New approach of modeling of plate relative motion

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A network of moving plates called plate circuit, and there are issue about how large a discrepancy exists inside the circuit. Take hotspot drift (Steinberger et al., 2004) for instance, it is hard to estimate it without good understanding of the plate circuit. The discrepancy should be caused by 1, errors of models of plate relative motion, 2, intra-plate deformation, 3, unknown plate boundaries (Acton and Gordon, 1994). Here we introduce a new way of modeling of plate relative motion with less error and partly considered intra-plate deformation.

Plate relative motion (finite rotation) is calculated from position and ages of coeval isochrons on two plates produced by a single ridge in the middle. Because of limited numbers of the isochrons identified, parameters (poles and opening angles) of the finite rotation of a model are also limited. There are cases that projecting an isochron on a plate to the other plate using those parameters, sometimes it poorly match with counterpart isochron. It means that the parameters are incorrect in this area. We present a new approach for creating a model which is more accurate and easy to estimate errors. We modified the Polygonal Finite Rotation Method (Harada and Hamano, 2000) so as to apply the finite rotation of plate relative motion. In the case of PFRM, a congruent polygon traced along hotspot tracks in a plate, and the finite rotation of the polygon is calculated. In this case, a polygon that can change its shape trace along fracture zones in a plate. The finite rotation is calculated from a polygon in a plate and counterpart polygon in the other plate without need to know the shape of 0 age polygon. The interpolation of those poles and opening angles can be made along the fracture zones. Ridge jumps can easily be neglected by omitting the segment. The difference between the newly created model and previous one will be discussed.