Data Set: Indian Ocean Magnetic Anomaly and Fracture Zone Picks for Chrons 34y to 20o
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Data Set Description

This data set consists of the input files and output files for the finite rotations published in Tables 2, 3 and 4 of Cande and Patriat (2015). These rotations were calculated using the "Hellinger" software package written by Jean-Yves Royer and Ted Chang based on the statistical methods described in Chang (1987, 1988), and Royer and Chang (1991). In this method, for each time step, the magnetic anomaly and fracture zone picks along a spreading ridge are broken into multiple segments. Each segment contains conjugate data points from two plates with an estimate of the error in the location of each point. The program determines the best fitting finite rotation for the plate pair by fitting great circles to the data points within each segment.

The finite rotations given in Tables 2 and 3 were calculated using the Royer and Chang program Hellinger1 which fits the data points from two plates: the African and Antarctic plates for Table 2 (Southwest Indian Ridge; SWIR) , and the Capricorn and Antarctic plates for Table 3 (Southeast Indian Ridge; SEIR). The input files (*.chang.points) are in the format required by the program Hellinger1. The first line gives the number of segments that the data are broken into. The rest of the file consists of individual data points, one point per line. Each data point includes the plate ID (1 = Antarctic plate for Tables 2 and 3; 2 = African plate for Table 2 and Capricorn plate for Table 3), the segment ID, the latitude and longitude of the data point, an estimate of the uncertainty in position (in kms), and an optional comment about the origin of the data point. The output files (bestfit.*.out) were generated by the program Hellinger1. These files contain the bestfit rotation and the covariance matrices for the uncertainties.

The finite rotations given in Table 4 were calculated using the Royer and Chang program Hellinger3 which fits the data points from three plates simultaneously: the African, Antarctic and Capricorn plates (The Indian Ocean Triple Junction; IOTJ). For these calculations, the basic input data for the three plates was the same as used in Cande et al. (2010) except that the data points for the African-Antarctic ridge were updated to correspond to the data points used in the two-plate calculation presented in Table2. Table 4 only presented the results for the Africa-Antarctic plate pair. However the output files presented with this data set includes the results for all three plate pairs: Africa-Antarctica, Capricorn-Antarctica and Capricorn-Africa. The input files (*.iotj.chang.points) are in the format required by the program Hellinger3. The first line gives the number of segments that the data are broken into. The rest of the file consists of individual data points, one point per line. Each data point includes the plate ID (1 = Capricorn plate, 2 = Antarctic plate, 3 = African plate), the segment ID, the latitude and longitude of the data point, an

estimate of the uncertainty in position, and an optional comment about the origin of the data point. The output (PAR) files were generated by the program Hellinger3. These files contain the bestfit rotation and the covariance matrices for the uncertainties. For each rotation there are three output files, PAR12, PAR13 and PAR23, one for each of the 3 plate pairs. The rotations in Table 4 correspond to the PAR23 output files.

The finite rotations given in Table 5 of Cande and Patriat (2015) were determined by summing the two-plate rotations given in Tables 2 and 3 using programs in the Royer and Chang software package.

References

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