General considerations

The paper by Williams and colleagues provides information on the geometry, kinematics, and seismotectonic meanings of 275 possible earthquake sources in Malawi and surrounding regions. The earthquake sources are divided into faults, sections, and multi-faults based on commonly used segmentation criteria. The Malawi Seismogenic Source Model (MSSM) which completes and updates the previously published South Malawi Seismogenic Source Database represents a step forward in the knowledge of this poorly-studied area, representing a valuable and solid scientific basis for future studies on the seismicity and seismotectonics of Malawi.

The study is well performed. The manuscript is fluent, I had a good time reading it. Data are well presented and uncertainties are properly described.

My opinion about this manuscript is generally positive even though some points need to be further discussed and some improved or corrected. I hope my suggestions (comments attached) will be useful to improve this work. I consider the manuscript acceptable for publication with minor-to-moderate revision.

Major comments

Lines 63-66: *"However, faults do not necessarily rupture along their full length in a single event but may also host shorter ruptures bound by along-strike geometrical complexities, and/or longer 'multi-fault' earthquakes where adjacent faults rupture simultaneously (Biasi and Wesnousky, 2016, 2017; 65 DuRoss et al., 2016; Fletcher et al., 2014; Litchfield et al., 2018)…."*

This is a good point and it is good that the authors are emphasizing it; This is the concept of fault segmentation. Geometric and structural complexities, which can stop the propagation of the coseismic rupture, are commonly used to define segmentation. Recent literature proposes some criteria that can be adopted to define the segmentation of the fault portions, using as constraints both geological data such as the geometry or the coseismic effects (e.g., Bello et al., 2022a, 2022b; DuRoss et al., 2019; Valentini et al., 2020), and seismological data (e.g., Cirillo et al., 2022). I suggest expanding this part of the introduction with these concepts (or at least referring to them), thus strengthening the general and broad interest and projecting the manuscript towards future worldwide comparisons with similar tectonic contexts.

Ref.:

Bello S., Andrenacci C., Cirillo D., Scott C.P., Brozzetti F., Arrowsmith J R., Lavecchia G. 2022a "High-detail fault segmentation: Deep insight into the anatomy of the 1983 Borah Peak earthquake rupture zone (Mw 6.9, Idaho, USA)", Lithosphere 2022 (1): 8100224. https://doi.org/10.2113/2022/8100224

Bello S., Lavecchia G., Andrenacci C., Ercoli M., Cirillo D., Carboni F., Barchi M. R., Brozzetti F. 2022b "Complex trans-ridge normal faults controlling large earthquakes" Scientific Reports 12, 10676 https://doi.org/10.1038/s41598-022-14406-4

