

Onboard paleomagnetic results of basalt cores from Shatsky Rise, IODP Expedition 324

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Shatsky Rise, located in the northwest Pacific ocean, is a large oceanic plateau that was formed by the eruption (and/or intrusion) of a large amount of magma. This rise is mainly composed of three large massifs (Tamu, Ori, and Shirshov Massifs, from south to north). IODP Expedition 324 has cored five sites, with one site (U1346) on the summit of Shirshov Massif and two sites each on Ori (Sites U1349 and U1350) and Tamu (Sites U1347 and U1348) Massifs.

Paleomagnetists of Expedition 324 measured discrete samples obtained from the five sites to investigate paleomagnetic remanence of the basement rocks of Shatsky Rise. The goal of paleomagnetic studies during Expedition 324 was to characterize magnetic remanence of recovered igneous rocks from all the drilled holes on Shatsky Rise. The majority of basement rock samples showed low coercivity and blocking temperatures characteristic of titanomagnetite (-maghemite) with a range of Ti content. Overall, it was found that stable characteristic magnetization inclinations are shallow and mostly negative. However, several atypical behaviors were encountered and need to be addressed during post-cruise research before interpreting the results. For example, in some stratigraphic units, many samples displayed irregular behavior during demagnetization experiments. Additionally, samples from Hole U1349A may show evidence of a chemical remanent magnetization (from hematite) instead of a thermoremanent magnetization (from titanomagnetite). In some samples, partial self-reversal of the magnetization may have occurred during the thermal demagnetization procedure. However, the overall results show shallow average inclinations at all sites, supporting the hypothesis that Shatsky Rise was formed near the paleomagnetic equator. Furthermore, the low scatter in stratigraphic-average inclination groups implies that at most sites, especially Sites U1347 (Tamu Massif) and U1346 (Shirshov Massif), little time passed during the eruption of igneous units. Data from the volcanoclastic sediments at Site U1348 were the only sedimentary measurements made during Expedition 324. Samples from this site show higher corecivity, consistent with single-domain titanomagnetite. The average stable magnetization inclinations from these samples are also low, implying low paleolatitude. Because these rocks are volcanoclastic sediments, the inclinations are from a depositional remanent magnetization, rather than a thermal remanent magnetization as at other sites, that requires further measurements and interpretation.

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