

Variation of paleomagnetic directions within basalt lavas in Iceland

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Systematic measurements of magnetic remanence directions in Icelandic basalt lava sequences have been carried out on altogether several thousand lava flows of 0-15 Ma age since 1950. Each of these directions has been considered to reflect fairly accurately the field originating in the Earth's core at that moment in geological history when a lava was cooling down from the Curie temperature of its titanomagnetite grains. This view is supported e.g. by the excellent stability of the directions during demagnetization treatment, and by the consistency of directions from samples collected up to tens of m apart. Various error sources may be present, but they have hitherto not been investigated in detail as the errors are expected to be much smaller than those found in other rock types worldwide.

One factor possibly causing scatter between lava-mean remanence directions has been the existence of irregular local fields, due to the magnetization of nearby rocks during the cooling of a lava. The authors have recently investigated two aspects of this factor, by sampling a) many exposures in single lava flows (or series of lava flow-units without intervening sediments) spread over distances of up to >10 km, and b) vertical sections through several single flows and flow-unit series. In both cases it turns out that the within-flow variations of remanence directions are very small. Hence, local field anomalies do not have a significant effect on the interpretation of the directions in terms of fields originating in the core.