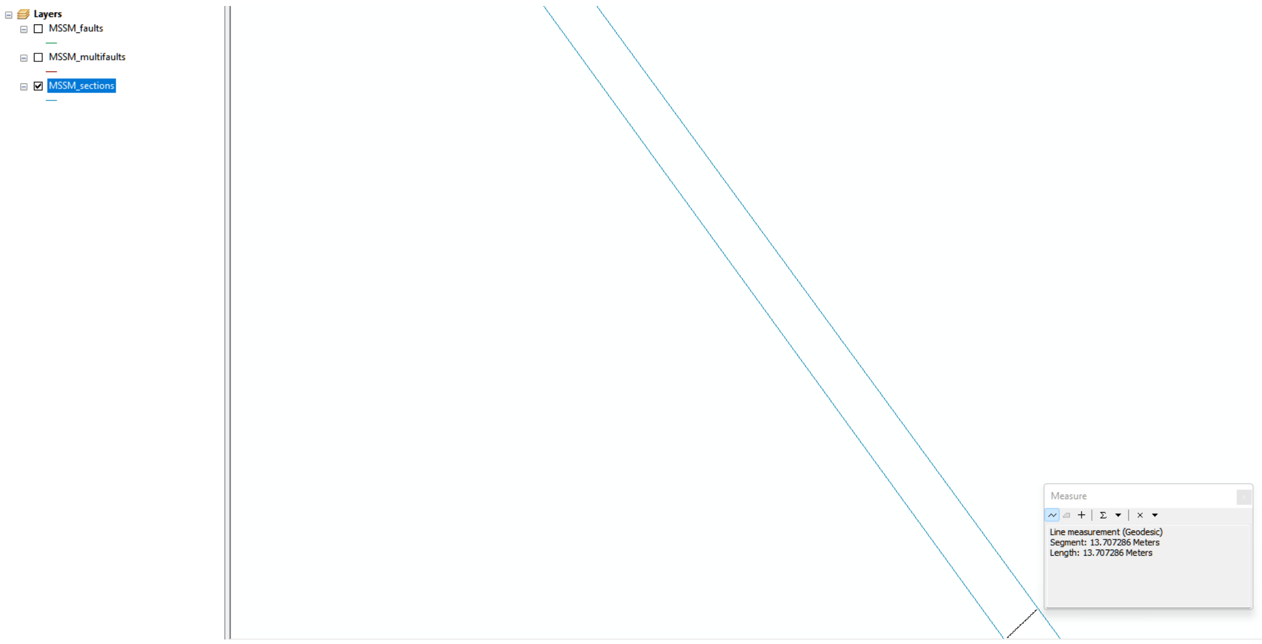
Cirillo D., Totaro C., Lavecchia G., Orecchio B., de Nardis R., Presti D., Ferrarini F., Bello S., Brozzetti F. 2022 "Structural complexities and tectonic barriers controlling recent seismic activity in the Pollino area (Calabria-Lucania, southern Italy) - constraints from stress inversion and 3D fault model building", Solid Earth. Vol. 13, No. 1, 205 – 228. https://doi.org/10.5194/se-13-205-2022

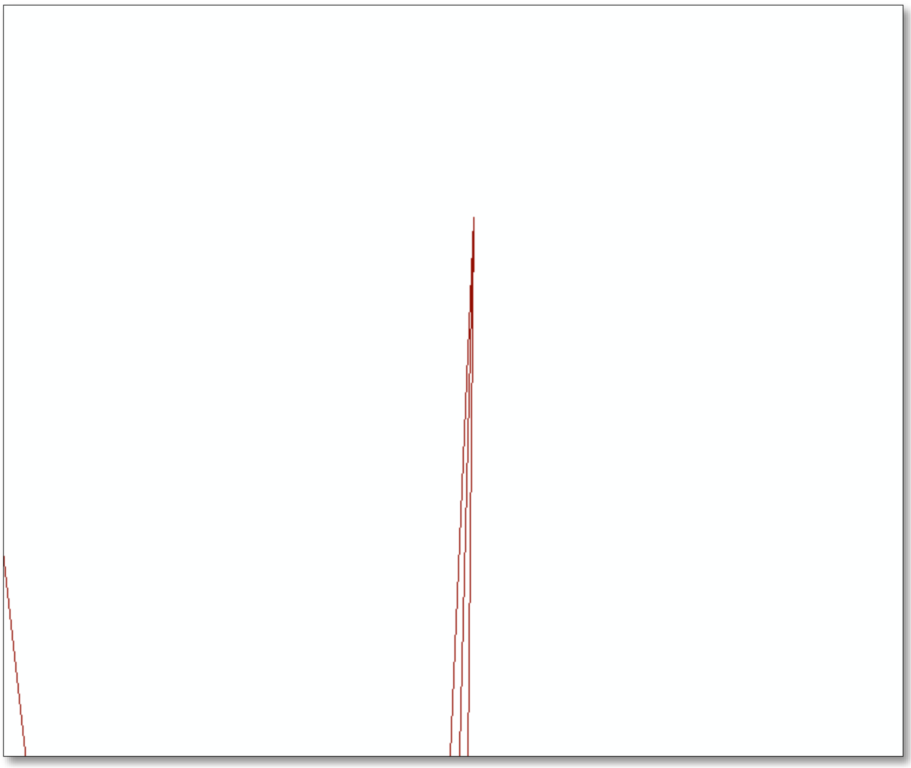
DuRoss, C.B., Bunds, M.P., Gold, R.D., Briggs, R.W., Reitman, N.G., Personius, S.F., Toké, N.A. 2019 “Variable normal fault rupture behavior, northern Lost River fault zone, Idaho, USA,” Geosphere, vol. 15, no. 6, pp. 1869–1892. https://doi.org/10.1130/GES02096.1

