Point-by-Point Response to Reviewer #1 Angelo Camerlenghi

RC: This study presents a very interesting case in which high-resolution seismic reflection data collected on a continental margin with available high-quality geological and geophysical background data demonstrate the potential to improve the accuracy of measuring the rate of creep induced by normal faults. Unlike in previous studies, the high values of creep rate obtained with this study introduce the possibility that slip rate has dramatically increased in postglacial time, and faults may have reacted to seismic shaking with co-seismic slip. The suggested approach has a high potential for application when relevant geological and geophysical information is available, in hazard assessment in relation to the use of the seabed on continental slopes, in case of deployment of submarine cables, pipelines, or seabed installations. Therefore, the manuscript has the potential to become a substantial contribution to the understanding of submarine geological hazards.

AC: We thank the reviewer for his positive assessment of our work and for recognizing the importance of high-resolution seismic data in assessing submarine geohazards. We are pleased that the reviewer highlighted the potential application of our approach to seabed infrastructure such as cables and pipelines, as this was a primary motivation for our study. We have carefully addressed all technical and fundamental comments provided by the reviewer to further strengthen the manuscript's contribution to the field.

RC: The manuscript is well written, with clear and appropriate language, well structured, and illustrated with figures that are, in most cases, of good quality.

However, some key aspects of the study need to be addressed in a revision of the manuscript:

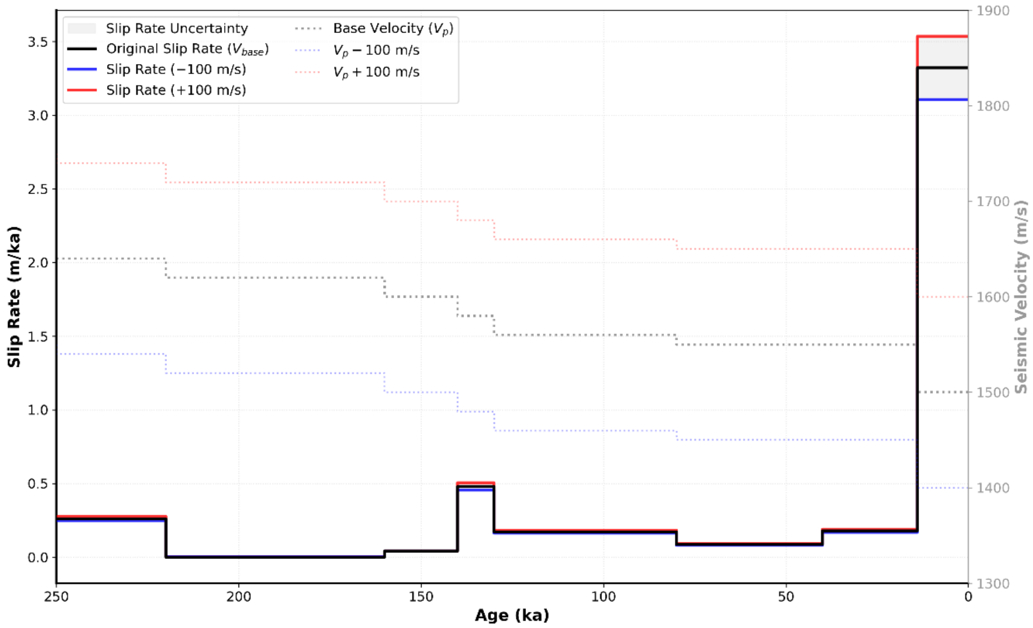
1) RC: The conversion to depth of the two-way travel times of the reflectors used for measurement (in meters) of the displacement across the faults is not addressed. One can assume that the deep penetrating, and lower resolution seismic reflection data available from oil and gas prospecting contribute to an overall three-dimensional seismic velocity field (Vp) that can be used for conversion. If so, it should be clearly stated in the Methods section. The seismic data processing is described up to a pre-stack time-migration.

AC: We agree with the reviewer that the methodology for time-to-depth conversion is essential for the transparency of our displacement measurements. We intend to clarify this process in the revised manuscript. Specifically, we will update the Methods section to include a detailed description of the depth conversion, specifying the interval velocity values used for different stratigraphic units and the basis for these selections.

2) RC: Even if a depth conversion is applied using a regional velocity field, the error induced by the velocity field in the displacement t,v calculation should be discussed. I think that this could be done by demonstrating, in a graphic form, how strongly the calculated displacement in meters depends on the velocity used for conversion.

