Metasomatic alteration of zircons from potassic granites

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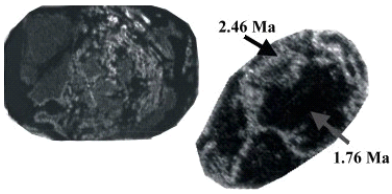
Zircon is a well known and a widely used geochronometer, since it is capable in retaining radiogenic Pb during high T metamorphic events. But often zircon has a complex behavior and can transform under hydrothermal conditions, especially when interacting with CO_2-rich fluid (Tugariniv, Bibikova, 1980, Rizvanova et al., 2000, Liferovich et al., 2001).

Zircons from some potassic granites of the Kola Peninsula, Russia were studied by cathodoluminescence (CL) and dated by ion-microprobe methods. Zircons show complicated structure under cathodoluminescence (fig.-1).

The originating of altered parts in zircons can be well



explained as a process of metasomatic substitution of crystals - synchronous subprocesses of dissolving and growth. Under the influence of fluid some parts of zircons were dissolved and completely substituted with a newly formed zircon phase. Susceptibility of zircon to alteration can be enhanced by metamictization or mechanical fracturing during deformation. Zircons with high U and Th concentrations are more likely to be metamict and susceptible to leaching. We observed such type of internal structure in zircons from potassic granites only. Potassic granites are rich in U and Th, so zircon as a concentrator of U and Th is also rich in these elements. Its structure is initially disturbed by high foreign elements content and damaged from decay of incorporated U and Th. As well as metasomatic alterations of rocks often take place in zones of deformation where rocks become penetrative for fluids - all lattice defects in zircon play a role of channels for metasomatic solutions. Zircons with low U-contents from other rocks in the studied districts remained nearly unaffected by the fluid.

Reconstruction of paleoproductivity in the Sea of Okhotsk over the last 30 kyrs

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Two sediment cores were taken from the central and western Sea of Okhotsk, which is located in the northwestern Pacific rim and is characterised by high biological productivity and the presence of seasonal sea ice. The cores were studied for phytoplankton-derived biomarkers (alkenones, brassicasterol and dinosterol), as well as biogenic opal and ice rafted debris (IRD), in order to reconstruct the paleoproductivity over the last 30 kyrs. Down core profiles of the phytoplankton markers suggest that primary productivity was restricted in the glacial period, but abruptly increased toward the deglaciation period and stayed high in the Holocene.

The comparison of three sediment cores including GGC-15 core taken from the southern Okhotsk Sea [Ternois et al., 2001] showed a propagative increase in the alkenone mass accumulation rates (MAR) from the last glacial maximum to the deglaciation. This increase started from the southeastern part of the sea and extended to the northwestern region. Spatial and temporal distributions of the phytoplankton productivity were found to be consistent with the changes in the reconstructed sea-ice distribution based on the IRD records. This study demonstrates that the progress and retreat of sea ice had controlled the primary productivity in the Sea of Okhotsk with the minimum productivity during the glacial period.

MARs of alkenones and biogenic opal indicate that the dominant phytoplankton species in the deglaciation was haptophyte, *Emiliania huxleyi*, whereas diatom overwhelmed haptophyte in the late Holocene. Such a phytoplankton succession from haptophyte to diatom was probably caused by the increase in the silicate supply possibly from the Pacific Ocean to the surface water of the Okhotsk Sea due to the changes in the hydrographic structure of the sea as well as the North Pacific Ocean.