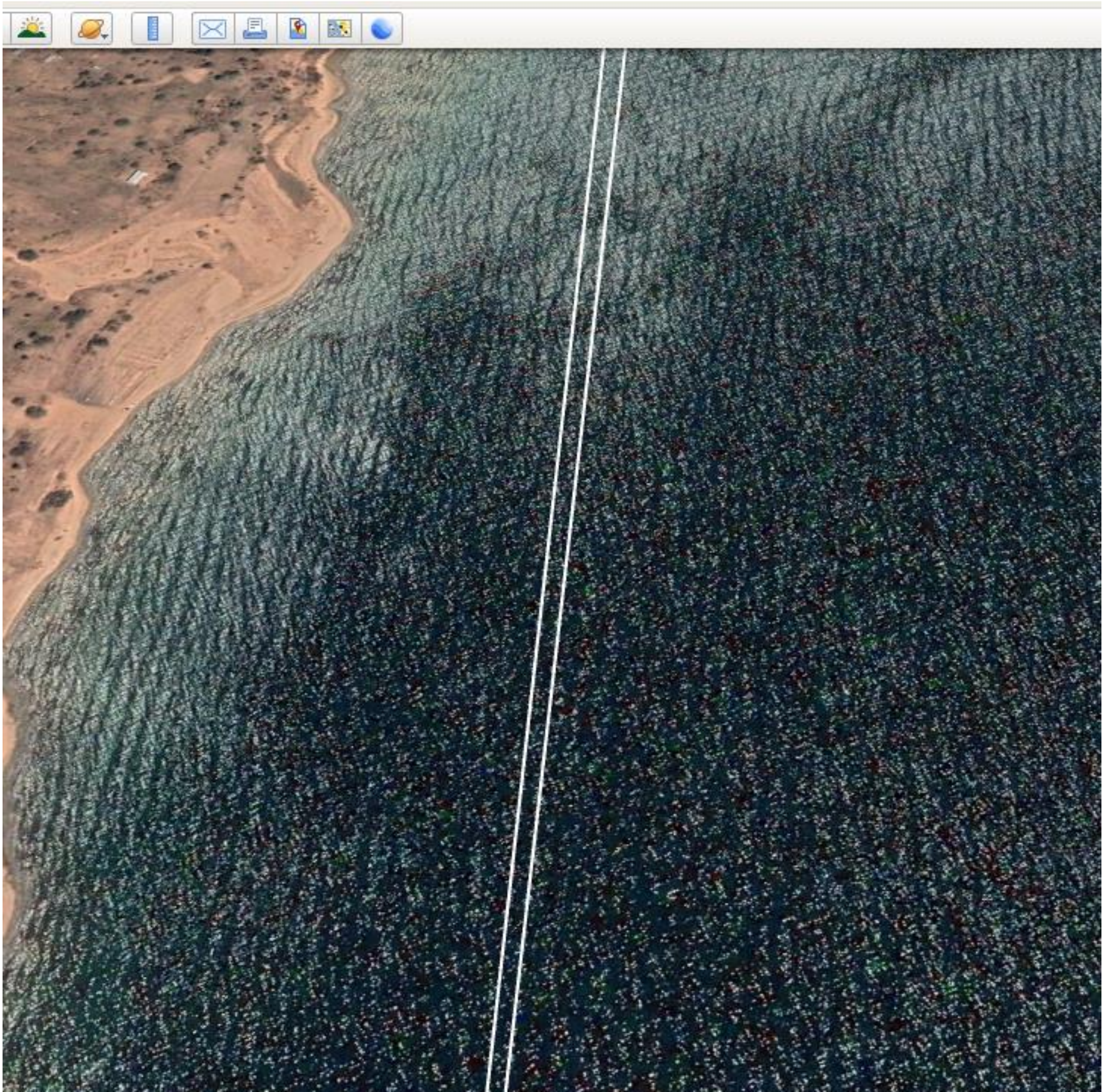
Valentini A. DuRoss C. B., Field E. H., Gold R. D., Briggs R.W., Visini F., Pace B. 2020 “Relaxing segmentation on the Wasatch fault zone: impact on seismic hazard,” Bulletin of the Seismological Society of America, vol. 110, no. 1, pp. 83–109. https://doi.org/10.1785/0120190088

