Evaluation of lake biomarkers as indicator of environmental changes along a climatic gradient in Cameroon

VALÉRIE SCHWAB-LAVRIČ[1]*, YANNICK GARCIN[2], DIRK SACHSE[2], GILBERT TODOU[3], OLIVIER SÉNÉ[4], JEAN-MICHEL ONANA[4], GASTON ACHOUNDONG[4] AND GERD GLEIXNER[1]

[1]Max-Planck-Institut für Biogeochemie, Jena, Germany (*correspondence: vschwab@bgc-jena.mpg.de)
[2]DFG-Leibniz Center for Surface Process and Climate Studies, Institut für Erd- und Umweltwissenschaften, Universität Potsdam, Germany
[3]École Normale Supérieure, University of Maroua, Cameroon
[4]National Herbarium of Cameroon, IRAD, Yaoundé, Cameroon

Small crater lakes that have not been exposed to anthropogenic impacts are considered as sensitive recorders of environmental conditions. Here, we studied changes in lipid composition of sediments and water particles organic matter (POM) from lakes, and soils from lake catchments collected in Cameroon along a large environmental gradient (rainfall of ~ 4000 to 700 mm per year) to evaluate sedimentary lipids as indicators of local and regional environmental changes in the tropics.

Large abundances of an unresolved complex mixture and bacterial lipids in water POM, higher relative concentration of terrestrial refractory lipids in deeper water POM as well as differences in compound distributions and abundances between sedimentary and aquatic lipids indicate intense degradation of primary autochthonous organic matter throughout the water column. No characteristic changes in the distribution patterns of the major compounds, short- and long-chain *n*-alkanes, *n*-alkenes, alcohols and fatty acids, in the studied samples along the environmental gradient indicate that distribution of these source-specific biomarkers may not be appropriate to reconstruct ecosystem changes in tropical fossil records. In sediments, tetra- and penta-cyclic triterpenoids, principally consisting of brassicasterol and mainly terrestrial plants-derived stigmasterol and β-sitosterol, increase in abundance with rainfall. Campesterol is identified only in the drier zones. C_{32}-C_{34} botryococcenes usually associated with the freshwater *B. braunii* algae were found in soils and lake sediments of the rainiest site. A possible terrestrial contribution of these compounds to lake sediments in this environment will be discussed.

$PM_{2.5}$ chemical composition at rural background site in Central Europe

J. SCHWARZ[1]*, J. KARBAN[1], V. HAVRÁNEK[2], E. CHLUPNÍČKOVÁ[3] AND J. SMOLÍK[1]

[1]Institute of Chemical Process Fundamentals AS CR, Prague, Czech Republic (*correspondence: schwarz@icpf.cas.cz)
[2]Institute of Nuclear Physics AS CR, Řež at Prague, CR
[3]Czech Hydrometeorological Institute, Prague, CR

$PM_{2.5}$ mass and its chemical composition was studied from Feb 2009 to Mar 2010 at Czech rural backgroud site Košetice. The site is located about 80 km SE from Prague and it is part of EMEP, EUSAAR, and ACTRIS networks. Samples were taken 24 hours each 6th day, in total, 70 samples were analyzed. Besides gravimetry, water soluble ions (IC), elements (PIXE), OC/EC (TOT method) and levoglucosan (GC-MS) were analyzed.

The mass closure was calculated between $PM_{2.5}$ mass and analyzed species. The concentration of crustal elements (Al, Si, Ca, Ti, Fe, Mn were recalculated to their oxides, OC (corrected for positive sampling artifact) and EC were converted to OM resp. EC mass using factor 1.6 resp. 1.1. Using these factors the total analyzed mass was equal to 90% of $PM_{2.5}$ mass determined using gravimetry in average. A resulting average chemical composition of $PM_{2.5}$ mass at Košetice site is shown in the Fig. 1.

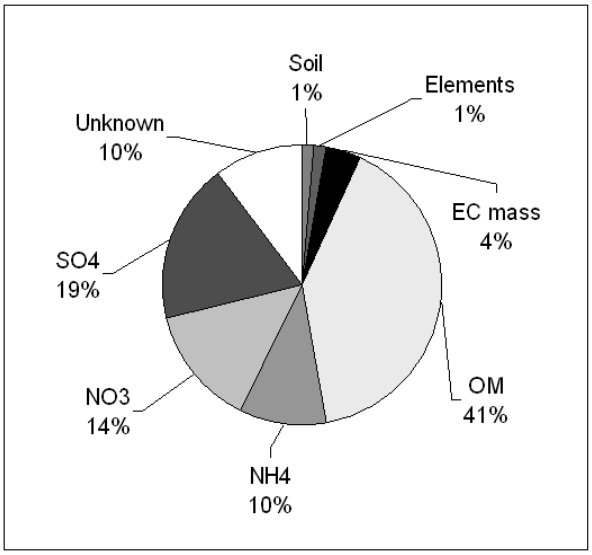

Figure 1: Average composition of PM2.5 at Košetice

$PM_{2.5}$ was dominated by OM and secondary inorganic ions. We thank for support to GA CR by grant No.205/09/2055.