



Effect of temperature on the emission of N₂O in water saturated soils

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The processes of denitrification and therefore emission of N₂O from soil to the atmosphere are favoured by anaerobic conditions. In the present study, the effect of temperature on the emission of N₂O was studied in soils under different types of use (forest, grassland, crop growing) and under water-saturated conditions. For this, an experiment was carried out in which the soils were incubated for 42 days under controlled conditions of moisture (saturated) and temperature (between 10 and 35 °C), and the amounts of N₂O emitted by the soil were measured every 3 or 4 days during the incubation period. Emission of N₂O was low in all soils at temperatures of up to 20°C, with the grassland soil emitting most and the cropped soil emitting least N₂O. In all three soils, there was a large increase in N₂O emission between 20 and 35°C, with emission occurring in successive waves. This suggests that the denitrifying organisms are basically thermophilic, that during the incubation the denitrifying populations are renewed, and that incubation of the soil under reducing conditions modifies the pool of nitrogen subject to denitrification. At the highest temperature considered in the study (35°C) the grassland soil emitted most N₂O (as also occurred at lower temperatures), which suggests that the accumulation of readily decomposable forms of nitrogen from organic fertilizers (abundant in grassland soil) provides a fundamental source of N₂O emissions.

In conclusion, it is clear that the effect of climate change of N₂O emission when the soils are water-saturated will be much more important in grasslands than in soils under other uses like forest or cropping.