Data Set: Indian Ocean Magnetic Anomaly and Fracture Zone Picks for Chrons 13o to 29o
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Date: August 26, 2013

Data Set Description

This data set consists of the input and output files for the Indian Ocean Triple Junction Euler rotations published in Cande et al. (2010). The Euler rotations were generated by solving the motions of three plates, the Indian, African and Antarctic plates, simultaneously using the best fitting criteria of Chang (1987, 1988), and Royer and Chang (1991). In this method the magnetic anomaly and fracture zone picks for each time step are broken into multiple segments. Each segment contains conjugate data points from two plates. Because there are outstanding tectonic questions in the Indian Ocean regarding the rigidity of different plates at different times, for example whether or not there was motion between the Carlsberg ridge and the Central Indian Ocean prior to Chron 24, the data constraints were considered in five different combinations as described in Cande et al. (2010). The files for the different combination of data constraints are presented in the five subdirectories in each of the input and output file directories.

The input files are in the format required by the program Hellinger3 which is part of the Royer and Chang software package. 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 = Indian (Capricorn) plate, 2 = Antarctic plate, 3 = African (Somalia) 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.

Cande, S.C., P. Patriat and J. Dyment, 2010, Motion between the Indian, Antarctic and African plates in the early Cenozoic, Geophys. J. Int., 183, 127-149

Chang, T., 1987. On the statistical properties of estimated rotations, *J. geophys. Res.*, **92**, 6319–6329.

Chang, T., 1988. Estimating the relative rotation of two tectonic plates from boundary crossings, *J. Am. stat. Assoc.*, **83**, 1178–1183.

Royer, J.Y. & Chang, T., 1991. Evidence for relative plate motions between the Indian and Australian plates during the last 20 m.y. from plate tectonic reconstructions: implications for the deformation of the Indo-Australian plate, *J. Geophys. Res.*, **96**, 11779–11802.