Dear Reviewer 1,

Thank you very much for your thorough review and for your evaluation of our manuscript. We have followed your suggestions line by line and incorporated the corresponding modifications into the manuscript. We have slightly restructured Section 1 (Introduction) to further emphasise recent literature on the joint inversion of InSAR and GNSS data and added relevant papers on the topic (including Wu et al., 2024). We have also revised several figures in accordance with your comments. We believe that these changes have improved the quality and readability of the manuscript. We remain at your disposal in case any further changes or clarifications are required. Please, find below the detailed responses to each of your comments.

Overview and general recommendation

This paper provides an InSAR Kinematic Modelling based on a reliable and widely used approach (TDEFNODE). As reported by the authors, this model has been applied in the study zone but is limited to GPS/GNSS data. The relevant point is the joint inversion of GNSS and InSAR velocities. The authors present all the expected elements for a manuscript like this. After a detailed review of the manuscript, I consider the paper suitable for publication, but it will require minor corrections, as outlined in the following comments.

General comments:

The abstract, introduction, data and methodology, strain rate field, kinematic results, discussion, and conclusions are generally well written; however, minor comments are outlined in the next section as suggestions for the authors' consideration. In my view, probably, the inversion strategy is one of the most interesting contributions of this paper. However, I note a lack of revision of similar joint inversion strategies by other authors (e.g.). Wu et al. https://doi.org/10.1029/2023GL106143.

L. 34. It's correct NW-SE instead east to west?.

We changed it for "in a WNW-ESE direction", which we think is more accurate.

Figure 1. CHORT (in the caption)- is shown in the figure as CHOR. Motions instead of motion. I suggest using a different color bar for FM solutions. 1 arcsec instead of arc. sec.

We have standardised all CHORT references to CHOR. The other minor changes were also implemented in the caption. We changed the colour scale to make the change with depth more visible in the focal mechanisms. We also highlighted the FORE block following the suggestions from Reviewer 2.

L.57. Figure 1 shows 13 mm/yr.

Indeed, it varies from ~12 to ~14 mm/yr along El Salvador (increasing towards the west). We have added the 12-14 mm/yr reference.

L.63. Cocos and North American plates.

Done.

L.65 translated *into.*

Done.

L.81. based *on* GNSS

Done.

L. 82. Staller (2014) “created”. The use of this verb sounds rare.

You are right, we changed it for “developed”.

L.89. “without including” instead of excluding or maybe another sentence more gentle.

We changed it to “without including”.

L.96. Data and *methodology.*

Done.

L. 106. GNSS time series *accounting for*

Done.

Figure 2. “mm/yr” for BC figures.

We changed it in the B and C subpanels.

L. 130. Guatemala.

Done.

L.149. “mark” instead of represent

Done.

L.157. Our models are fed by

Done.

L 161. (S=ΦV) italic?

Done.

L. 164. In the TDEFNODE, tectonic blocks are imagined as polygons limited by faults or free borders (McCaffrey, 2002; Meade et al., 2002).

We rephrased it and added the new reference: “In TDEFNODE, tectonic blocks are modelled as polygons bounded by faults or free boundaries (McCaffrey, 2002; Meade et al., 2002).”

L. 175. The crustal fault nodes,

Done.

L.180. In the text and figures, we found CHOR, CHORT. To review the uniformity in the whole manuscript.

Thank you for pointing this out. We have reviewed all references to the Chortís block throughout the manuscript and have standardised the terminology to “CHOR.”

Figure 3. To revise the grammar of the sentence in the caption “The CSAL block, together with Af and Bf faults appear with an asterisk,--”

We have rephrased that sentence in the caption: “The CSAL block and the Af and Bf faults are marked with an asterisk, indicating that we also present models in which the CSAL block is tied to the FORE block and, consequently, these faults are not inverted.”

Please, let us know if it is still not clear enough.

L. 230 “ a predominance of NE-SW extension around the ESFZ, and … , ~~which is~~ consistent with Staller (2014).

Changed.

L.237. Table 1**,** and Supplement…

We added the comma.

Table 1. “Plus sign” instead of Positive.

Done.

L. 280. We generally obtain..

Done.

L. 281. Remain instead fo exist.

Done.

L. 283. We deem it

Done.

