Geophysical Research Abstracts
Vol. 17, EGU2015-15685, 2015
EGU General Assembly 2015

Water management history affects GHG kinetics and microbial communities composition of an Italian rice paddy

Alessandra Lagomarsino (1), Allessandroelio Agnelli (1), Roberta Pastorelli (1), Grazia Pallara (2), Daniel Rasse (3), and Hanna Silvennoinen (3)

(1) Consiglio per la Ricerca e la sperimentazione in Agricoltura, Centre for Agrobiology and Pedology, P.zza M. D'Azeglio 30, Firenze, Italy, (2) Department of Agrifood Production and Environmental Sciences, University of Florence, P.zzale delle Cascine 18, Firenze, Italy , (3) Norwegian Institute for Agricultural and Environmental Research (Bioforsk), Fr. A. Dahlsvei 20, 1430 Ås, Norway

The water management system of cultivated soils is one of the most important factors affecting the respective magnitudes of CH4 and N2O emissions. We hypothesized an effect of past management on soil microbial communities and greenhouse gas (GHG) production potential The objective of this study were to i) assess the influence of water management history on GHG production potential and microbial community structure, ii) relate GHGs fluxes to the microbial communities involved in CH4 and N2O production inhabiting the different soils. Moreover, the influence of different soil conditioning procedures on GHG potential fluxes was determined. To reach this aim, four soils with different history of water management were compared, using dried and sieved, pre-incubated and fresh soils.

Soil conditioning procedures strongly affected GHG emissions potential: drying and sieving determined the highest emission rates and the largest differences among soil types, probably through the release of labile substrates. Conversely, soil pre-incubation tended to homogenize and level out the differences among soils.

Microbial communities composition drove GHG emissions potential and was affected by past management. The water management history strongly affected microbial communities structure and the specific microbial pattern of each soil was strictly linked to the gas (CH4 or N2O) emitted. Aerobic soil stimulated N2O peaks, given a possible major contribution of coupled nitrification/denitrification process. As expected, CH4 was lower in aerobic soil, which showed a less abundant archeal community. This work added evidences to support the hypothesis of an adaptation of microbial communities to past land management that reflected in the potential GHG fluxes.