AC: We thank the reviewer for this important suggestion, which will significantly improve the transparency of our error analysis. We intend to incorporate a sensitivity analysis into the revised manuscript, including a new figure that illustrates the relationship between the chosen interval velocities and the resulting slip rates. Furthermore, in response to this comment and the related points raised by Reviewer #2, we plan to add a dedicated subsection in the Discussion section focusing on uncertainties.

Velocity uncertainties plot:



3) RC: The high-resolution seismic reflection data used for this study are produced with a sparker source that produces a range of frequencies from 500 to 3000 Hz, which is appropriate. Given the importance of the high-resolution method in the study, displaying the spectrum of the source would help to understand where, in this frequency range, most of the energy is concentrated.

AC: We thank the reviewer for this constructive comment regarding the source's spectral characteristics. We intend to update the Methods section to include a more detailed characterization of the sparker source's frequency spectrum, specifically identifying the frequency range where the energy is most concentrated. This addition will be directly linked to an expanded discussion on vertical resolution, providing the necessary geophysical context for the precision of our horizon picking and the resulting displacement calculations.

4) RC: Seismic sources using the sparker method are known to contain a wide frequency spectrum, but the signature is generally longer than that produced by airguns or boomers, and often has lower repeatability. The implication is that the picking of the reflector used for the calculation of the displacement and to correlate dated horizons implies uncertainties.

AC: We thank the reviewer for this insightful observation regarding sparker characteristics. While we acknowledge the inherent limitations of some sparker systems, the GeoMarine Survey Systems sparker utilized in this study is a high-performance, modern system that provides a stable, highly repeatable, and sharp signal. We clarify that the perceived lack of precision in the current figures is partly due to graphic resolution limits during submission; however, we intend to provide higher-resolution figures and zoomed-in panels in the revised manuscript to better demonstrate the clarity of the data and the precision of our horizon picking. Furthermore, we will include a more detailed discussion on the acquisition method's impact on uncertainty, specifically addressing the system's vertical resolution. We will clarify that since the measured offsets significantly exceed the resolution limits, the calculated displacement rates remain robust.

RC: In the seismic images used for illustrations (e.g. Figures 4, 5, 8), the picking does not seem to correspond to a peak in the seismic wavelet. This does not invalidate the result of the study, but it requires a deeper discussion of how the acquisition method affect the error in the calculation of displacement and consequent rates.

AC: We thank the reviewer for this observation regarding the horizon picking. We intend to clarify in the revised manuscript that our picking strategy is designed to track stratigraphic boundaries, which may coincide with distinct seismic reflections in certain locations or represent transitions between different reflectivity packages (seismic facies) in others. To address this point, we plan to update the description of our interpretation procedure to explicitly state these criteria.

RC: I think that given the strong reference to the applicability of the method for offshore hazard analysis, a discussion on pro and cons of seismic methods providing similar frequencies, like new-generation boomer sources, small volume high resolution airguns, watergins and sparker sources will improve the quality of the study.

AC: We thank the reviewer for this suggestion. While we agree that various seismic sources offer different advantages, we believe that a comprehensive comparative evaluation of different acquisition systems is outside the scope of this study. Instead, our work focuses on the procedures and significant benefits of high-resolution imaging and stratigraphic interpretation for fault analysis. To address the reviewer's point, we will emphasize that the combination of sub-meter resolution and several hundred meters of sub-seafloor penetration is critical for this type of work. Furthermore, we will clarify that since our measured offsets remain significantly above the resolution limits of the system, the resulting interpretations and slip rates are robust.

5) RC: One final comment is on the presented relationship (direct or indirect) between sea-level rise and submarine slope instability. The cited literature seems to be a bit outdated (to about 10 -12 years ago). Recent positive relations are available, for example from the Pearl River margin (e.g. Li et al., 2016; 2025, https://doi.org/10.1016/j.epsl.2016.07.007, https://doi.org/10.1038/s43247-025-02949-z), or the Tyrrhenian margin (Sammartini et al., 2019 https://doi.org/10.1144/SP477.34, or Martorelli et al., 2023, https://doi.org/10.1016/j.geomorph.2023.108775)

AC: We thank the reviewer for these recommendations. We intend to update the manuscript with relevant recent literature to better reflect the current state of research in the field.