AGU PUBLICATIONS

Geochemistry, Geophysics, Geosystems

Supporting Information for

The Malawi Active Fault Database: an onshore-offshore database for regional assessment of seismic hazard and tectonic evolution

Jack N. Williams[1,2], Luke N. J. Wedmore[2], Christopher A Scholz[3], Folarin Kolawole[4], Lachlan J. M. Wright[3], Donna J Shillington[5], Åke Fagereng[1], Juliet Biggs[2], Hassan Mdala[5], Zuze Dulanya[6], Felix Mphepo[5], Patrick Chindandali[8], Maximilian J. Werner[2]

[1]School of Environmental Sciences, Cardiff University, Cardiff, UK

[2]School of Earth Sciences, University of Bristol, Bristol, UK

[3]Department of Earth Sciences, Syracuse University, Syracuse, New York, USA

[4]BP America, Houston, Texas, U.S.

[5]School of Earth and Sustainability, Northern Arizona University, Flagstaff, Arizona, USA

[6]Geological Survey Department, Mzuzu Regional Office, Mzuzu, Malawi

[7]Geography and Earth Sciences Department, University of Malawi, Zomba, Malawi

[8]Geological Survey Department, Zomba, Malawi

Contents of this file

Figures S1 to S3

Additional Supporting Information (Files uploaded separately)

Captions for Datasets S1 to S2

Introduction

Figure S1 shows plots for the power law exponents (α) and characteristic length-scale (1/λ) of the fault populations in the Malawi Active Fault Database, plotted as function of the fault length lower bound (L_{min}). Figures S2 and S3 are equivalent to Figure 7 in the main text but consider only the length of faults in Lake Malawi (Figure S2) or length of faults in South Malawi (Figure S3).

The Malawi Active Fault Database and Malawi Other Fault Geographic Information System (GIS) files are also included and described here as Datasets S1 and S2

