May 2011, and comprises 11 articles, plus an introduction and summary.

The introduction provides a background to the nature of the problem, and discusses the biological sources and sinks of N_2O in oceans, soils and wastewaters, as well as the fate of the gas in the atmosphere. More widely, genetic regulation and molecular details of the enzymes involved are described and techniques for determining global and local N_2O budgets are presented.

The conclusions are drawn together in a discussion of strategies for mitigating N_2O emissions, under three headings: managing soil chemistry and microbiology; engineering crop plants to fix nitrogen; and sustainable agricultural intensification.

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