

Title: Deadly disasters in Southeastern South America: Flash floods and landslides of February 2022 in Petrópolis, Rio de Janeiro

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This work was intended to investigate the causes of the landslide that occurred in Petrópolis city, Rio de Janeiro, Brazil, on February 15, 2022. Despite the authors' efforts, several crucial points needed to be revised and remade. Considering that, I suggest reconsidering the manuscript with MAJOR REVISIONS.

Abstract:

- The authors mention two datasets. The first one started in 1977, and another one began in 1985. Where did the data from 1932 come from? Is it another dataset?
- What means "*urban sprawling .. to*"?
- The authors also say that they will investigate the root cause of the landslide, but in the final sentence; they also say, "heavy rainfall was not the **only cause** responsible for the catastrophic event of February 15, 2022; a **combination** of unplanned urban growth on slopes between 45-60°, removal of vegetation, and the absence of inspection were also significant elements of this natural disaster" in which there is not something especially "new" regarding landslides events.

Line 44: change for "on February"

Line 45: "amounting to 258 mm". What is the source of this rainfall record?

Line 46: From where is this information "rainfall the city had seen since 1932"?

Line 48: 250 mm of rainfall. Why different rainfall records? Is it from different rain gauges?

Line 49: From where the authors affirm that "expected rainfall for the month of February to be 185 mm"?

Line 50: The previous extreme rainfall record was 1932 or 2011?

Line 53: "According to CNN." Is there no federal agency that could give precise information?

Line 58: The authors should say summer austral months. Besides that, the summer austral begins in December. For a better fit, the authors should say warm/rainy season.

Line 58: "In December 2021, floods killed at least 33 people and displaced some 50,000 in the country's northeast (Marengo et al 2022)." How is this information relevant to the manuscript? Do the authors intend to study some teleconnection patterns?

Line 66: I suggest the authors remove all the nonfederal agencies' websites. The information is not reliable. I tried to access <https://newsbeezer.com/brazileng/with-171-dead-the-tragedy-inpetropolis-is-the-largest-ever-recorded-in-the-municipalitys-history-rio-de-janeiro/> and the result as NOT FOUND.

Lines 71-76: Again, the authors are using not reliable sources to describe the past natural disasters in Rio de Janeiro state. I guess if there is any reliable academic and scientific work made that could be used instead.

Line 82: What is "Marengo al Alves 2012"?

Line 92: 415 mm of **rainfall**. What are the sources of this rainfall data?

Line 100: This hypothesis is not something new. For sure not only in Petropolis but in several regions of the world.

Line 101: What do the authors say about the public government educating the residents about the region's vulnerability?

Figure 1: The presentation order of the figure should be inverted.

Line 130: How many stations of INMET was used? What means INMET?

Lines 137: "The hourly rain gauge observations from June 1976". Could the authors explain how the data was an hourly record in that period? I assume only conventional measures were made in that time if they were.

Line 139: "<http://www.inea.rj.gov.br/ar-agua-esolo/monitoramento-hidrometeorologico/>)"
There is any information about the rain gauge data (especially de 1973 year), the start of the observations, the spatial distribution. The authors must explain this.

Line 146: "(not shown)". Why discuss that in the manuscript if the authors do not show critical information?

Line 253: The authors discuss Figure 4 before Figure 2. Please change it.

Line 253: "The average for the entire month of February is approximately 200 mm". Please reference the information given.

Line 254: What means "summer, , S"?

Line 254-255: "Such hourly rates and amounts have not been recorded in Brazil and are rare even for other parts of the world." Could the authors give some references?

Line 256: Why January and February? I hope the authors can say where the rainfall data come from. Besides that, how is the reliability of this data? How do the authors compare rain gauges with different time series and spatial distribution? Especially given the complex orography of the city.

Figure 2: Where are the spatial distribution of the 5 weather stations?

Figure 3: Why did the authors make this comparison?

Figure 4a: The number means the rainfall recorded? The numbers are too small. Please redo this figure.

Figure 4b: Why did the authors choose Alto da Serra station? Is that near to the landslide local?

Line 293: "The INEA hydrological station, Alto da Serra (2243315) was the only one with data of this event". This information is not true.

Figure 7: Why are the authors comparing these time images?

Figure 9: Why did the authors not differentiate between the images? All of them appear to be the same.

Line 428: What are the mesoscale convective cell's extraordinary characteristics (a common meteorological phenomenon)? Could the authors explain how specific the atmospheric environment for developing the recorded rainfall amount was?

Line 429: If the SACZ is a usual system during the austral summer over the region, how does this specific SACZ produce this huge rainfall volume?

Line 431: What were the particular characteristics of the cold front?

Lines 431-435: The authors are concluding results that were not shown. Please show the results.

Line 438: Please show the results or technical reports of "CEMADEN, from a hydrological point of view".

Line 445: Could the authors inform the more precise time of the first landslide occurrence?

Line 447: "recorded in some of the CEMADEN stations." Given the unique character of the landslide events, the authors should precisely say the local of the observations.

Line 517: Why does a scientific study need to be compared to media reported?