**1. REDBACK Smoothed APM models**

**Table S1.** Absolute plate motion model A of Africa (Mascarene fit), with uncertainties. The angle is given in degrees, Ages are in Ma, and *a*–*f* is given in rad2. For the uncertainties is set to 1 and *g* to 10-5. Covariance estimates for the *i*’th rotation are given by

**Table S2.** Absolute plate motion model B of Africa (Chagos-Laccadive fit), with uncertainties (see Table S1 for details).

**2. Unsmoothed APM models**

**Table S3.** Unsmoothed absolute plate motion model A of Africa (Mascarene fit), with uncertainties (see Table S1 for details).

**Table S4.** Unsmoothed absolute plate motion model B of Africa (Chagos-Laccadive fit), with uncertainties (see Table S1 for details).

**3. Global APM Predictions**

To investigate the implications of our APM results for net lithospheric rotation, we combined our APM models with RPM models that provide a continuous description of plate boundaries ([Gurnis et al., 2012](#_ENREF_37); [Seton et al., 2012](#_ENREF_65)). We then calculated NLR at 1 Ma intervals, both for our APM models and the other comparable models.

**Figure S1a.** Mascarene fit APM at 5 Ma

**Figure S1b.** Chagos-Laccadive fit APM at 5 Ma

**Figure S2a.** Mascarene fit APM at 10 Ma

**Figure S2b.** Chagos-Laccadive fit APM at 10 Ma

**Figure S3a.** Mascarene fit APM at 15 Ma

**Figure S3b.** Chagos-Laccadive fit APM at 15 Ma

**Figure S4a.** Mascarene fit APM at 20 Ma

**Figure S4b.** Chagos-Laccadive fit APM at 20 Ma

**Figure S5a.** Mascarene fit APM at 25 Ma

**Figure S5b.** Chagos-Laccadive fit APM at 25 Ma

**Figure S6a.** Mascarene fit APM at 30 Ma

**Figure S6b.** Chagos-Laccadive fit APM at 30 Ma

**Figure S7a.** Mascarene fit APM at 35 Ma

**Figure S7b.** Chagos-Laccadive fit APM at 35 Ma

**Figure S8a.** Mascarene fit APM at 40 Ma

**Figure S8b.** Chagos-Laccadive fit APM at 40 Ma

**Figure S9a.** Mascarene fit APM at 45 Ma

**Figure S9b.** Chagos-Laccadive fit APM at 45 Ma

**Figure S10a.** Mascarene fit APM at 50 Ma

**Figure S10b.** Chagos-Laccadive fit APM at 50 Ma

**Figure S11a.** Mascarene fit APM at 55 Ma

**Figure S11b.** Chagos-Laccadive fit APM at 55 Ma

**Figure S12a.** Mascarene fit APM at 60 Ma

**Figure S12b.** Chagos-Laccadive fit APM at 60 Ma

**Figure S13a.** Mascarene fit APM at 65 Ma

**Figure S13b.** Chagos-Laccadive fit APM at 65 Ma

**Figure S14a.** Mascarene fit APM at 70 Ma

**Figure S14b.** Chagos-Laccadive fit APM at 70 Ma

**Figure S15a.** Mascarene fit APM at 75 Ma

**Figure S15b.** Chagos-Laccadive fit APM at 75 Ma

**Figure S16a.** Mascarene fit APM at 80 Ma

**Figure S16b.** Chagos-Laccadive fit APM at 80 Ma