



Soil Emission of Nitrous Oxide and its Mitigation

By David Ussiri, Rattan Lal

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Nitrous oxide gas is a long-lived relatively active greenhouse gas (GHG) with an atmospheric lifetime of approximately 120 years, and heat trapping effects about 310 times more powerful than carbon dioxide per molecule basis. It contributes about 6% of observed global warming. Nitrous oxide is not only a potent GHG, but it also plays a significant role in the depletion of stratospheric ozone. This book describes the anthropogenic sources of N₂O with major emphasis on agricultural activities. It summarizes an overview of global cycling of N and the role of nitrous oxide on global warming and ozone depletion, and then focus on major source, soil borne nitrous oxide emissions. The spatial-temporal variation of soil nitrous oxide fluxes and underlying biogeochemical processes are described, as well as approaches to quantify fluxes of N₂O from soils. Mitigation strategies to reduce the emissions, especially from agricultural soils, and fertilizer nitrogen sources are described in detail in the latter part of the book.

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Editorial Review

From the Back Cover

This book offers a clear and concise analysis of the global budget of nitrous oxide and the factors controlling its emission. It also describes the anthropogenic sources of nitrous oxide with major emphasis on agricultural activities. Anthropogenic activities have more than doubled the availability of reactive nitrogen in the biosphere, primarily through agricultural activities. Increasing nitrogen availability is producing unintended environmental consequences, including enhanced nitrous oxide emissions. Nitrous oxide gas is a long-lived radiatively active greenhouse gas (GHG) with an atmospheric lifetime of approximately 120 years, and heat trapping effects about 310 times more powerful than carbon dioxide on a per molecule basis. Nitrous oxide is not only a potent GHG, but it also plays a significant role in the depletion of stratospheric ozone. This book offers an extensive look at mitigation techniques to reduce emissions from agricultural soils and fertilizer nitrogen sources.

The global nitrogen cycle and role of enhanced reactive nitrogen in nitrous oxide emission is discussed. The Present and the future of enhanced nitrous oxide emissions on climate change and ozone depletion is outlined. The majority of the book focuses on soil borne nitrous oxide emissions. The spatial-temporal variation of soil nitrous oxide fluxes and underlying biogeochemical processes are described, as well as approaches to quantify fluxes from soils. Global nitrous oxide budget estimation based on various techniques and the associated uncertainties are outlined with the emphasis on research need to provide data for modeling. Mitigation strategies to reduce the emissions, especially from agricultural soils and fertilizer nitrogen sources are described in detail in the later part of the book.

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