Two pyroxene-garnet rock of the Gridino area of Belomorian mobile belt (Northern Karelia), Karelia, Russia: Record of the prograde and retrograde metamorphic events

A.A. Morgunova[1]* and A.L. Perchuk[1,2]

[1]Institute of Experimental Mineralogy, Academica Osipyana Street 4, Moscow distr. 142432, Chernogolovka, Russia (*correspondence: almor@iem.ac.ru)
[2]Lomonosov Moscow State University, Geological Faculty, GSP-1, Leninskie Gory, Moscow, Russia (alp@geol.msu.ru)

Archean felsic gneisses in the high pressure Gridino complex host lenses boudins and dikes of eclogitized mafic (gabbro, gabbro-norite) and ultramafic (garnet-pyroxene rock, orthopyroxenite) rocks. The paper is aimed to reconstruct metamorphic evolution of the two pyroxene-garnet rock forms a boudin of size 4*5 m in the amphibole-biotite gneisses on the Visokii Island of the White Sea.

The early episode of the rock evolution is characterized by inclusions of calcite and diabantite (rare Fe-Si chlorite). The diabantite is well-known as product of metasomatic alteration of peridotites. Inclusions of this mineral were found in all rock-forming minerals (garnet, clino- and orthopyroxene). They often associate with REE and U, Th-rich minerals, which tend to crystallize at the walls of the vacuoles. The inclusions are very unusual in term of the surrounding cracks. The inclusions hosted by pyroxenes are surrounded by the both concentric and radial cracks, whereas inclusions in garnets are surrounded by the only radial cracks. Theses features indicate that the inclusions have been recrystallized after their trapping. Thermobarometric study of the rock indicates that unhydrous mineral assemble garnet+clinopyroxene+orthopyroxene that replaced diabantite-bearing metasomatic rock was formed under T-P conditions (690ºC/1.7 GPa) of eclogite facies similar to those determinated for the Archean mafic eclogites within the complex. Rim zones of the rock-forming minerals indicate isothermal decompression down to $P \sim 1.2$ GPa, followed by the episode of cooling to $T \sim 650$ºC and decompression to $P \sim 0.9$ GPa recorded by development of the retrograde amphibole-garnet-orthopyroxene association [1].

[1] Morgunova & Perchuk (2011) *Russian Geology & Geophysics*, in press.

Dispersal of tritium and ^{3}He along the outer rim of the Weddell gyre

R. Moriarty*, Z. Zhou and C.J. Ballentine

SEAES, University of Manchester, M13 9PL, UK
(*correspondence: roisin.moriarty@manchester.ac.uk)

Weddell gyre plays an important role in the southern closure of the Meridional Overturning Circulation (MOC) and in the ventilation of the deep ocean through the formation of Antarctic Bottom Water (AABW). Estimates of AABW production in the region are not very well constrained and range between 3 and 11Sv (1Sv=10^6 m^3 s^{-1})[1]. Recent observations [2, 3] suggest that the Weddell gyre may not be the primary region of AABW formation as previously thought. Exchange between the Weddell gyre and the world oceans occurs at the outer rim of the gyre. Determination of the transport of water masses across this boundary is needed to quantify the production and export of AABW in and from the gyre and to determine its contribution to global ocean circulation.

Seawater samples (~500) for tritium and helium-3 analysis were collected along the outer rim of the gyre as part of ANtarctic Deep Rates of EXport (ANDREX) project between (Dec. 2008 and April 2010). These samples covered 48 stations and ranged from suface to a depth of 6000m. Helium-3 values in conjunction with another steady state tracer, PO_4*, will allow the calculation of dilution times using optimum multiparameter techniques. Tritium in conjunction with CFCs and SF_6 will allow the quantification of ventilation ages and the trasist times since a water parcel was last in contact with the atmosphere. They will also give a second estimation of dilution times. Preliminary results for tritium indicate values ~0.15 TU in surface waters, a tritium dead layer at intermediate depths and an increase in tritium concentration at depths $\geq$4000m. These data provide the basis for modelling mechanisms that control the dispersal and calculation of the AABW production rates.

[1] Naveira Garabato, *et al.* (2002) *Deep-Sea Res. II* **49**, 3735-3769. [2] Meredith, *et al.* (2000) *J. Geophys. Res.* **105**, 1093-1104. [3] Hoppema, *et al.* (2001) *J. Mar. Res.* **59**, 257-279.