We are truly grateful for the reviewers comments and questions that were highly relevant. We believe that they helped to clarify our observations.

The main change of this revised manuscript is the separation of the « Main » part into different sections "Data," "Methods,", "Results" and « Statistical Analysis » sections. We expanded the details on the GKN station in the "Data" section and in the Supplementary Material. Additionally, we further developed the "Results" section by discussing the seismicity evolution at distances of 0-20 km from the epicenter. We insist on the short durations of the clusters occuring in 2010 and 2014 compared to the one that occurs only one month before the mainshock.

We extended the paragraph on this latest cluster occuring in March 2015 since it is, as reviewer B pointed out, the most important observation of this manuscript. We also moved the figure of the seismic cluster from March 2015 from the Supplementary Material to the main text (now Figure 4).

We added the equation for the magnitude computation (equation 1) and detail how the declustering is done. Furthermore, we added an explanation on the Z score use and its definition (equation 2).

We hope that the changes and details added will give more clarity to the paper and highlight the observation of a preparatory phase in an intercontinental subduction fault system, that is the Himalayan megathrust system.

Reviewer A :

Seismicity acceleration and clustering before the M w 7.9 Gorkha earthquake, Nepal

B. Gardonio et al., 2025

Review report

In this article, the author used data from a single station in Nepal and a template-matching technique to see the seismicity before the 2015 Gorkha earthquake. I found the work done by the author is well explained and addressed related questions.

Evaluation

I found the manuscript is written in good format and the research question and their answers are clear and nicely illustrated. The findings are novel mainly because of the seismicity associated with a pre-seismic phase in the context of Himalayan earthquakes. This is a good contribution to the field.

Comments

Here are my comments mostly they are minor.

Line 19: Gorkha Nepal earthquake >> Gorkha earthquake in Nepal

We modified l. 19

Line 61-63: Why closer stations are better?

We search for microearthquakes with typical magnitudes below 2, and proximity to the analyzed area is crucial. For instance, the template in Fig. 3 (shown in red) was not detected by KKN, the second closest station in the studied area (located in Fig.1). This highlights the need to be sufficiently close to the small earthquake sources to detect them. The GKN station provides us with this advantage and opportunity. We added a sentence in the manuscript to specify this l. 77-78.

Section 2: Main, is it Methods and Data? Please be more specific.

Thank you for pointing that out. We specified the different paragraphs and clarified the sections.

Line 76-78: Add some information about the GKN station for example geophone frequency, flat frequency response, installation, etc. In addition, I strongly recommend adding a PSD PDF plot for the GKN station to see the noise level over time.

We added information about the GKN station in the « Data » paragraph on l.79-85 and added its PSD in Supplementary Material for 2014 (Fig. S1) and 2015 (Fig. S2).

Line 82: Add ~ sign before 23km >> ~23 km.

Added l. 98

Line 96-98: It is better to mention what % of the data are available for GKN in the given period.

We added this information in the Data paragraph, l. 93-94

Line 119: Depth uncertainty, please cite the source.

We added the source, l. 127

Line 123: Nepalese >> local

Corrected l. 131

Line 157: distance of about 17.5 km

Added l. 184

Line 224: I suggest adding similar LVZ findings in other parts of the Himalayas, for example, western Nepal.

Thank you for the suggestion, we added a citation of Subedi et al., 2018 in l. 293

Line 237: Activity is not correct

Modified by « seismicity » l. 306

Reviewer B :

Gardonio et al. performed a template matching study using 6 years of data recorded before the 2015 Mw 7.9 Gorkha earthquake (Nepal) by a single station located near the epicenter. They used 1,851 template waveforms corresponding to local catalogued earthquakes in order to detect micro-events in the vicinity of the fault area where the earthquake initiated. They find an increase in the micro-seismicity rate one month before the earthquake and argue this highlights a precursory process.

