

Kuehnast Lecture Series

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GLOBAL NITROGEN CYCLING:
ACCELERATION AND
CONSEQUENCES

Dr. Elisabeth A Holland

Scientist II

**Atmospheric Chemistry Division
National Center for Atmospheric Research
Boulder, CO**

The Earth's nitrogen cycle has been perturbed by widespread combustion of fossil fuels, crop nitrogen fixation, expansion of agriculture and fertilizer production. Fossil fuel combustion releases oxidized reactive nitrogen (nitric oxide with a small component of nitrous oxide), thereby enhancing N and acidic deposition globally and substantially increasing global surface ozone concentrations. Coincidentally the expansion of agriculture and animal husbandry required to support growing human populations has resulted in widespread release of ammonia, nitric and nitrous oxide, and contamination of the Earth's limited freshwater resources and coastal oceans. The resulting N deposition is fertilizing the Earth's biosphere, generating yet another perturbation to the global carbon cycle. We examine the consequences of the N perturbation with an in-depth look at the changes in the spatial and temporal distribution of reactive N deposition from both available data and model simulations, the influence of N deposition and land use on carbon cycling of terrestrial and oceanic ecosystems, and the contribution of the accelerated release of oxidized N to tropospheric ozone formation. We also examine the contribution of current and projected increases in nitrous oxide production to stratospheric ozone depletion against a background of declining CFC production resulting from the implementation of the Montreal Protocol. Acceleration of the global N cycle will continue to influence the sustainability of the biosphere through its influence on the chemistry and biology of all of the components of the Earth system.

WELCOME MARK SEELEY
PROFESSOR AND EXTENSION CLIMATOLOGIST
DEPARTMENT OF SOIL, WATER, & CLIMATE

FAMILY INTRODUCTIONS KAYLEE KUEHNAST
WALDORF COLLEGE, IA

INTRODUCTION OF SPEAKER KEN DAVIS
ASSISTANT PROFESSOR
DEPARTMENT OF SOIL, WATER, & CLIMATE

KEYNOTE SPEAKER DR. ELISABETH A. HOLLAND
