domains above the quantification limit 88% of the time on average across laboratories. Results of qPCR quantification demonstrate no significant difference (p-value > 0.05) in qPCR values when using the same bacterial and archaeal primers to amplify DNA extracted with similar protocols. Although total cell counts from direct counting were all above the quantification limit of $1.3x10^7$ cells/mL (after accounting for the dilution to physically separate cells from sediment), only 45/435 counts (10%) with CARD-FISH were above this quantification limit. Proteinase K permeabilization of archaeal cell walls was not sufficient to bring these samples above the quantification limit. In addition, this study showed that quantification of particular microbial taxa gives inconsistent results when comparing CARD-FISH and qPCR, and that further improvement of methods is required.

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IODP

Birth and early life of the Izu-Bonin-Mariana island arc

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In mid-2014, IODP Expedition 351 Izu-Bonin-Mariana (IBM) Arc Origins successfully drilled the geological record of subduction initiation and island arc inception at Site U1438 in the Amami Sankaku Basin, in the northwest Philippine Sea. Whereas the young oceanic igneous basement formed during subduction initiation some 52 Ma ago, the overlying volcaniclastic sediments record the magmatic evolution of the juvenile Kyushu-Palau-Ridge, a remnant part of the presently active Izu-Bonin-Mariana island arc. Fresh magmatic crystals (mainly clinopyroxenes) recovered from this sequence contain numerous pristine glass inclusions that provide important insights into the composition of primitive melts, magmatic differentiation and evolution of island arcs.

Here we present the major element analyses of 340 glass inclusions along with volatile (Cl, S, H_2O) and trace element data of a representative subset of samples. Even though hosted in clinopyroxenes, we can show that the vast majority of these glass inclusions are pristine and our record is thus unique in terms of a consistent suite of samples. U1438 glass inclusions cover the full compositional range from high-Mg (basaltic) andesite and basalt to rhyolite with different suites belonging to either the low-K and high-Fe or medium-K and low-Fe rock series. More interestingly, these chemical differences are not random but systematic with the volcaniclastics shed shortly after arc inception hosting glass inclusions more similar to high-Mg andesites, whereas melts erupted at a later stage of IBM arc evolution are overall more evolved (lower MgO) but also interestingly tend to a tholeiitic composition.

Trace and volatile elements give further insights into the magmatic processes behind these compositional changes and argue for variable contributions from the slab either by fluids or sediments and the mantle wedge itself. Further work is in progress to set qualitative and quantitative constraints on the different components contributing to the parental melt.

IODP

Microstructures and fluid inclusion petrography and microthermometry of hydrothermal veins of Site U1414, IODP Expedition 344 (CRISP 2)

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We present new data from microthermometry of fluid inclusions entrapped in hydrothermal veins within the Cocos Ridge basalt and the overlying lithified sediments of Unit III from the IODP Expedition 344 Site U1414. This concerns a primary task of IODP Expedition 344 to evaluate fluid/rock interaction linked with the tectonic evolution of the incoming Cocos Plate from the Early Miocene up to recent times. Aqueous, low saline fluids are concentrated within the veins from both the Cocos Ridge basalt and the overlying lithified sediments. Fluid inclusion analyses show evidence for communication with deeper sourced, high-temperature hydrothermal fluids within the Cocos Plate magmatic basement. Hence, the source of the aqueous low saline fluids may be related to an early carbonic/aqueous fluid where the mobile aqueous phase acted as pore water mixed with invaded seawater. Isochores from primary, modified and secondary fluid inclusions crossed with litho-/hydrostatic pressures indicate an anti-clockwise PT evolution during vein precipitation and modification by isobaric heating and subsequent cooling at pressures between ca. 210 and 350 bar. Internal over- and underpressures in the inclusions enabled decrepitation and re-equilibration of early inclusions but also modification of vein generations in the Cocos Ridge basalt and in the lithified sediments. We propose that lithification of the sediments was accompanied with a first stage of vein development in the Middle Miocene and was a result of the Galapagos hotspot activity. Heat advection, either related to the Cocos-Nazca spreading center and/or the Galapagos hotspot or a further heating event close to the trench, led to subsequent vein modification related to isobaric heating. The latest mineralization within aragonite and calcite veins occurred during crustal cooling up to recent times.

Furthermore we show results of microstructural observations within the vein mineralizations. Mineralization and crosscutting relationships give constraints for different vein generations. Calcite veins within the sedimentary rocks contain twin lamellae with maximum twin width of 120 µm. Mean twin densities indicate differential stress between ca. 30 to 141 MPa. These differential stresses exceed the lithostatic pressures within hole U1414 by a factor of 10 and are therefore assumed to be related to tectonic stresses related to plate convergence and subduction of the Cocos Plate along the Middle American Trench.