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Biosphere-atmosphere-exchange of C and N trace gases and microbial N turnover processes in irrigated agricultural systems of the Aral Sea Basin, Uzbekistan

Land use and agricultural practices affect the soil microbial carbon (C) and nitrogen (N) turnover and hence the biosphere-atmosphere exchange of greenhouse gasses (GHG). The emissions of CH_4 and gaseous N losses of NO, N_2O, and N_2 were investigated in the predominating land-use systems of the Khorezm Region, Uzbekistan. The irrigated agricultural production there is a relevant source of GHG due to significant N_2O emissions from cotton and winter wheat and CH_4 emissions from flooded rice fields. Under the prevailing agricultural practices, denitrification is a major pathway of N-loss, and substantial amounts of N-fertilizer are lost as N_2 to the atmosphere. This study concludes that GHG emissions from irrigated land in the Khorezm Region could be substantially reduced by the optimization of fertilization and irrigation practices and the conversion of annual cropping systems into perennial forest plantations.