

Effect of fertilizer use and N deposition on global terrestrial nitrogen cycling in 1960-2010

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Human activities have considerably disturbed terrestrial nitrogen cycling especially after the industrial revolution. Because Haber-Bosch techniques and fossil fuel combustions have been large sources of reactive nitrogen to the terrestrial ecosystems. The recent N loading derived from these sources on terrestrial ecosystems was estimated 2 times higher than biogenic N fixation in terrestrial ecosystems (Gruber et al., 2009). In this study, we evaluated N fertilizer and N deposition on global terrestrial N cycling using ecosystem model 'VISIT' and global datasets. For the cropland, we made spatial temporal explicit N fertilizer input data (as NH₄⁺ and NO₃⁻ respectively) made by FAO statistics, historical land-use dataset and global crop calendar in SAGE dataset. For N deposition, we used global grid data from Galloway et al. (2004) with simple interpolation in time-series. From the simulation results, we evaluated historical N cycling changes by land-use changes and N depositions in N cycling (e.g., N leaching, N₂O, NO) at global scale.

Keywords: N fertilizer, N deposition, N₂O, Land use change, N leaching