Magmatic geochemistry and geotectonic configuration of the southern Okinawa Trough and the northern Taiwan volcanic zone

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The modern Ryukyu subduction zone extends for ~1400 km from South Kyushu, Japan to the Kueishantao island volcano in the northeastern Taiwan. Behind the arc ridge, the nascent backarc basin (Okinawa Trough) is currently subject to opening. The southern Okinawa Trough has been subdivided into two segments [Yaeyama Graben (YEG) in the east and the Yonaguni Graben (YNG) in the west] that are bounded by non-transform offset at ~123.5°E.

Overall, basalts recovered from the axial zones of YEG and YNG show strong arc-like signature, with having high LILE/HFSE and LILE/LREE ratios, similar to the associated volcanic front lavas. This is consistent with proximal location of these axial zone to the Ryukyu subduction system, compared to mature backarc basin like Mariana Trough.

Our new Hf isotope data revealed two distinct trends; both are parallel to the mantle array. It is unlikely that they share common end-members. The trend having lower εHf includes lavas from the Nothern Taiwan Volcanic Zone (NTVZ). Wang *et al*. (2004) proposed two mantle source components for the NTVZ magmas: depleted asthenospheric and subduction-modified (metasomatised) lithospheric mantles. These are represented by the 2.6 Ma Mienhuayu (MHY) high-Mg basaltic andesites (E-MORB-like) and the 0.2 Ma Tsaolingshan (TLS) high-Mg potassic lavas, respectively. In εNd-εHf space, MHY and TLS represent end-member compositions of the NTVZ trend. The exception for NTVZ trend is basalts from Sekibisho of the Senkaku Islands, which plot on the trend having higher εHf that includes lavas from the southern Okinawa Trough, and southern Ryukyu volcanic front,.

Therefore, our new Hf isotope dataset indicates that at least two types of asthenospheric mantle have been involved in the magma generation in this region. One is represented by MHY andesite. The other has higher εHf but similar εNd, close to YEG basalts. The latter mantle source seems dominate whole Okinawa Trough area.

Effect of heterotrophic bacteria extracted from Icelandic groundwater on Ca silicate dissolution

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This work is aimed at the assessment of the potential role of microorganisms on fluid-basalt/ultramafic rock interaction. In particular, we wanted to assess the extent to which microbes can be used to enhance or inhibit basalt carbonation reactions in the subsurface in the context of *in situ* CO_2 mineralisation. For this, we sampled deep underground water (HK31, 1700 m deep and, t = 25-30°C) from basaltic aquifer located within the Hellisheidi CO_2 injection pilot site (Iceland). Following this sampling, we separated, using culture on nutrient agar plates, four different groups of gramm-negative aerobic bacteria. The enzymatic activity of studied species has been evaluated using Biolog Ecoplates and their genetic identification was performed using 18-S RNA analysis. The optimal growth conditions of these bacteria on Brain Hearth Broth nutrient bouillion at three different concentrations (37, 3.7, 1.9 and 0.74 g/L) have been determined as 25°C > 5°C > 37°C and growth media pH varied from 7.0-8.2. The addition of bicarbonate ions (from 1 to 10 mM) produces net decrease of the growth rate and this inhibition is more pronounced at diluted growth media compared to the normal one. These experiments allowed determining the optimal physico-chemical conditions for bacteria culture experiments in the presence of basic Ca, Mg-containing silicates (wollastonite, diopside, olivine and basaltic glass). Such experiments were performed in constant-pH, bicarbonate-buffered nutrient-diluted media in batch reactors. The release rate of divalent metal and silica was measured as a function of time in the presence of live, actively growing, dead (autoclaved) cells and bacteria exometabolites. Our preliminary results indicate that the pH and dissolved organic matter are the first-order parameters that control the element release from dissolving silicates at far from equilibrium conditions. This allowed better understanding of microbially-affected silicate dissolution in basaltic aquifers and provides a firm methodological basis for constructing the mixed-flow reactors for studying the interaction of heterotrophic bacteria with silicate powders at naturally-relevant conditions.