The diversity of the N2O reducers matters for the relative proportion of N2O emitted across cropping systems by denitrification

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ORAL PRESENTATIONS

Diversity of N_2O reducers matters for the relative proportion of N_2O emitted across cropping systems by denitrification

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Agriculture is the main source of terrestrial emissions of N_2O, a potent greenhouse gas and the main cause of ozone layer depletion. The reduction of N_2O into N_2 by microorganisms carrying the nitrous oxide reductase gene (*nosZ*) is the only biological process known to eliminate this greenhouse gas. Recent studies showed that a previously unknown clade of N_2O-reducers was related to the capacity of the soil to act as an N_2O sink, opening the way for new strategies to mitigate emissions. Here, we investigated whether the agricultural practices could differently influence the two N_2O reducer clades with consequences for denitrification end-products. The abundance of N_2O-reducers and producers was quantified by real-time PCR, and the diversity of both *nosZ* clades was determined by 454 pyrosequencing. Potential N_2O emissions and potential denitrification activity were used to calculate the N_2O emission ratio. Overall, the results showed limited differences between management practices but there were significant differences between cropping systems in both the abundance and structure of the *nosZII* community, as well as in the N_2O emission ratio. More limited differences were observed in the *nosZI* community, suggesting that the newly identified *nosZII* clade is more sensitive than *nosZI* to environmental changes. Potential denitrification activity and potential N_2O emissions were explained mainly by the soil properties while the diversity of the *nosZII* clade on its own explained 26 percent of the proportion of N_2O emitted, which highlights the importance of understanding the ecology of this newly identified clade of N_2O reducers for mitigation strategies.