INGV terremoti vulcani ambiente
ISTITUTO NAZIONALE DI GEOFISICA E VULCANOLOGIA

NIOZ

INVITO A SEMINARIO

La Dott.ssa NADINE SMIT

del Department Microbiology & Biogeochemistry
Royal Netherland Institute for Sea Research (NIOZ),
Texel, The Netherlands

terrà un seminario dal titolo:

Developing lipid biomarkers for aerobic and anaerobic methane oxidation in the environment – methane oxidation in soils at terrestrial methane seeps in southern Sicily, Italy.

MERCOLEDI' 26 OTTOBRE 2018 ALLE ORE 11:30
AULETTA CONVEGNI
INGV- Sezione di Palermo
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Abstract

The greenhouse gas methane (CH_4) is an important contributor to natural and anthropogenic global climate changes in present and past environments. Several natural sources of biogenic and thermogenic CH_4 are known in the environment, e.g. aquatic (wetlands or lake beds), terrestrial (plant biomass or mud volcanoes) or marine (methane hydrates, pockmarks or estuaries). Besides chemical CH_4 oxidation in the troposphere, microbial CH_4 oxidation in soils is one of the largest sinks for atmospheric methane and accounts for up to 10% of total oxidized methane worldwide. Various soil CH_4 oxidizing microbes are known, with each using a subset of electron acceptors to convert CH_4 to carbon dioxide under aerobic and anaerobic conditions.

However, applicable tools for determining past methane concentrations in the atmosphere and the intensity of methane fluxes in the terrestrial and marine realm are currently lacking. Therefore, we are investigating cultured microbes and environments where CH_4 oxidation likely Here, we have investigated soils from terrestrial methane seeps in southern Sicily, Italy where gases with methane concentrations of up to 95% are naturally released, likely stimulating microbial aerobic methane oxidation (AMO) in surrounding soils. Soils from the dry CH_4 seep Fuoco di Censo and from around the mud pool Bissana were sampled with increasing distance from the methane seeps.

We found an increasing abundance of isotopically depleted unsaturated C16 fatty acids and hopanoic acids (-42 to -55 permill) with decreasing distance to the methane seep. The high abundance of unusual methylated fatty acids characteristic for mycobacteria in combination with their isotopic depletion suggest that these bacteria are involved in the oxidation of methane, ethane and/or propane at this CH4 seep. Additional, 16S rRNA gene amplicon sequencing confirmed the presence of mycobacteria at the Fuoco di Censo seep. Measurements of bacteriohopanepolyols (BHPs) via ultra-high performance liquid chromatography-high resolution mass spectrometry (UHPLC -HRMS) indicate a positive correlation of certain BHPs with changing CH4 concentrations. Previous studies on AMO bacteria suggest that distinct BHPs can trace active methane oxidation and can therefore be used to describe the community as well as changes in methane concentrations. Further investigations on the lipid inventory and gene diversity data of the sample sets is currently underway and will be used to link the methanotrophic biomarkers with the microbes present in these soils.

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