Is mid-ocean ridge basalt chemistry a function of melt-rock reaction in the lower oceanic crust?

C.J. LISSENBERG[1], H.J.B. DICK[2] AND C. MÉVEL[1]

[1]Equipe de Géosciences Marines, Institut de Physique du Globe de Paris, 4 Place Jussieu, Tour 14, 5e etage 75252 Paris cedex 05 France (lissenberg@ipgp.jussieu.fr, mevel@ipgp.jussieu.fr)

[2]Woods Hole Oceanographic Institution, 360 Woods Hole Road MS#8, Woods Hole MA 02543 United States (hdick@whoi.edu)

Gabbroic rocks recovered from the Kane Core Complex (23°N, Mid-Atlantic Ridge), contain evidence for reactions between preexisting cumulates and melts migrating in diffuse, cm-wide channels. Evidence for melt-rock reaction includes disequilibrium compositions (anomalous Ti-Cr relationships in clinopyroxene, anomalous plagioclase-clinopyroxene equilibria) and textures indicative of mineral dissolution. The reaction that formed the reaction channels was: Melt 1 + olivine + high-An plagioclase = Melt 2 + high-Mg clinopyroxene + low-An plagioclase.

Modeling of this reaction as an assimilation-fractional crystallization process revealed that melts undergoing this reaction are enriched in MgO and Al_2O_3, and depleted in CaO. As such, this melt-rock reaction process can account for the global MgO-Al_2O_3-CaO systematics of mid-ocean ridge basalts (MORB). Previously, these systematics, as well as the occurrence of high-Mg clinopyroxene, were attributed to fractionation of mid-ocean ridge basalts in the upper mantle at elevated pressures. However, our modeling shows that the melt involved in the reaction yields increasingly higher pressures as the reaction proceeds, suggesting that such pressures may be artifacts of melt-rock reaction. In addition, our model produces high-Mg clinopyroxene. We suggest that lower crustal melt-rock reaction may significantly influence MORB chemistry, and that calculated pressures are overestimated as a result.

Transcription of *E. coli* on stringent promoter enhanced by nickel stress

C.H. LIU[1], C. TANG[1], Z.Z. ZHAO[1], S.P. YAO[1], Y.R. XUE[1] AND B. LIAN[2]

[1]Nanjing University, 22 Hankou Road, Nanjing 210093 (chliu@nju.edu.cn)

[2]State Key Laboratory of Environmental Geochemistry, Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550002, China (bin2368@vip.163.com)

Nickel is proved to be utilized by a variety of bacteria for function and survival, however, high concentration of nickel is toxic to cells. Therefore, regulation of nickel import and export is critical process for bacteria to allow for optimal growth and resist to nickel stress.

In bacteria, control of transcription initiation of RNA polymerase on different promoters is the key step for directing the appropriate cellular response to environmental changes. Generally, bacterial promoters could be divided into two classes: stringent promoter (e.g. rrnB P1, pyrBI) and non-stringent promoter (e.g. lacUV). In this study, two strains RLG1319 and RLG1350 containing lacUV5 - lacZ and rrnB P1 - lacZ respectively were constructed from wild type MG1655 of E. coli. Compared with RLG1319 and MG1655, which were rarely affected at the given concentrations of nickel, the growth of RLG1350 was inhibited by the nickel (doubling time was 55, 60, 80 and 125 min at the concentrations of 0, 0.2, 0.5 and 0.8mM) but the relative β-galactolactase activity of the growing cells was augmented with the increase of nickel concentrations. Moreover, the transcriptional activity of RNA polymerase on stringent promoter was significantly higher than that on the non-stringent promoters at both log phase (OD600=0.4) and stationary phase (OD600=0.8). The mechanism of bacterial transcription on stringent promoters regulated by nickel is required to disclose in the future.