Supplementary Figures

Figure S1

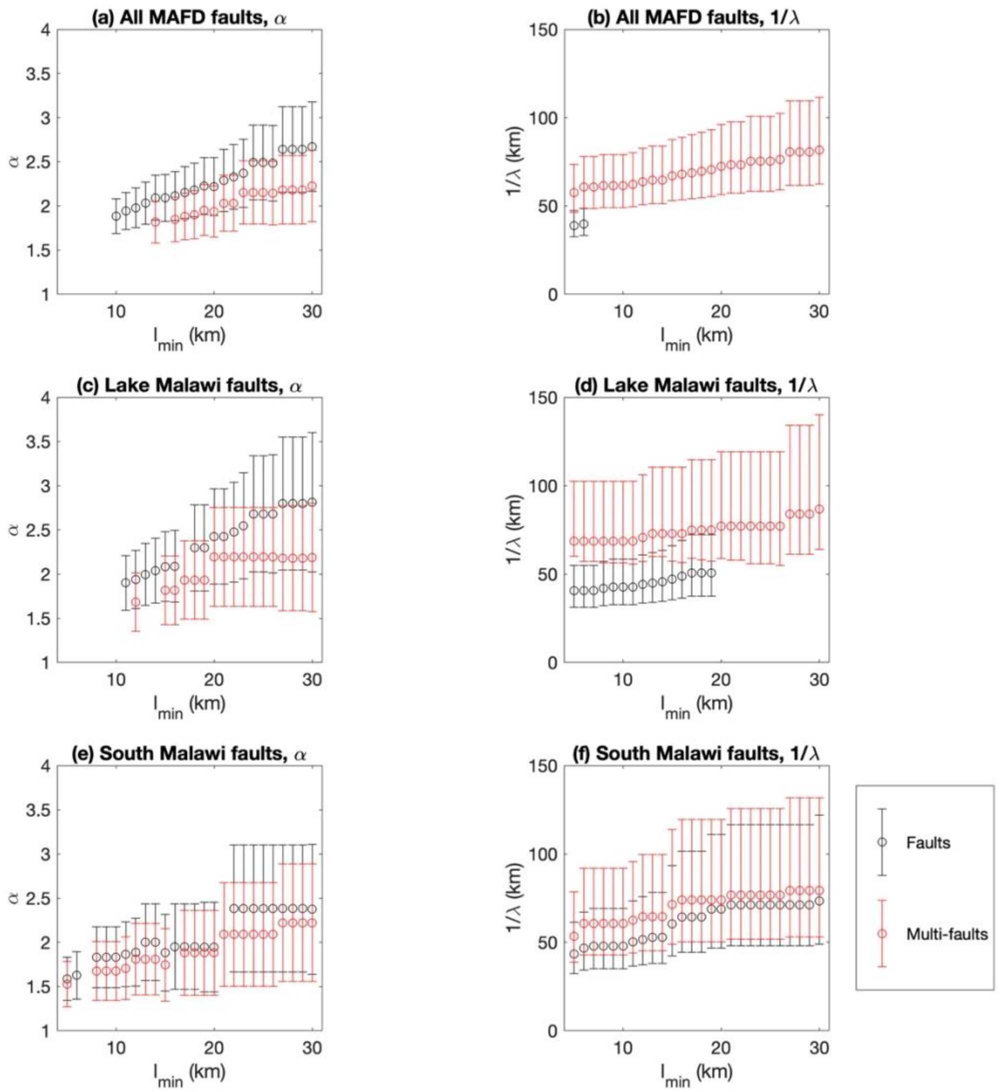

Figure S1: Power law exponent (α) and characteristic length-scale (1/λ) as a function of fault length lower bound (l_{min}) for fault length distributions that (a&b) consider all faults in the MAFD, (c&d) faults in Lake Malawi, (e&f) faults in south Malawi. Error bars show 95% confidence interval. Error bars only shown for l_{min} values where the null hypothesis is not rejected (i.e., $p>0.1$).

