

Reviewer 3

The manuscript by Olaiz et al. offers valuable insights into the seismotectonics of greater Iberia. The authors have compiled and analysed over 500 focal mechanism solutions to enhance the understanding of the region's active tectonics. While there are some typos and inconsistencies in acronym usage (e.g., SHmax) and figure references (e.g., "Fig." vs. "Figure"), these are minor issues likely to be addressed during the production stage. Overall, the manuscript is well-organized but would benefit from an additional round of English editing. Therefore, I recommend publication pending minor revision.

Dear Reviewer,

We sincerely value your feedback. Your suggestions will greatly enhance the manuscript.

Please, find below our comments written in red.

Best regards,

Antonio Olaiz

Some general comments

A clearer explanation of the database would be helpful, particularly regarding how the authors identified and handled duplicate entries. While the highest %DC is mentioned, additional detail on the process would improve clarity.

During the compilation and merge of different databases, the date and origin time format was standardized. When two or more events share the same date, the time is reviewed. If the time also matches, the coordinates are analysed to confirm that it is the same event. Finally, the %DC is compared, and only the higher value is retained.

I feel the depth parameter was not thoroughly discussed across the different sections. For example, were there any observed changes in stress regime with depth? Also, I wasn't sure how depth was accounted for in Figure 3; was the map created using focal mechanism data? If so, how did you generate a map considering that focal mechanisms come from varying depths?

In this approach, we assume that the type of stress is uniform throughout the entire seismogenic crust. With two exceptions: The focal mechanisms in the Atlantic offshore, which, being only five in number, we have included mechanisms at mantle depths. The solution is very congruent. In the Western Betics population, where evidence of a vertical slab is present, we have considered two subpopulations: those above and below 20 km.

A clearer explanation on your 're-evaluation' for other stress data (inferred from WSM) would be great. Also, I think WSM has lots of stress inferred from focal mechanics solutions for this region. So, how did you deal with it as you also have a new comprehensive database of FMS.

We will update and expand the text accordingly including a minor update of the quality assignment of the Iberia data set which does not affect any of the results. The latter is only a technical issue to be consistent with the new release of the World Stress Map (WSM) database 2025 (Heidbach et al., 2025) and the WSM technical report TR 25-01 where the latest update of the WSM quality ranking has been published very recently (Rajabi et al., 2025). The Iberia dataset has been integrated into the WSM database release 2025 with these slight changes that we will also adopt in the manuscript.

Technically we started with the compilation of stress data records from the WSM database release 2016 in the area between 15°W – 5°E and 34°N – 45°N and re-evaluated each data record. For the sub-dataset of single focal mechanisms (FMS data records), we compiled a completely new dataset (see chapter 2 of the manuscript). This was necessary as the WSM cannot look into regional details. This is an agreement with the WSM policy encouraging regional studies (special study areas) that are more precise in the data assessment. If such a special study area is reported the dataset is replaced in the global WSM compilation. This has been done e.g. for Iceland (Ziegler et al., 2016) and more recently for Taiwan (Heidbach et al., 2022). These special study areas are also explained in the WSM TR 25-01 (Rajabi et al., 2025) and our study is one of these.

The completely new compilation resulted in 542 data records with robust focal mechanisms. These were used in two ways: First, determined from the nodal plane of each focal mechanism the P-, T-, and B-axes and applied the WSM guidelines to derive from these the S_{Hmax} orientation and the stress regime and assigned the data quality following the WSM quality ranking scheme (see WSM TR 25-01 of Rajabi et al., 2025). Secondly, we use these focal mechanisms for a formal stress inversion (FMF) that resulted in 24 FMF data records (see Tab. 5 of the manuscript).

For all other stress indicator types in the WSM from borehole data (BO, DIF, HF), overcoring measurements (OC) and geological fault slip analysis (GFI), we checked for each data record if the information needed to assign a data quality is provided and correctly taken from the original literature. We then re-assigned the data quality according to the latest WSM quality ranking scheme 2025 (now published in the aforementioned WSM TR 25-01). We also checked the literature for new data records in the regional of interest and added these to the compilation.