Lines 63-66: *“These are freely available under a Creative Commons CC-BY-4.0 license on the Zenodo Data Archive (https://doi.org/10.5281/zenodo.5599616) and on 175 Github (https://github.com/LukeWedmore/malawi_seismogenic_source_model)....”*

A major issue that I found in uploading both the shapefiles on ArcMap and the .kmz on Google Earth, is represented by the constant presence of parallel lines (fault traces) which, if I deduce correctly, do not represent different faults but the continuation of two faults in a unique structure in the same location. In fact, these run for tens of km and are often only a few meters apart (see the screenshots below).

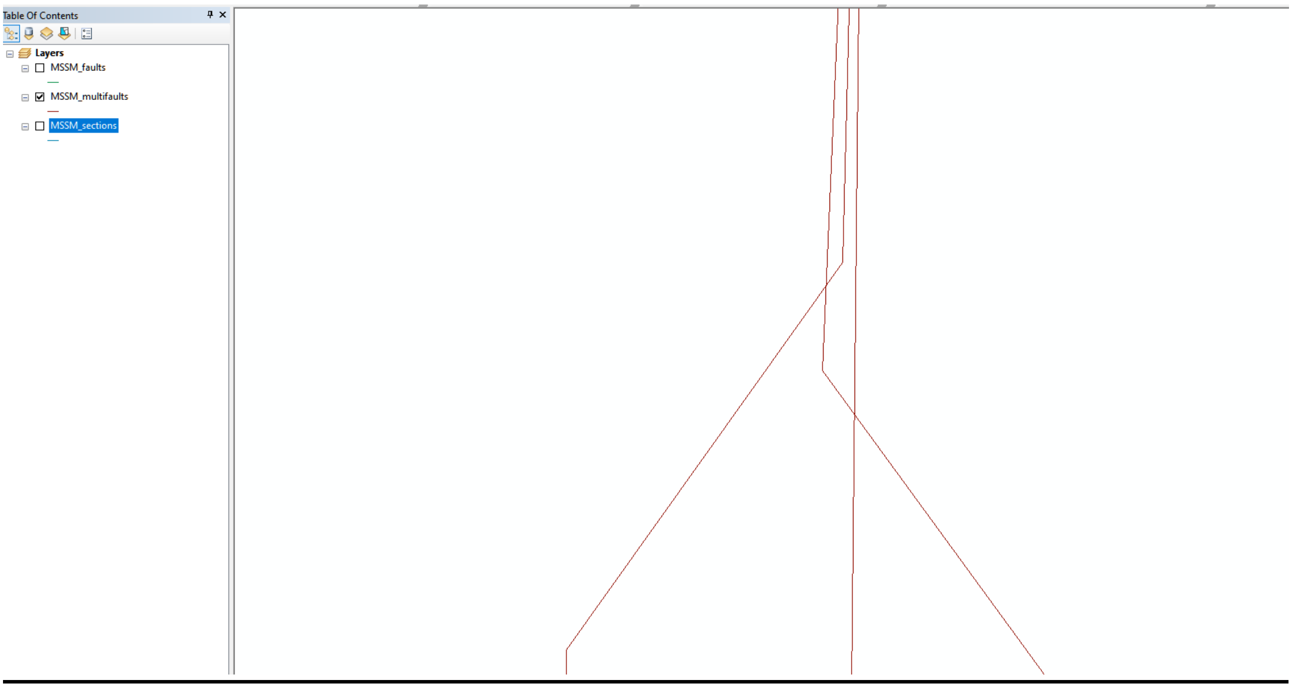






In other cases, lines that are only a few meters or tens of meters apart intersect several times (see for example the screenshot below). If this were the intention of the authors, and this is not considered an error, a problem of hierarchies between these structures would arise.

