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Asymmetric seafloor spreading on the Reykjanes Ridge - influence of the Iceland anomaly?

Ásdís Benediktsdóttir (1,2), Richard Hey (3), Fernando Martinez (3), and Ármann Höskulddson (2)

(1) Iceland Geosurvey, Reykjavik, Iceland (asdis.benediktsdottir@isor.is), (2) Nordic Volcanological Center, Institute of Earth Sciences, University of Iceland, Reykjavík, Iceland, (3) Hawaii Institute of Geophysics and Planetology, University of Hawaii at Manoa, Honolulu, United States of America

Recently it has been shown that the crustal accretion on the Reykjanes Ridge (RR) is asymmetric with more lithosphere being consistently transferred from the Eurasian Plate to the North American Plate. In Iceland, the center of spreading has moved to the east, creating an age-asymmetry on Iceland, with more lithosphere on the North American side than the Eurasian side. The eastward movement of the spreading center is likely explained by the presence of the Iceland anomaly; if the anomaly is fixed with respect to the plate movements then the ridge system is drifting to the west and therefore the shift of the system is to the east, toward the Iceland anomaly. The shift of the center of spreading in Iceland must somehow be observed in the ridge systems off shore. We argue that the asymmetry on the RR south of Iceland, as observed in the magnetic data, is a result of the spreading center movements in Iceland. The RR extends down to the 15 km long right-lateral Bight Transform Fault (BTF) 1000 km south of south Iceland. Although it is short, it is a a sturdy and long lived offset, dating back to at least 37 Ma when spreading ceased in the Labrador Sea, and before that it was a triple junction between the North America–Greenland–Eurasia plates. Just south of the BTF, asymmetries in the magnetic data have been documented. The asymmetry is consistent to what is occurring in Iceland. Lithosphere is being transferred from the Eurasia Plate to the North America Plate. The question arises whether this is an influence of the Iceland anomaly? How far from Iceland do the influence of its anomaly reach and how to we quantify them? The off-shore asymmetries discussed here are not continuous, but seen in the magnetic fabric as if the ridge center was transferred a few kilometers, consistently to the east. A continuous asymmetry would have a different magnetic signature. The best documented asymmetry producing mechanism is a propagating rift (e.g. the Galapagos propagator). The magnetic signature of a propagating rift is evident if the offset between the new and the dying rift is greater than the width of the neo-volcanic zone. The asymmetries documented on the RR are a series of spreading center shifts, shorter than the neo-volcanic zone on the ridge (which is $\sim$10km wide). The magnetic modeling used to model propagating rifts has been useful to identify and quantify the asymmetries on the RR, resulting in a hypothesis of a series of propagating rifts on the RR. The resulting features of "propagators" on the RR lack some of the major characteristics of the larger well-established propagators (i.e. the rotated fabric in the zone of transferred lithosphere and other geophysical footprints of the failed rift and pseudofaults). We are still in the process of understanding the mechanisms behind the observed asymmetries and their relation to the Iceland anomaly, the V-shaped ridges south of Iceland, and a newly formed theory on propagating buoyant upwelling instabilities.