Report #1

The authors have substantially revised their manuscript and addressed the reviewers' comments. However, I note that the statistical significance of the results still lacks in-depth analysis and that a few minor comments should still be addressed before publication:

The total number of samples is only 114, but it was reduced to 88 for the rainfall analysis and even to 10 events for the Réunion hotspot. With such small population sizes, the significance of the results must be discussed carefully. Distributing events into monthly bins should be avoided when the number of samples is too small (e.g., in hotspot analyses), and using 2 seasons instead of 12 months might help.

Thank you for your suggestion. We agree that our sample sizes are very small. Events were not binned for statistical analysis, only for visualization in plots, and events that occurred at hotspots were not statistically analyzed because they had such small numbers. We add a clarification in the methods:

"Monthly bins for hot spot analysis were only used for visualization and not statistical analysis."

We do note in multiple places (including in the abstract and conclusion) caveats with the statistical results, including that the underlying dataset is likely incomplete:

"The complicated relationship between rainfall and fatal coastal cliff failures could also be related to the limited number of events available for analyses in both hot spots."

In addition, several sections (San Diego hot spots, wet/dry rainfall analysis) do use seasonal context as suggested.

Similarly, for the multivariate negative binomial regression model of cliff failure per country, the number of events (<30) seems too small for the number of predictors (5). This point should be discussed for clarity.

We agree that there are a low number of countries discussed, and have added a new paragraph regarding this issue in response to the next comment.

Finally, a paragraph discussing statistics for small sample sizes and how the authors addressed this issue would be necessary.

Thank you for this suggestion. We agree and as indicated above, have added the following paragraph to the discussion:

"Throughout this paper, the number of events are underestimated because of several stated biases. In addition, other data treatments such as separating events and fatalities into countries resulted in a small sample size (27) compared to the number of predictors tested (5). These types of statistical tests would be more robust with additional data points. Because of the small sample sizes, results should be interpreted with caution."

Report #2

The authors have addressed the principal concerns raised in the previous review. The manuscript has been substantially improved. Before publication, the following points should be clarified:

1. The manuscript states that countries without a recorded fatal coastal cliff failure were excluded to avoid zero inflation. Please clarify that the resulting country-scale regression models are conditional on countries with at least one documented event. The findings should not be interpreted as explaining the global occurrence or absence of fatal coastal cliff failures across all countries. If feasible, please include a brief sensitivity analysis or explain why a zero-truncated, hurdle, or zero-inflated modelling framework was not adopted.

Thank you for this suggestion. We have now added the following to the methods:

"These country-scale models are conditioned on the presence of at least one documented event per country and not intended to account for the global pattern of occurrence or non-occurrence of fatal coastal cliff failures."

We also now provide a sensitivity analysis and further model choice explanation in the methods:

"We do not know if countries without a fatal cliff failure event actually had no events or if zeroes are a byproduct of biased information in the dataset. Because we purposefully excluded zeroes, we tested the sensitivity of our models using zero-truncated models, which resulted in similar statistical results (tourism and per-capita GDP significant for events and population significant for fatalities) to non-truncated models."

2. Please describe the daily rainfall analysis in sufficient detail to ensure reproducibility. In particular, clarify the unit of analysis, whether non-event days were included, the temporal aggregation procedure, the response variable used in each model, predictor scaling, and the reporting of uncertainty intervals. If the analysis of event frequency is based solely on dates when failures occurred, the interpretation should be revised, as event incidence cannot be evaluated without comparison with non-event periods.

Thank you, we have now clarified in the methods that daily rainfall units are total millimeters per day, that non-event days were not included, clarified response variables, uncertainty, and scaling. IRR confidence intervals are now also reported in the results.

This following was also added to the methods:

"However, we do not compare event periods to non-event periods because of low event counts and uncertainty regarding non-event periods (database incompleteness or actual lack of events), these rainfall patterns should be interpreted with caution."

The following underlined sections show the new changes:

“To evaluate seasonal relationships between rainfall and fatal coastal slope failures, we used gridded 1.0° daily total precipitation (mm) from the NOAA Global Precipitation Climatology Project (GPCP) (Adler et al., 2017; Huffman et al., 2001). Using data from the nearest grid point within the global precipitation grid, we compiled total rainfall for the day-of the event, 1, 7, and 30 antecedent rainfall totals, and the associated anomalies compared to average rainfall for those time spans. 26 events out of 114 (23\%) lacked precipitation matches because they occurred outside the time span of the precipitation data (October 1996 to 2024). Events without matches were excluded from the rainfall analysis. We also note that 1.0° grid cells may not account for local variation in precipitation. Days without events were not included in statistical analysis. However, we do not compare event periods to non-event periods because of low event counts and uncertainty regarding non-event periods (database incompleteness or actual lack of events), and rainfall patterns should be interpreted with caution.”