This new compilation of FMS data records from earthquake focal mechanism (n=542), new FMF data records (n=24, this study) and the new assessment of all old data records according to the up-to-date quality assignment resulted in average in a decrease of data records with higher quality, but we now have a consistent and robust dataset. This decrease is a typical result of other special study areas since lots of data records haven't been touched partly for 30 years when the first major WSM database was released in 1992, but progress in knowledge how to interpret data more robust results typically in a downgrading the quality following the up-to-date WSM quality ranking scheme.

References

- Heidbach, O., Liang, W.-T., Morawietz, S., von Specht, S., and Ma, K.-F.: Stress Map of Taiwan 2022, GFZ German Research Centre for Geosciences, Potsdam, 10.5880/wsm.Taiwan2022, 2022.
- Heidbach, O., Rajabi, M., Di Giacomo, D., Harris, J., Lammers, S., Morawietz, S., Pierdominici, S., Reiter, K., von Specht, S., Storchak, D., and Ziegler, M. O.: World Stress Map Database Release 2025, GFZ Data Services [dataset], 10.5880/WSM.2025.001, 2025.

Rajabi, M., Lammers, S., and Heidbach, O.: WSM database description and guidelines for analysis of horizontal stress orientation from borehole logging, GFZ Helmholtz Centre for Geosciences, Potsdam, WSM TR 25-01, 118, 10.48440/WSM.2025.001, 2025.
Ziegler, M. O., Rajabi, M., Heidbach, O., Hersir, G. P., Ágústsson, K., Árnadóttir, S., and Zang, A.: The stress pattern of Iceland, Tectonophysics, 674, 101-113, 10.1016/j.tecto.2016.02.008, 2016.

A supplement (or appendix) consisting of the details of 542 focal mechanics solutions would be great.

Following journal guidelines, a Zenodo repository has been created, including the complete and referenced database at <https://doi.org/10.5281/zenodo.14326528>.

The text in the data availability chapter has been modified to be more comprehensive.

Supplementary material includes the focal mechanism compiled and the calculated for this study is available at a Zenodo repository (<https://doi.org/10.5281/zenodo.14326528>). A database encompassing both the results of this study and vintage data from World Stress Map, is standardized in accordance with World Stress Map guidelines and accessible at <https://doi.org/10.5281/zenodo.14326528>.

Detailed comments

Line 90: use Geofon (GFZ-Potsdam) instead of GFZ-Potsdam.

Done

Line 99: Maybe show the Moho depth of the study area as a map?

It is drawn in the cited reference: Diaz et al., 2016.

Line 113: It needs a sentence or two to explain what the Reches (1992) method is known for and why did you prefer this method?

Done

This approach enables iterative testing of various friction coefficients, validated by angular criteria established by SLIP and PAM, as detailed in the subsequent section. The methodology has been recently revised and implemented in MATLAB (Buseti et al., 2014; Wetzler et al., 2021).

Line 115: thrust or thrusting?

Thrusting. Done

Line 115-117: What about stress orientation?

We have added "and stress-strain orientations"

Why both 3.1 (line 118) and 3.2 (185) have the same title (i.e., kinematic analysis)?

Sorry. We changed to 3.1 Kinematic analysis. Composite focal mechanism

And 3.2 Kinematic analysis. Slip model

Line 185 to 190 needs at least reference as you are providing some info from the literature.

The provided references (Reches, 1983; de Vicente et al., 1988) give this information.

Figure 3: What particular depth this map has been prepared for?

We answered that question in the second comment.

Line 763: change 'inver-sions' with 'inversions'.

Done

Figure 9: I see lots of SHmax orientations inferred from FMSs on this map. It would be great to clarify if there are new FMSs (based on your database) or if they were in the WSM database?

The map includes both orientations, the new obtained in this study and the previous included in the WSM database. It is hard to represent both using different symbols. However, the database is available at <https://doi.org/10.5281/zenodo.14326528>.

Figure 15: it would be great to add a background (e.g., topography) and some names on the map for those who are not familiar with the area.

This is what we initially did, with the map in Fig. 1 blurred. Other reviewers suggested that we better make the background white. We believe that simultaneous viewing of the two figures yields better results.