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Uncertainty of Global Ammonia Emissions from Global Agricultural Production Systems

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We present an uncertainty analysis of NH_3 emissions from agricultural production systems based on a global NH_3 emission inventory with a 5 by 5 minute resolution. The uncertainty range for the global NH_3 emission from agricultural systems is 27-38 Tg NH_3-N yr^{-1}, N fertilizer use contributing 10-12 Tg yr^{-1} and livestock production 16-27 Tg yr^{-1}. Most of the emissions from livestock production come from animal houses and storage systems (31-55%); smaller contributions come from the spreading of animal manure (23-38%) and grazing animals (17-37%). The most important determinants of the uncertainty related to the global agricultural NH_3 emission comprise four parameters (N excretion rates, NH_3 emission rates for manure in animal houses and storage, the fraction of the time that ruminants graze and the fraction of non-agricultural use of manure) specific to mixed and landless systems, and total animal stocks. N excretion rates and NH_3 emission rates from animal houses and storage systems are the most important parameters in most parts of the world. Input parameters for pastoral systems are less relevant. However, there are clear differences between world regions and individual countries, reflecting the differences in livestock production systems. This uncertainty analysis thus shows which input parameters will require further research to improve NH_3 emission inventories on different scales.