Abstract ID : **148**

Dissolved organic carbon and its 14C signature in the Elbrus ice-core (Caucasus, 1880-1980 CE): biogenic versus anthropogenic sources of atmospheric organic carbon in south-eastern Europe

Content

With the aim to reconstruct the history of organic carbon emissions in south-eastern Europe, dissolved organic carbon (DOC) and its 14C signature were investigated along a 182 m long ice core drilled in 2009 at Mount Elbrus in the Caucasus. Due to rapid contamination of firn by gaseous organics, investigations were restricted to the ice part of the core that covers the years 1774-1980 CE. DOC measurements were achieved on a quasi-continuous basis over 1910-1980 CE. Additional measurements were done to investigate the period 1805-1833 CE and 1879-1986 CE. Finally, 21 summer samples and 12 winter samples were measured for DO14C. This first investigation of seasonally resolved DO14C record in a non-polar ice glacier permits to discuss the origin of organic carbon present over south-eastern Europe in winter and summer.

In summer, the DOC levels increased by 35% from prior to 1950 to the 1963-1980 CE. The 14C signature in ice deposited during the major bomb-peak era follows (within one year) the change of atmospheric 14CO2 caused by atmospheric nuclear tests, suggesting the living biosphere as the main biogenic source of DOC in summer in this region. Whereas the DO14C ice-record mimics well the bomb-induced change in 14CO2, the ice levels were lower by ~30% after 1960 suggesting that the slight increase of DOC is mainly due to the growth of anthropogenic emissions. That contrasts to what was previously seen in the Alps where most of the summer increase of DOC (a factor of 2-3) from 1920-1950 CE to 1970-1988 CE was mainly due to an increase of vegetation emissions. Such a difference in the response of OC in western and south-eastern Europe will be discussed in terms of use land and global warming.

An increase by 40% of DOC winter level associated with a 14C signature 52% lower than that of 14CO2 is observed. The relatively higher contribution of anthropogenic emissions in winter than in summer is likely reflecting a weakened contribution of biogenic emissions. The 14C signature in ice deposited during the major bomb-peak era follows the change of atmospheric 14CO2 caused by atmospheric nuclear tests with a delay of some 3-4 years, suggesting wood burning as a biogenic source of DOC in winter in this region.

Primary author: PREUNKERT, Susanne (Institut des Géosciences de l'Environnement, Université Grenoble Alpes, Grenoble, France)

Co-authors: LEGRAND, Michel (Laboratoire Interuniversitaire des Systèmes Atmosphériques, Université de Paris and Univ Paris Est Creteil); FRIEDRICH, Ronny (Curt-Engelhorn-Zentrum Archäometrie); KUTUZOV,Stanislas; MIKHALENKO, Vladimir

Presenter: PREUNKERT, Susanne (Institut des Géosciences de l'Environnement, Université Grenoble Alpes, Grenoble, France)

Track Classification: High-alpine ice cores