Figure S2

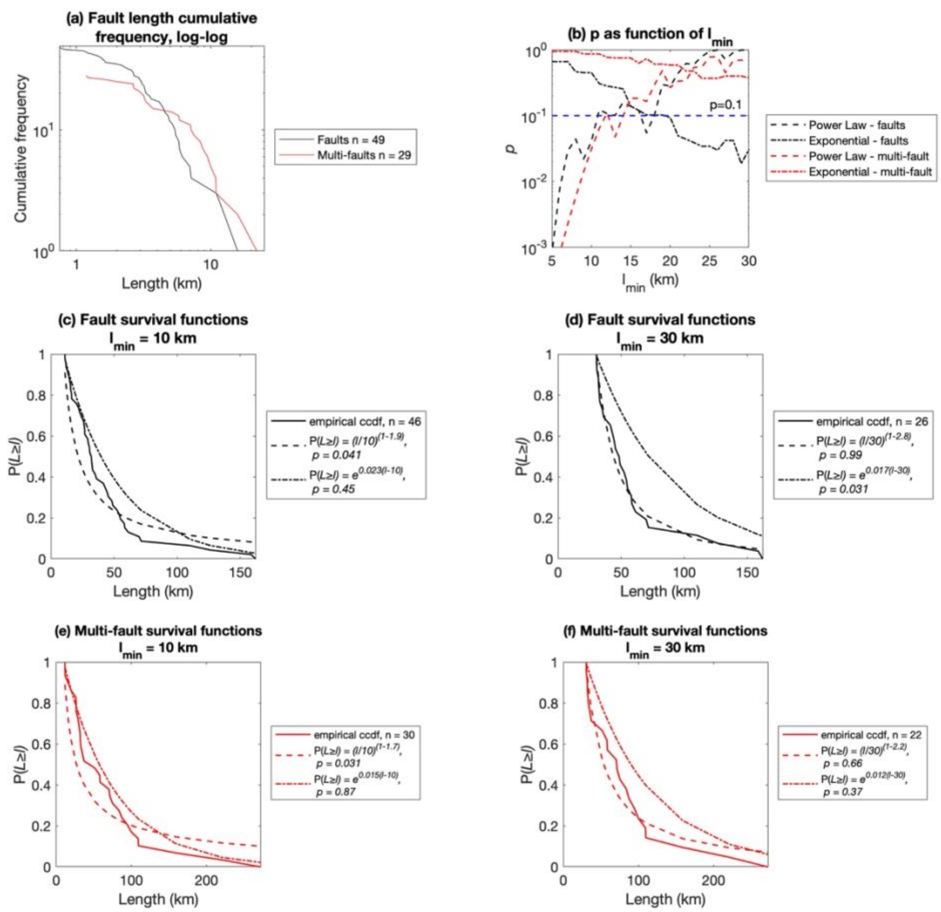

Figure S2: Equivalent to Figure 7 in the main text but considering only faults lengths mapped under Lake Malawi. (a) The empirical cumulative frequency of the lengths of these faults and considering cases where each fault represents a distinct fault, and where closely spaced *en-echelon* faults represent a single structure (the 'multi-fault case', see Section 3.3 in the main text). (b) Resulting *p*-value from two sample Kolmogorov-Smirnov (K-S) tests for the fit between empirical and theoretical survival functions of fault lengths, where the lower bound of fault length (l_{min}) is varied between 5-30 km. We consider both power-law (equation 1) and exponential (equation 2) survival functions in these K-S tests, with the power-law exponent and exponential rate parameter estimated via maximum likelihood. The K-S test rejects the null hypothesis when $p<0.1$ (highlighted). In (c)-(f), empirical and theoretical survival functions of fault lengths for representative values of l_{min} of 10 and 30 km, are plotted assuming (c&d) that each fault represents a distinct structure, and (e&f), the multifault case. For each of these plots, the equation for the theoretical trend, and its fit to the empirical trend (i.e., the *p*-value from a K-S test), is also reported.

Figure S3

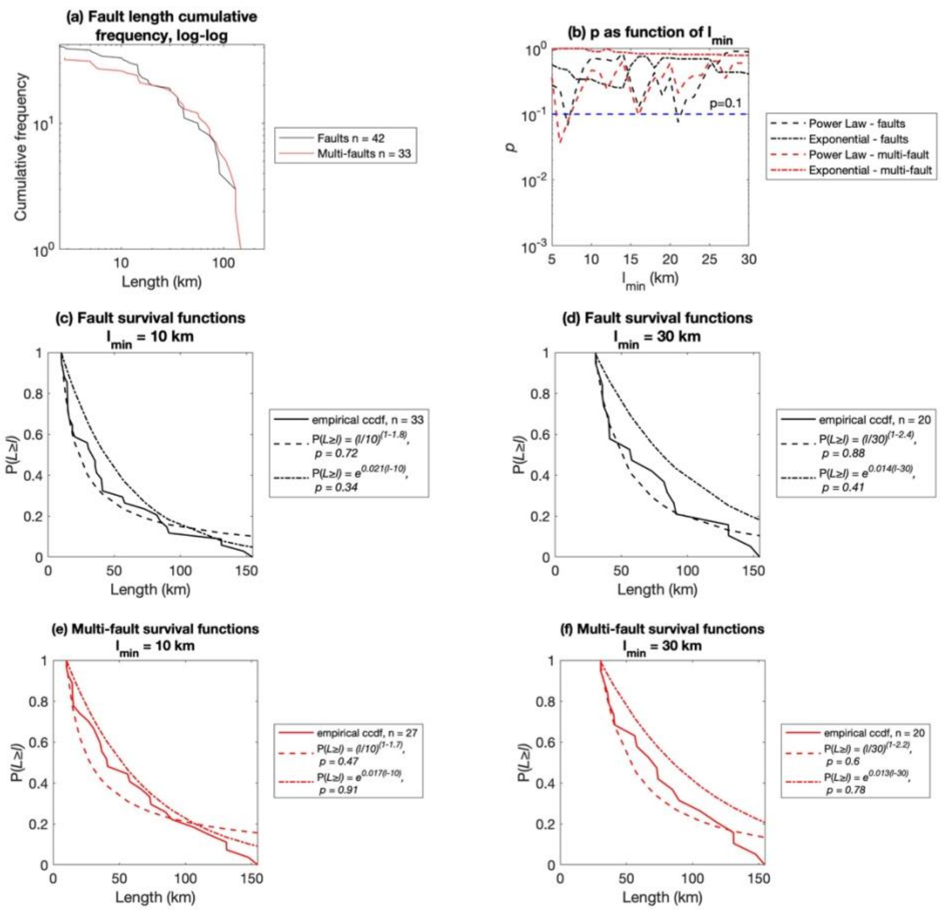

Figure S3: Equivalent to Figure S2 and Figure 7 in the main text, but considering only faults lengths mapped in south Malawi.

Additional Supporting Information

Data Set S1: the Malawi Active Fault Database (MAFD). Its principal component is an Environmental Systems Research Institute (Esri) shapefile (.shp) in which the geometry of the fault traces is stored. However, there are also a number of other files (.dbf, .prj, .qpj, .shx) associated with it which are necessary to plot the MAFD in standard Geographic Information Systems (GIS) software such as ArcGIS, Google Earth, and QGIS, and to access the geomorphic and mapping data associated with each fault (see Table 1 in the main text).

Data Set S2: the Malawi Other Faults GIS shape file. Information on how to view this file is equivalent to Data Set S1.