Multi-proxy investigation of Holocene climate in West Siberia using peat deposits

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West Siberia is a vast region that covers a large part of northern Asia and, in spite of its size, is relatively homogenous in terms of topography and climate. It is an ideal target for studying palaeoclimate, because even a relatively limited number of sites would provide representative data for investigating climate changes that affect large areas of this region. This project uses a multi-proxy approach to study Holocene climate change in West Siberia.

A peat core was obtained from an ombrotrophic bog located in the vicity of Tomsk. Bog vegetation is dominated by peat moss, but also comprises a substantial number of vascular plant species. The base of the 6.5-m-long core was dated at 10,500 cal yr BP. Organic matter was subjected to palynological, biomarker, and stable isotopic analyses.

Our preliminary testate amoebae (analyst I.V.Kurina) and n-C_{23} alkane (sourced mainly by *Sphagnum* spp.) δD in the upper 260 cm of the core show the following patterns. The percentage of hydrophilic testate amoebae starts to increase from the background level at 140-135 cm, reaches its peak at 125-115 cm, drops to a minimum at 85-65 cm, and then undergoes an increase towards the top of the core. The δD values of n-C_{23} decrease from -170‰ at *c*. 200 cm to -225‰ at 105-100 cm, change sharply to -210‰ at 95-85 cm and then reach -190‰ at the top. Because more negative δD values of *Sphagnum* spp. could indicate colder or wetter (or a combination of both) climate, we suggest that these two data sets point to a period of wetter climate during the time interval recorded by the peat sequence between 140 and 100 cm. The integration of our data with palynology from previously published reconstructions of West Siberian climate from 500 and 1700 cal yr BP, corresponding to *c*. 150-50 cm of our core, suggests a period of cold and wet climate. Our ongoing work on biomarker and stable isotopic compositions of various sources of organic matter in this core will allow us to provide more detail with regards to palaeoclimatic changes during this and earlier time intervals in the Holocene.

Boron isotopes in boninites from the Izu-Bonin-Mariana arc system: Insights into subduction initiation

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The origin of boninites has long been debated and several mechanisms for their formation have been proposed [1]. These rocks have both high MgO contents and somewhat LREE+LILE enrichments, thus their genesis should involve large percentage melting of highly melt-depleted but also highly fluid metasomatized mantle sources. One mechanism to explain boninite generation in the Izu-Bonin-Marianas (IBM) arc-basin system invokes sinking of cold Pacific oceanic slabs, trench retreat and intense backarc spreading [1]- all resulting in anomalous mantle melting conditions and voluminous boninite eruptions close in time and space to the oldest mafic volcanic arc rocks in IBM at ~ 51 Ma [2]. Since the mantle is extremely depleted in B and has very negative $\delta^{11}B$ ratios and the slab fluids have very positive $\delta^{11}B$ signatures, B and B isotope ratios are able to trace the slab–fluid additions and the resulting boninite generation. We have selected a suite of representative boninites from the the Izu-Bonin (Bonin Ridge) and the Marianas (Guam Island) segments of the IBM. The boninites all have remarkably similar $^{87}Sr/^{86}Sr$ (0.7042-0.7049) and $^{143}Nd/^{144}Nd$ (0.51283-0.51297) isotope signatures. Interestingly the boninites $\delta^{11}B$ ranges from +0.9 to +5.1 permil (data always better than ±1 per mil), supporting models for early slab fluid liberation via dehydration of old foundering Pacific slabs. Such fluid additions are necessary for lowering the melting temperature of the depleted mantle wedge and for boninite generation. Based on the isotope (B, Nd, Sr) and trace element similarities we envision the boninite sources to be chemically similar to blueschist-containing serpentinite muds and serpentinized peridotites erupted today via mud volcanoes in the IBM forearc and successfully drilled during ODP Legs 195 and 125 [3]. Links between high Mg arc volcanic rocks and serpentinite-derived fluids are becoming increasingly common [4] and we will discuss possible links between metamorphic petrology of the slab inventory, island arc magma generation and the usefulness of B isotopes as tracer.

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