Insights from geochemistry and age of associated seamounts into the mantle source evolution of Shatsky and Hess Rises

*Maria Luisa Tejada[1,2], Jörg Geldmacher[3], Folkmar Hauff[3], Daniel Heaton[4], Anthony AP Koppers[4], Dieter Garbe-Schönberg[5], Kaj Hoernle[3,5], Ken Heydolph[3], William W Sager[6]

1.Department of Solid Earth Geochemistry, Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan, 2.Research and Development Center for Submarine Resources, Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan, 3.GEOMAR, Helmholtz-Zentrum für Ozeanforschung Kiel, Wischhofstr. 1-3, D-24148 Kiel, Germany , 4.College of Earth, Ocean and Atmospheric Sciences, Oregon State University, Corvallis, Oregon, 97331 USA, 5.Institute of Geosciences, University of Kiel, Germany, 6.Department of Earth and Atmospheric Sciences, University of Houston, Houston, TX 77204 USA

Shatsky Rise in the Northwest Pacific is the best example so far of an oceanic plateau with two potential hotspot tracks emanating from it: the linear Papanin volcanic ridge and the seamounts comprising Ojin Rise. Arguably, these hotspot tracks also project toward the direction of Hess Rise, located ~1200 km away, leading to speculations that the two plateaus are connected. New $^{40}Ar/^{39}Ar$ ages and trace element and Nd, Pb, and Hf isotopic data were obtained from dredged rocks recovered from the massifs and seamounts around Shatsky Rise in an effort to understand the relationship between these plateaus and associated seamounts. The similar initial source composition and geochemical evolution supports a plausible connection between Shatsky Rise and Hess Rise, with the latter probably representing either a resurgent plume head pulse and/or a triple junction-aided second LIP eruption. Each of these rises could have evolved from plateau-building stage composed of isotopically-depleted tholeiites forming the large massifs to post-plateau building stage consisting of isotopically-enriched trachytes forming the much smaller seamounts, e.g., Shatsky Rise to Cooperation-Earthwatch-Ojin seamount and Hess Rise to DSDP Site 465A seamount. Like Shatsky Rise's Ojin Rise, a short chain of seamounts of alkaline composition (Wentworth Seamount Chain) extending SE from southern Hess Rise, i.e. from DSDP Site 465, seems to show an age progression that is consistent with being a classical hotspot track associated with the Hess plateau. Although the results of this study cannot unequivocally provide a direct link between the plateaus and seamount volcanism, further investigation of these similar trends of mantle source variation, not only between Shatsky and Hess Rise but also Ontong Java, Manihiki, and Hikurangi plateaus could lead to a better understanding of the origin, evolution, and emplacement mode of most Pacific oceanic plateaus.

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