First, I have to say that the quality of the writing is rather poor, to the level that it is difficult to follow the reasoning of the authors. Second, this manuscript appears to be brutally copy-pasted (by

parts) from an unsuccessful previous submission to another journal. This makes the manuscript awkwardly structured, with technical parts – likely moved from previous supplementary material to the main text – appearing in the middle of broader discussion parts and supplementary figures not corresponding to the ones called in the main text (S10) or not mentioned at all (S8, S9) neither in the main text nor in the supplementary information. Therefore, I would only recommend publication of this manuscript after significant improvement in the quality of the writing (fixing numerous typos, and reformulating many awkward phrasing).

This said, the observation reported by the authors does seem interesting. My main comment will be to provide more details on the last sequences before the Gorkha earthquake (the big yellow and red dots in Fig 3). I would like to see the details of the time evolution of those 2 sequences (on a magnitude vs time plot). I understand that the authors cannot formally calculate magnitudes with their template matching procedure but a very decent proxy for the relative amplitudes would be the relative waveform amplitudes of the different events. Since all these earthquakes are interpreted as occurring at the same location and since all the observations are recorded at the same station, the relative magnitudes should scale with the waveform amplitudes in a pretty straight forward way. The idea behind this request is to make sure those sequences are not mainshock-aftershock sequences. The observation would still be interesting regardless of the outcome of this specific point, but presenting the details of those 2 sequences would be an important added value to the existing literature (specifically to Huang et al., 2017): what about the recurrence times of those events (are they close to periodic? Accelerating? Decelerating?). This is the most interesting observation of the paper. I strongly recommend focusing on analyzing the details of those sequences.

While writing this, I realized this may have been what the authors show in Figures S8, S9, S10, but there is no mention of those figures neither in the main text nor in the supplements (and therefore no explanation on how those figures have been made nor any discussion and the results).

Thank you for your pertinent remarks. We reorganized the manuscript into clearly identified paragraphs and clarified their content. We added informations on the different period of seismicity increase for earthquakes located at distance 0-20 km from the epicenter. We also put in the main text the figure of the cluster occurring one month before the Gorkha earthquake. Furthermore, we made sure that all supplementary figures are called in the text.

I am listing some more minor comments below:

L85-88: Are there other stations that could be used in a multi-station template matching approach? At least comment on if they exist and why you are not using them?

We added a comment l. 77-78 to specify that the KKN station is too far to detect micro-earthquakes because it hasn't detected all the templates detected by the GKN station.

L90: obspy template matching code –> corrected it l. 107

L91: "about"? Give the exact number –> corrected it l. 108

L102: Can you write a decent formal equation? –> We added the equation for the magnitude (equation 1) and for the Z statistics (equation 2).

L127-128: Interesting point. Where can we see that? –> We detailed the analysis of period g represented in Figure 2c at lines 174-196 and add the Figure of the 2015 cluster in the main text.

L147: "Fig. Fig." –> corrected it.

Fig 2: It looks like the 0-20km seismicity before Gorkha is dominated by 2 templates (large red and orange dots)? These should be illustrated in more details (see major comment above).

Thank you, we added a figure that shows the detail of the sequence detected by these two earthquakes and expanded the paragraph on the 0-20 km seismicity.

Fig S7: "Fig ??" in caption –> We corrected it.

L149-150: "This cluster is detected by two, very close-by earthquakes"?? –> We rephrased it l. 176

Clusters detected by earthquakes? –> we rephrased it l. 176

L176-178: "always"?? –> we removed it

L178-179: Either I am missing something or this doesn't make sense. What you are writing is that the seismicity rate change is always significant (what does that mean?) but in the few months before the event? I don't understand how this fits in the big picture of a precursory process. Please clarify.

We have clarified the paragraph by adding the definition of Z. It evaluates the difference between two means, i.e. the mean rates before and after a change point. This is based on a null hypothesis of stationarity (equality of observed rates before and after the changepoint). Z >2 means that the increase in seismicity rate is statistically significant. We tested different change points to see how the Z score evolves with time. When applied to the raw catalogue, Z is always greater than 2. When applied to the declustered catalogue, it is greater than 2 except after April 2015, when the data ends.

Recommendation: Resubmit for Review