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Direct N_2O emissions from rice paddy fields: summary of available data

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Rice cultivation is an important anthropogenic source of atmospheric nitrous oxide (N_2O) and methane. We compiled and analyzed data on N_2O emissions from rice fields (113 measurements from 17 sites) reported in peer-reviewed journals. Mean N_2O emission $\pm$ standard deviation and mean fertilizer-induced emission factor during the rice-cropping season were, respectively, 341 $\pm$ 474 g N ha^{-1} $season^{-1}$ and 0.22 $\pm$ 0.24% for fertilized fields continuously flooded, 993 $\pm$ 1075 g N ha^{-1} $season^{-1}$ and 0.37 $\pm$ 0.35% for fertilized fields with midseason drainage, and 667 $\pm$ 885 g N ha^{-1} $season^{-1}$ and 0.31 $\pm$ 0.31% for all water regimes. The estimated whole-year background emission was 1820 g N ha^{-1} yr^{-1}. A large uncertainty remains, especially for background emission because of limited data availability. Although midseason drainage generally reduces CH_4 and increases N_2O emissions, it may be an effective option for mitigating the net global warming potential of rice fields.