Comparison of internal and external metabolites produced by a diatom

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Introduction

Marine photosynthetic microorganisms play a key role in the global carbon cycle because they fix inorganic carbon into organic compounds. Many of these compounds are exuded into the environment during growth and collectively, they constitute a large fraction of dissolved organic matter in the surface ocean. Despite the significance of this carbon production mechanism, we know little about the molecular-level composition of photosynthetically-derived dissolved organic matter and the environmental factors that govern its production.

Methods

We sampled laboratory cultures of a marine phytoplankton (*Thalassiosira pseudonana*) at different stages of its growth. At each sampling point, we compared the molecular-level composition of dissolved organic matter released into the environment with the dissolved organic compounds retained within the phytoplankton cells. All measurements were made with an HPLC coupled to an ultrahigh resolution mass spectrometer (FT-ICR MS) in positive ion mode. Resulting mass and fragmentation data were compared to metabolite databases such as KEGG and MassBank.

Results

Our data reveal distinct differences between the dissolved organic compounds retained inside the phytoplankton compared to those compounds released into the surrounding media as well as some similarities in these two metabolite pools. Tentative identifications based on database comparisons and fragmentation data suggest a dynamic metabolome for *T. pseudonana*. From these identifications, we will present possible biomarkers for future quantitative metabolic studies of this diatom and related organisms.

Evolution of Variscan orogenic Popiel peridotite (SW Poland)

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Small (few hundred metres in diameter) outcrop of peridotite occurs in the western part of the Sudetes (SW Poland) at the Intra-Sudetic Fault Zone, close to the NE margin of the Karkonosze granite, which is one of the main tectonic lines in NE Bohemian Massif.

The rock consists of olivine (Fo_{84-88}, NiO 0.17 – 0.36 wt %), orthopyroxene (mg# 0.84 - 0.88, Al_2O_3 0, 71- 4, 69 wt %) and spinel (typically $Mg_{0,68}Fe_{0,31}Ni_{0,01}Al_{1,79}Fe_{0,13}Cr_{0,08}O_4$) + chromiferous magnetite ($Fe_{0,99}Mg_{0,02}Mn_{0,01}Ni_{0,01}Fe_{1,68}Cr_{0,19}Al_{0,06}Ti_{0,03}O_4$ + very scarce ilmenite. The composition of minerals vary from sample to sample. The primary mineral assemblage is overprinted by tremolite (Si = 7.95 atoms pfu), overgrown by magnesiohornblende (Si = 6.78 a pfu). The serpentine is texturally later than the amphibole.

The rock composition: SiO_2 39 - 43, Al_2O_3 4 – 7, CaO 3- 6 wt %, MgO 24 – 32 wt % and Fe_2O_3 11 -13 wt % is Fe, Al and Ca enriched. Whole rock trace-element and REE patterns are slightly (1 – 10 times) enriched relative to primitive mantle, flat, with weak Zr and Eu negative anomalies. The rocks was altered by low-grade metamorphism producing tremolite, followed by contact metamorphism in the Karkonosze granite aureole (hornblende crystallization). The rock has been affected by metasomatism and later metamorphism under oxidizing conditions. It is the unique in Sudetes (NW margin of the Bohemian Massif) example of small orogenic peridotite body affected by metasomatic and metamorphic conditions.