Deep crust of the Siberian craton evidence from xenolith

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Deep-seated xenoliths hosted in kimberlite pipes (Udachnaya, Leningradskaya, Yubileynaya, Komsomolskaya, Botuobinskaya, Zapolyarnaya) from the Siberian craton include mafic and felsic garnet granulite, two-pyroxene granulites, gneisses, and amphibolite. Calculated equilibration temperatures range from 600 to 850 °C at pressures from 8 to 1.4 GPa. Garnet granulites give the highest temperatures (710-850 °C) and pressures (9-14 GPa) and amphibolites the lowest; felsic granulites fall between these two groups. The mafic xenoliths are picrobasaltic to basaltic in bulk chemical composition. The chondrite-normalised REE patterns for the mafic granulite xenoliths vary from flat to LREE-enriched (La_N/Yb_N=8.6-18.8); some have slight positive Eu-anomalies. Garnet granulite xenoliths with low REE contents and positive Eu-anomalies are interpreted as cumulates. The bulk compositions of felsic granulites and gneisses vary from andesite to rhyodacite. Zircon LAM-ICPMS dating shows several episodes in the formation of the deep crust of Siberian craton. Zircons from mafic granulites are metamorphic and have concordant ages from 1.78 to 1.97 Ga. Most zircon grains from felsic granulites show oscillatory zoning in BSE images; some show core-rim structure, in which the cores have oscillatory zoning. The age of 2.95 Ga obtained from zircon in felsic xenoliths of the Botuobonskay pipe is the oldest age recorded in the xenolith suite. Magmatic zircons from the Zapollyarnay pipe yielded NeoArchean ages of 2.71 Ga.

Primary biological organics in ambient PM in the Southeastern U.S.

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Primary biological organic particles (or bioaerosols) are released by, or composed of, biological organisms. These can include fungal spores, microbes, pollen, or other materials. Little is known about the contributions of such biological materials to ambient particulate matter (PM), though indications are that in highly vegetated regions a substantial amount of organic PM mass could be due to such sources. Large areas of natural wilderness exist in the Southeastern U.S., and even the urban areas in the region are known to be heavily impacted by biological emissions.

Therefore a field campaign was launched at one urban (Atlanta, GA) and one rural site (Yorkville, GA) in fall 2009 and spring 2010 to quantify the amount of bioaerosols in both PM2.5 and PM10-2.5. Particle mass, elemental carbon (EC), organic carbon (OC), bioaerosol fragments, and several biochemical markers (endotoxin, protein, and β-D-glucans) were measured through established and modified sampling methods. The methods and method testing will be described, and preliminary results on the contributions of bioaerosol to particle organic carbon will be provided. For example, scanning electron microscopy demonstrated that bioaerosols accounted for 60-70% of the organic carbon mass in PM10-2.5.

This analysis will help to determine the amount and sources of organic PM mass (in particular the importance of primary biological particles to PM), and to investigate potential impacts of naturally emitted PM on human health.