

## Are Ontong Java Plateau and Lyra Basin related?

M.L.G. TEJADA<sup>1</sup>, K. SHIMIZU<sup>2</sup>, K. SUZUKI<sup>2</sup>, T. HANYU<sup>2</sup>,  
T. SANO<sup>3</sup> AND M. NAKANISHI<sup>4</sup>

<sup>1</sup>University of the Philippines, Quezon City, Philippines

(\*correspondence: ma\_luisa.tejada@up.edu.ph)

<sup>2</sup>IFREE, JAMSTEC, Yokosuka, 237-0061, JAPAN

<sup>3</sup>National Museum of Nature and Science, Tokyo, JAPAN

<sup>4</sup>Graduate School of Science, Chiba University, JAPAN

Unusually thick, old oceanic crusts are found in the East Mariana Basin to the north and in the Nauru Basin to the east of the Ontong Java Plateau (OJP). The thicker than normal oceanic crusts in these locations are attributed to the emplacement of large volumes and thick lava flows from the OJP. However, areas to the west of the plateau, in the Lyra Basin, is yet unexplored and has the potential to reveal information about the extent of OJP volcanism in both space and time.

We explore the possible relationship between Lyra Basin and OJP through the Hf and Os isotope study of volcanic rocks recovered by dredging during the R/V Kairei (JAMSTEC) KR06-16 cruise in December 2006. Dating and geochemical studies suggest that the Lyra Basin volcanic rocks are alkalic lavas formed by low degrees of melting ~60 m.y. after the main stage of plateau volcanism [1]. Our Os and Hf isotope results also indicate a distinct mantle source compared to that of OJP plateau lavas. Combined Pb-Nd-Sr-Os-Hf isotope data for the Lyra Basin basalts show some affinities with the younger alkalic rocks associated with OJP lavas in Malaita, Solomon Islands. Together with the Solomon Islands alkalic lavas, the Lyra Basin alkalic basalts could represent post plateau volcanism as the basin travelled over the South Pacific hotspots on its way to its present position.

[1] Shimizu *et al.* (2008) *Geochim. Cosmochim. Acta* **72**, A860.

## Microbial Fe cycling at basalt-biofilm interfaces on the seafloor

A.S. TEMPLETON<sup>1</sup>, T.P. TRAINOR<sup>2</sup>, B. AREY<sup>3</sup>,  
A. DOHNALKOVA<sup>3</sup>, H. STAUDIGEL<sup>4</sup> AND B.M. TEBO<sup>5</sup>

<sup>1</sup>University of Colorado (alexis.templeton@colorado.edu)

<sup>2</sup>University of Alaska, Fairbanks (fftpt@uaf.edu)

<sup>3</sup>Pacific Northwest National Laboratory (arey@pnl.gov)

<sup>4</sup>Scripps Institution of Oceanography (hstaudig@ucsd.edu)

<sup>5</sup>Oregon Graduate Institute (btebo@ebs.ogi.edu)

Recently, an increasing number of studies have explored the phylogenetic diversity of microbial communities associated with weathered basalt surfaces on the seafloor. However, the likely metabolisms of the epilithic biofilms appear to be surprisingly varied and poorly defined. Moreover, we cannot yet constrain how the microbial communities may control the progressive alteration of the volcanic rocks, and the composition of the secondary minerals that persist over time.

It is broadly assumed that basalt-hosted biofilms at least partially rely upon C fixed by Fe(II)-oxidizing chemolithoautotrophic organisms, yet we cannot quantitatively and predictively define the role of microbial organisms in the oxidative alteration of the ocean crust. Thus our primary objective is to mechanistically understand the microbially-mediated cycling of Fe (and associated Mn and C) during basalt dissolution. During the past 5 years, we have employed numerous cultivation techniques to isolate psychrophilic metal-oxidizing and reducing bacteria from submarine basalts. These isolates are commonly detected in basalt-biofilm environmental clone libraries, and so we have subsequently used laboratory and field-based studies to explore microbially-influenced rates and mechanisms of Fe solubilization, oxidation, re-reduction, and biomineralization. Much of our data relies upon the development and application of spatially-resolved, synchrotron-based x-ray scattering and spectroscopic techniques to define Fe (and Mn) oxidation state and mineralogy from the ~10nm to the ~10 micron scale. We have coupled this work with high-resolution SEM, focused-ion beam (FIB) milling and TEM analysis of the incipient weathering rinds to structurally and chemically characterize the bacteria/mineral associations. We will present a conceptual framework for understanding the feedbacks between basalt weathering, Fe biomineralization and biofilm formation in the deep ocean. In particular, rapid cycling of Fe (and Mn) is quantitatively significant and exerts a strong impact on the mineralogy of the basalt alteration assemblages, as well as the synergistic interactions among microbial community members.