“We completed a univariate negative binomial regression analysis on daily global precipitation values using day-of, 1-day, 7-day, and 30-day antecedent anomalies and total precipitation for those time spans. Response variables were event counts ($n=88$) and fatality counts per event ($n=86$ because two events had an unknown number of fatalities). Uncertainty is reported within profile likelihood 95% confidence intervals. Rainfall anomalies were calculated for the designated time span before the event, compared to the average precipitation for that same time span over the full dataset at the same location. A two-sided binomial test was used to test if there was a significant difference between positive and negative rainfall anomaly counts associated with fatal coastal cliff failure events. Total precipitation values are raw and unscaled because we used univariate negative binomial regression.”

“Multivariate negative binomial regression indicated that per-country ($n = 29$ countries) international tourism visits had the strongest relationship with the number of events (Fig. 3; $p = 1.08e-07$, IRR = 1.26, 95% CI [1.16, 1.37]). Per-capita GDP also showed a significant relationship to fatal coastal cliff failure events, ($p = 0.026$, IRR = 1.14, CI [1.01, 1.29]). The country population, length of coastal cliffs, and percentage of coastline composed of cliffs did not significantly explain the number of fatal coastal failures on a per-country basis for the full dataset and for a post-1995 subset of the data (not shown).”

“For coastal cliff fatalities ($n = 27$), per-country population had the strongest relationship of the tested variables (Fig. 4; $p = 0.024$, IRR = 1.96, CI [0.96, 4.58]). Tourism, per-capita GDP, length of coastal cliffs per country and cliff percentage did not exhibit strong relationships with per-country coastal cliff fatalities. These results are consistent with a post-1995 subset of the dataset. Locals and tourists were impacted almost equally, with 66 locals and 69 tourists killed (and 157 fatalities of unknown victim affiliation).”

3. The new appendix states that the first source documenting each event is retained and that duplicate sources are listed only when they provide additional information. Please also explain how duplicate events were identified across sources and how conflicts in reported dates, locations, or fatality counts were resolved. This information is necessary for database reproducibility.

Thank you for this suggestion. The appendix now states:

“Source: The first source found that documented the event. Duplicate sources are not listed unless they provided additional information used to locate or date the event. Duplicate events were identified if both sources listed similar locations, dates, and event-victim descriptions. Precision was altered to reflect location conflicts across sources (wider precision). In the rare case of a date conflict, the most local source (local news site) date was used. Fatality counts did not conflict across sources.”

4. Please report the results of the post-1995 sensitivity analysis clearly, preferably alongside the full-period results. Include the sample size, estimated coefficients or incidence-rate ratios, uncertainty intervals, and a concise statement indicating whether the principal conclusions remain unchanged.

Thank you for the suggestion. The results of the post-1995 sensitivity analyses are now reported as follows:

“Multivariate negative binomial regression indicated that per-country ($n = 29$ countries) international tourism visits had the strongest relationship with the number of events (Fig. 3; $p = 1.08e - 07$, IRR = 1.26 95%, CI [1.16, 1.37]). Per-capita GDP also showed a significant relationship to fatal coastal cliff failure events, ($p = 0.026$, IRR = 1.14, CI [1.01, 1.29]). The country population, length of coastal cliffs, and percentage of coastline composed of cliffs did not significantly explain the number of fatal coastal failures on a per-country basis for the full dataset. These results are consistent with a post-1995 subset of the data (n=29, Tourism [p=6.7e-07, IRR=1.22, CI [1.13, 1.33]], GDP [p=0.045, IRR=1.12, CI[1.00, 1.26]]).”

“For coastal cliff fatalities ($n = 27$), per-country population had the strongest relationship of the tested variables (Fig. 4; $p = 0.024$, IRR = 1.96, CI [0.96, 4.58]). Tourism, per-capita GDP, length of coastal cliffs per country and cliff percentage did not exhibit strong relationships with per-country coastal cliff fatalities. Population was not significant with a post-1995 subset of the dataset, nor were other factors. People local to the area and people traveling to the area were impacted almost equally, with 66 locals and 69 tourists killed (and 157 fatalities of unknown victim affiliation).”

Minor author initiated modification:

To improve clarity of the manuscript regarding tourism, we changed language regarding “tourist” to “victim traveling to the area” and local to “victim living in the area,” and added the following sentence to the discussion:

“We note that simply labeling victims as “tourist” or “local” does not capture the familiarity of the victims with coastal hazards.”