I believe that the files hosted in the repositories are fundamental and represent an important contribution to the knowledge of Malawi, but these issues must be corrected or well explained and discussed before publication to facilitate readers/users in working correctly with these data.



Minor comments

Line 81: *"… Malawi Seismogenic Source Database (MSSM)…"*

Change with "Malawi Seismogenic Source Model (MSSM)"

Line 121: *"… Global Earthquake Model Global Active Faults Database…"*

Please, refer to the GEM database as "The GEM Global Active Faults Database" as indicated by the authors.

Line 146: *"… principal compressive stress (σ3; Delvaux and Barth, 2010; Ebinger et al., 2019; Williams et al., 2019)…."*

please also refer to Delvaux & Sperner (2003).

Ref.

Delvaux, D. & Sperner, B. 2003 New aspects of tectonic stress inversion with reference to the TENSOR program. Geol. Soc. Lond. Spec. Publ. 212, 75–100. https://doi.org/10.1144/gsl.Sp.2003.212.01.06.

Line 136: Please align “Digital Elevation Model” and “DEM”. I would suggest always using the latter.

Line 167: *“… Database of Individual Seismogenic Sources in Italy (Basili et al., 2008) ….”*

please refer to the DISS database as follows:

DISS Working Group. (2021). “Database of Individual Seismogenic Sources (DISS), version 3.3.0: A compilation of potential sources for earthquakes larger than M 5.5 in Italy and surrounding areas.” (Version 3.3.0). Istituto Nazionale di Geofisica e Vulcanologia (INGV). https://doi.org/10.13127/DISS3.3.0

Lines 220-221: As previous comment when referring to the DISS database.

Furthermore, a recent database (QUIN 1.0) of fault-strain indicators and Quaternary fault traces for seismic hazard has been published by Lavecchia et al. (2022), which detailed the fault traces of the databases cited in line 221. Authors should also consider this latter database among the others.

Ref.

Lavecchia G., Bello S., Andrenacci C., Cirillo D., Ferrarini F., Vicentini N., de Nardis R., Roberts G., Brozzetti F. 2022 “QUaternary fault strain INdicators database - QUIN 1.0 - first release from the Apennines of central Italy”, Sci Data 9, 204. https://doi.org/10.1038/s41597-022-01311-8

Line 268: *“for which we use an intermediate estimate of 35 km”*

How was this value obtained? I don't necessarily disagree, but it's important to clarify the source of this assumption (unless I missed it elsewhere in the text). Was it calculated as the depth within which 90% of the hypocenters are concentrated? Or does it come from literature?

Lines 450-451: *“…or if this reflects that previously distinct faults are beginning to interact and coalesce in this more evolved part of the Malawi Rift”*

What do you mean by " are beginning to interact "? Is it about fault maturity and growth of normal faults? I agree with this statement, but a reference like "*sensu*.. author et al.," should be added. (e.g., Manighetti et al., 2007 and/or Cartwright et al., 1996).

Ref.

Manighetti, I., Campillo, M., Bouley, S. & Cotton, F. Earthquake scaling, fault segmentation, and structural maturity. Earth Planet. Sci. Lett. 253, 429–438. https://doi.org/10.1016/j.epsl.2006.11.004 (2007).

Cartwright, J. A., Mansfield, C. & Trudgill, B. The growth of normal faults by segment linkage. Geol. Soc. Spec. Publ. 99, 163–177. https://doi.org/10.1144/GSL.SP.1996.099.01.13 (1996).

Figures

Figure 1:

Please, enlarge the figure to full page to improve readability. The borders between the states are barely visible and the texts are too small.

Add a north arrow in both panels.

Figure 2:

Please, enlarge the figure to full page to improve readability and add a north arrow to all panels.

Figure 3:

What software did the authors use to prepare this figure (Move etc)? Would it be possible to add a panel containing a zoom on a smaller area? This would give an immediate idea of the relationships between the structures. (This is just a suggestion).

Figure 7:

Legends and the axes text in this figure are unreadable in their size. Please enlarge the figure or at least the text.