

Dear Editor,

We are pleased to submit the manuscript '*A catalogue of 5000 aseismic slip events from the San Andreas, Anatolian, Dead Sea and Chaman fault systems*' to Seismica as a Data Report. We can confirm that this manuscript has not been previously published elsewhere and is not currently under consideration by another journal. Our research study aligns well with the aims and scope of Seismica, as our work focuses on near-surface aseismic slip, a crucial component of the overall earthquake cycle.

Since the 1960s, shallow aseismic slip has been monitored using creepmeters. This aseismic slip is often steady on surface faults but is occasionally interrupted by an impulsive or emergent acceleration in slip that offsets a surface fault by a few mm over a period of several hours to many days. Despite being known about for over 60 years, a comprehensive catalogue of events, akin to those used in earthquake seismology, does not exist; existing catalogues are confined to short time periods and limited locations. Here we present an analysis of timeseries data from 78 creepmeters on creeping faults worldwide between 1980 and 2023. We identify 5,695 slip events varying in amplitude from <1 mm to >1 cm, with durations from a few hours to a few weeks, recorded at sample rates from 1 s to 1 hour with a typical resolution of several μm . By providing these events in a unified form, this catalogue enables systematic future investigations into the mechanics and triggering of aseismic slip that were previously impractical.

Thank you for the thorough reviews and your helpful comments. In response, we have addressed the comments by:

- 1) Fixing typos throughout.*
- 2) Adding a new supplemental figure to show the difference between a creeplet and an artifact*
- 3) Moving some of the text to a new discussion section to improve the flow of the manuscript.*

We have also addressed reviews from two internal reviewers at the USGS. In total the USGS internal reviews requested many more modifications to the manuscript than the Seismica reviewers did, so the manuscript has many modifications. We hope that the Seismica reviewers will agree that those changes improve the manuscript as well.

Yours sincerely,

Daniel Gittins, on behalf of all co-authors

Editor Comment

In the "Data and code availability" section, could you please add the links to Zenodo in the section? The links are available in the reference item but it is an extra step for readers. It would be helpful to just add the links so the readers don't need to dig them out from the reference list.

Thank you, we have added the links to the two Zenodo resources.

Reviewer A:

I have some minor comments below about the writing and the figures. The references are pretty sloppy in terms of formatting: some have all caps for the title, some sources are abbreviated and others are not.

It seems like the issue with the references here is with Bibtex formatting. We will ensure these conform to journal standards on capitalization and other issues if the paper is accepted.

Line comments

47: Insert "Because" instead of "In that."

We have edited this to use the suggested phrasing.

77: Why do you spell out minutes but use the abbreviation for seconds?

We have made this more consistent using the abbreviation for both and have also made this consistent throughout the rest of the manuscript.

105-107: Pretty long sentence. I suggest "because" for "in that." A period after onset. A new sentence following onset that starts with "Then, the..."

We have shortened the sentence by splitting into two sentences using the phrasing suggested.

110: "to be contained"

We have rephrased this sentence to correct the tense issue.

111: It's a bit of shame that you describe something before you've described it (Section 4).

Thank you for this point; we agree that this logic was a bit recursive. We really mean that events deemed as instrumental noise, like stiction or two-data-point-events, were not included in the catalogue, so we have revised the sentence to "and removing any events that were originally identified but were deemed as noise on further more detailed examination."

115: You can trim some extra words: "event sequence originate from asperities in different..".

We have trimmed some words out of this sentence while keeping the original meaning.

117: I don't love using "you must fit a curve." I think I object to the pronoun in the sentence.

We have rephrased the sentence to remove the pronoun and made sure that the wording of this sentence and the following one now work together in the new wording.

127-128: Why do you capitalize the different types of events? Also, the order you name these slip behaviors doesn't match the order in Figure 5.

We have removed the capitalisation of these event types in the text and reordered them to reflect the order in Figure 5. This ordering was a left over from previous ordering in an earlier draft.

136: Titus et al. (2006) has three authors, not one. (Since that's me, it did make me wonder about whether there might be other mistakes in the references.)

We apologise for this error in the Titus et al. (2006) reference. We have subsequently fixed this issue in our reference manager and have also examined the rest of the references to make sure they are also correct. This point in the text has also been revised to take the slip velocity from a creepmeter and the reference was changed accordingly.

Section 4.5. I wondered if it would help to have a figure showing an artifact versus a creeplet?

We have added a comparison figure between a creeplet and an artifact to the supplementary material that now accompanies this manuscript.

226: I don't understand this phrase: "The complete separate of months-long creep surges from seasonal trends..."

We have edited the sentence to clarify that this should be separation and have also explained how the seasonal changes in creep rate are accommodated.

Section 5.1: Why did you only bin the different events into three categories, if you defined six different aseismic slip types?

This comment was raised by USGS reviewers as well. We have added: "In describing "slip events" in Figure 6, we did not include continuous creep (it is not an event) or afterslip (which often consists of ECEs), and did not make a specific distinction for triggered slip (triggering is simply described in the catalogue with a link to the possible triggering earthquake)."

287: I think you mean "occasional periods"

We have corrected the phrase to occasional periods.

292: Space between 1 and m.

We have added in the space between 1 and m.

316: Two creepmeters were installed (not was).

Fixed grammatical error

322: Space between 20 and s.

We have added in the space between 20 and s.

371: You use data as a plural word and then as a singular word in the same sentence. Pick one. And be sure it matches how you use the word data on line 373.

Thank you. We have standardized the use of data as plural throughout.

Figure 1. The text for the lat/lon is gigantic, especially compared to other maps you have included.

We have reduced the size of the text for lat/lon on figure 1 to make them closer in size to other figures.

Reviewer B:

line 96: remove "the method" after "examined"

We have removed this phrase.

line 110: "contain" should be "containing"

We have rephrased this sentence to correct the tense issue by using contain.

line 154: Section Triggered slip. Here the authors discussed the cause of the triggered slip as passing seismic waves. They have neglected the possibility of static stress triggering. It might be difficult to distinguish the dynamic triggering and the static triggering if the creep event is close to the location of the creepmeters. I suggest the authors explain why they have neglected the static stress triggering mechanism in this section.

Thank you for this point. We have added the following: "We note that there is also some evidence that earthquake-generated static stress changes can affect creep rates (Xu et al., 2018; Lienkaemper et al., 1997), but this effect is harder to identify in time series alone and requires event-specific modelling, so here we focus on the possible effects of dynamically triggered slip in the identified creep events."

line 274: "Figure 5c" should be "Figure 2c"

We have fixed which figure this is pointing to.

line 298: "Figure 5e" should be "Figure 2e"

We have fixed which figure this is pointing to.