Geophysical Research Abstracts
Vol. 13, EGU2011-2449, 2011
EGU General Assembly 2011

Global Warming Impacts on the Biogeochemical Functioning of the Arctic Cryosols in the Salluit region, Nunavik (Québec, CANADA).

Julien Fouché (1,2), Michel Allard (2), Jean Paul Ambrosi (1), and Catherine Keller (1)
(1) CEREGE, Aix Marseille III University, Aix en Provence, France, (2) CEN, Laval University, Quebec, Quebec, Canada

The impact of global warming on the biogeochemical functioning of arctic Cryosols is currently being monitored in Salluit (Nunavik Québec). This study aims at answering the following questions: Is organic matter mineralization increasing with soil warming? More precisely are there changes in:
o methane and carbon dioxide release from the soil?
o soluble elements concentrations in the soil solutions (organic and inorganic elements)?
o vegetation communities?
- Are the warmer and drier conditions changing the soil microbial status (activity, diversity and density)?
Two sites under tussock tundra vegetation were chosen: a histic Cryosol (H site) and a gleyic turbic Cryosol (M site) on marine clays. On each site an open top chamber (OTCs from ITEX design) was installed. Thereby all samples, measurements and analyses were performed in both normal (N) and transformed (T) conditions during the growth season (mid July to end of August 2010). In order to understand the physical behaviour of the soils, the temperature, moisture and redox potential were monitored hourly. Soil respiration (CO2) was measured three times per day, between 9 and 11 am, 2 and 4 pm and 7 and 9 pm. The soil solution was sampled every two days using tension-free lysimeters and suction lysimeters (rhizons). In addition at each site the different soil horizons were sampled at the beginning and at the end of the field session for organic matter fractioning, major and trace elements analyses and microbiological analyses. .
The first results show that the OTCs warms the soil surface (1 cm-deep) up to 4,75 °C (observed on H site on 31/7/10 2pm). These warmer and less windy conditions enhanced the soil respiration of 166,75 %, from 0,46 in H_N to 1,23 H_T μmol.m-2.s-1.