L. 295. Rewrite the sentence. “Causes the biggest difference” sounds uncommon.

We have rephrased that sentence: “However, introducing the CSAL block in central El Salvador produces the largest deviations from previous geodetic results in the main faults of the ESFZ, (…)”.

Please let us know if it still needs to be polished.

L. 308. North.

Done.

L. 315. They show~~, thus,~~

Done.

L. 324. with high uncertainty

Done.

L. 326. ..dip nearly vertically.

Done.

L.328. We use ~~for our model~~ an average dip of 80º for faults within the ESFZ in our model.

Done.

L. 334. appears to be *predominantly* random in space,

Done.

L. 350. …this single *accounts* for

Done.

L. 360. To revise the meaning of the sentence. Maybe: "…ESFZ decrease in strength…"

We opted for "decrease in magnitude". Let us know please if it sounds more natural now.

L. 363. In areas where ~~there is~~ no clearly dominant fault accumulates deformation, …

We changed it to: "In areas without a clearly dominant fault accumulating deformation".

L. 374. To constrain its kinematics robustly.

Done.

Figure 6. (fault-parallel, fault-orthogonal)

Done.

L. 413. , the imposed creep

Changed (we understand that you were referring to “they imposed creed”).

L. 425. …match the observed one better,

Done.

L. 435. Another ~~factor to consider as a~~ potential source

Done.

L. 443. … than half are based on episodic

Done.

L. 448 … and we do not have the resolution to resolve this issue using geodetic measurements.

Done.

L- 480. Additionally, we ~~also~~ test the

Done.

L. 495. Since deformation can accumulate …

Done.

Figure 8. data, and the mean.

Done.

Dear Reviewer 2,

Thank you for your time and for reviewing our manuscript. We have carefully addressed the points you raised and revised the manuscript accordingly. In particular, we have modified Figure 1 to better illustrate the approximate extent of the volcanic forearc, and we have added a brief discussion explaining why our model does not extend to the NOAM–COCO–CARI triple junction. We also mention its approximate location based on Legrand et al. (2025). We believe that these changes improve the clarity and robustness of the manuscript.

This study uses GNSS and InSAR data to examine the deformation at the triple junction where the Cocos, North American, and Caribbean plates meet. The kinematic block model results for El Salvador are particularly interesting for this complex region as they also identify the distribution of the different zones of coupling. As the results are consistent with most of the data, presenting a new kinematic block model for El Salvador is useful for understanding the region. The work appears to be well executed and I have no specific comments.

Just two minor comments:

1. Could you please highlight the Forearc Sliver (FORE) in Figure 1, perhaps by coloring it differently, even if its borders are not be well defined?

We have coloured the approximate extent of the Forearc Sliver and indicated it in the caption. Please note that this figure has also undergone minor changes, as suggested by Reviewer 1.

1. You terminated your IPAL block until 91.8°W. However, based on seismicity, Legrand et al. (2025) have suggested that the Japaltagua fault may extend westwards to the Tacana volcano (at ~92.1°W), with the triple junction located close to this volcano (the first of the CAVA). Could you discuss this hypothesis? You decided to place the triple junction further to the east. Why?

Legrand D., Perton M., Spica Z., Jon J., Alatorre M., Peiffer L., Campion R., Valdés C., Caballero-Jiménez G., Vargas-Zamudio K., Espíndola J.M., De la Cruz-Reyna S., 2025: The Magma plumbing system and seismo-tectonics of the Guatemala-Mexico triple junction as revealed by the seismicity of the Tacaná volcano before and after the 2017 Mw8.2 Chiapas earthquake. *Geophysical Journal International,* 242, 1-14, https://doi.org/10.1093/gji/ggaf167

Since our data (Fig. 2) only extends to central Guatemala (and the InSAR coverage is even smaller) we are not modelling the triple junction. Therefore, we just extend the end of the Jalpatagua fault towards the west. Note that the Triple Junction is not modelled, neither the NOAM-IPAL boundary (they are left to creep freely). Following your suggestions, we have

added the corresponding explanation in section 2.3.1. (Geometry definition), making reference to the provided publication. Moreover, we have displaced the TJ label in Figure 1 to make it coincide with the Tacana volcano approximately (and we also extended the shadowed area representing the Forearc Sliver to that point).