Living in soil pores: physical and nutritional constraints for microbial decomposers of soil organic matter

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Soil microorganisms live in a complex 3-D framework which can cause a variety of micro-environments to develop that are more or less suitable for microbial growth, activity and survival. In particular, the soil pore system controls the accessibility of substrates and oxygen to microorganisms and the local moisture conditions. Experiments, in which the location of microorganisms and substrates and the soil structure were manipulated, showed how the heterotrophic soil respiration depended on the size of pores and on their connectivity. In turn we show how microorganisms may change substrate diffusivity at the scale of their habitat, by exuding EPS. In all, characteristics of the habitat seem to have more impact on heterotrophic respiration than microbial community structure. We present innovative models explicitly representing soil structure and how microhabitats control the activity of microorganisms and hence the fluxes of C in soil.

Geophysical evidences for eclogites beneath the West Siberian basin

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The West Siberian basin is the world's largest intracontinental sedimentary basin. Its basement is formed through a number of collisional and accretional events during late Proterozoic-Paleozoic. The amalgamation, completed in the late Permian, was followed by a large-scale rifting and eruption of flood basalts in the Permian-early Triassic (ca 250 Ma). Active subsidence of the basin started in late Triassic with the main event only in Jurassic [1].

The West Siberian basin lacks surface topography, whereas the reliefs of the Moho and the top of the basement have amplitudes of ca. 20 km and 15 km, respectively [2]. The near-zero free air gravity over the basin indicates that it is in the isostatic equilibrium.

Assuming no effect of dynamic topography on basin subsidence, we examine the relative contributions of the crust and the lithospheric mantle to maintaining the surface topography. Lithosphere buoyancy is controlled by thicknesses and densities of the crust and the lithospheric mantle, composition, metamorphic state, and temperature. Crustal thickness and density are constrained by our new regional crustal model SibCrust, which is based on all existing seismic data [2]. Lithosphere thickness and temperature are constrained by the thermal model TC1 [3]. Our modelling shows large high-density anomaly (3.5 – 3.65 g/cm^3) in the upper mantle below the axial part of the basin along the major rift. This result is supported by the seismic velocity variation in the mantle along four ultra-deep reflection/refraction PNE profiles and by stretching factor. We propose that high density body in the mantle is caused by eclogitization and its presence can explain a substantial part of the subsidence of the West Siberian Basin.

[1] Vyssotski *et al*. (2005), Marine and petr. geol. **23**, 93-126; [2] Cherepanova et al, Tectonophysics, in press; [3] Artemieva and Mooney (2001), J. Geophys. Res., v.**106**, 16387-16414.

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