

Date of Submission	
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IPL Project (IPL-Number) Annual Report Form

**Period of activity under report
from 30 June 2025 to 30 June 2026**

1. Project Number and Title:

*IPL 242 - Studies of disasters related to natural and anthropogenic landslides in Brazil - Characterization of landslides triggers and impacts as a tool to rapid risk analysis – IPL 242 – **PHASE II***

2. Main Project Fields

Select the suitable topics. If no suitable one, you may add new field.

(1) Technology Development

B. Hazard Mapping, Vulnerability and Risk Assessment

(2) Targeted Landslides: Mechanisms and Impacts

A. Catastrophic Landslides

(3) Capacity Building

B. Collating and Disseminating Information/ Knowledge

(4) Mitigation, Preparedness and Recovery

A. Preparedness

Select the suitable topics. If no suitable one, you may add new field.

(1) Technology Development

B. Hazard Mapping, Vulnerability and Risk Assessment

(2) Targeted Landslides: Mechanisms and Impacts

A. Catastrophic Landslides

(3) Capacity Building

B. Collating and Disseminating Information/ Knowledge

(4) Mitigation, Preparedness and Recovery

A. Preparedness

3. Name of Project Leader

Prof. Renato Eugenio de Lima

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Email: : renatolima4340@gmail.com or renatolima@ufpr.br

Core members of the Project:

1. Prof. Lazaro Valentim Zuquette (CENACID –USP-SCar)
2. Prof. Tiago Marino (CENACID –UFRRJ)
3. **Prof. Marcelo Renato Lamour (CENACID –UFPR)**
4. Prof. Jefferson Picanço (CENACID –UNICAMP) :

4. Objectives (5 lines maximum)

Prepare the map of the distribution of types of mass movements throughout the country,

Classify the most destructive landslides in Brazil.

Provide scientific knowledge to facilitate the preparation and response of landslides disasters.

Apply and develop RRLA (Rapid Risk Landslides Analysis) methodology for rapid analyses of landslides, useful in disasters.

5. Study Area

The project aims to assess all landslide-prone areas in Brazil and foresees the development of detailed studies in the states of Paraná, Rio de Janeiro and Santa Catarina, as well as other landslide-affected areas. **In 2025 and beginning of 2026, the project group researched areas affected by destructive landslides in the states of Minas Gerais, Paraná and Santa Catarina.**

6. Project Duration

We are currently in the second stage of the project's activities (PHASE 2)—scheduled to run through the end of 2027—in response to an invitation from the National Institute of Historic and Artistic Heritage (IPHAN) to study landslides affecting historical heritage sites. CENACID receives financial support for this research from APPA (Paraná Ports Administration).

We are thus moving forward under the new title: "IPL 242 – Studies on natural and anthropogenic landslide-related disasters in Brazil – Characterization of landslide triggers and impacts as a tool for rapid risk analysis and community protection – PHASE 2."

7. Report

1) Progress in the project (30 lines maximum)

Between 2025 and the first half of 2026, scientists from CENACID-UFPR continued their research on landslide-related disasters. The group maintained its regular scientific activities, including scientific disaster response, desk-based studies, field investigations, and scientist training. It held a scientific seminar on risks affecting historical sites and the Serra do Mar mountain range.

We highlight the scientific response to the disaster that occurred in February and March 2026 in the state of Minas Gerais, in central Brazil. This disaster, which also involved flooding, saw over 1,200

recorded landslides and 65 fatalities. To support the response, the center conducted a scientific support mission, during which the team identified hazardous processes and classified the various types of landslides. CENACID also prepared landslide risk maps for some of the most severely affected regions.

We applied the group's methodologies, trained the use of the center tools as GIS "VICON" developed by the members of the center, the RRLA - Relative Rapid Landslides Analysis (Lima, 2013).

We also utilize newly acquired equipment, such as Ground Penetrating Radar (GPR) with new antennas for various depths, useful for assessing and investigating landslides.

Naturally, most landslides are associated with heavy rainfall. We are currently investigating three additional hypotheses regarding the triggering of some landslides: the day-night thermal gradient, micro-seismic events, and a new hypothesis related to nighttime fog moisture. In most cases, the mass movements continue to be classified as translational landslides and gravity-driven flows. All the landslides evaluated were classified using the RRLA (Relative Rapid Landslide Analysis) methodology and incorporated into the "VICON-desastres" GIS software, developed by members of CENACID.

Studies characterizing the impacts of landslides in Brazil are underway, focusing on the effects on strategic transportation systems and on landslides affecting national historical heritage.

Since the group was invited by the National Institute of Historic and Artistic Heritage (IPHAN) to develop a heritage protection project, we are advancing research into the landslide vulnerability of the Fortress of Nossa Senhora dos Prazeres, located on Ilha do Mel (Honey Island) in Paranaguá Bay, southern Brazil.

In February 2026, CENACID organized a seminar on the vulnerability of the Fortress of Nossa Senhora dos Prazeres to hazardous geological processes, with the participation of 35 scientists from six Brazilian universities.

In the second half of 2025, extended abstracts from the 13th Geology Symposium of Southern Brazil and the 1st Mercosur Geology and Mining Conference—both organized by the Brazilian Geological Society (SBG)—were officially published. Some of the results from IPL-242 were presented in these proceedings.

Professor Renato De Lima served as coordinator of the Symposium on Natural-Environmental Disasters and Geological Risks at this Brazilian Geological Society (SBG) event.

The team continued to update the database on major landslide-related disasters in Brazil. These data are being prepared for submission for publication in the journal "Landslides". Members also continued to participate in several interviews with national media outlets.

2) Planned future activities or statement of completion of the Project (15 lines maximum).

The center's team is now in the initial phase of what's called "PHASE II" of the project.

As explained in our last report, the project is progressing well, and several cities have benefited from the center's activities. Furthermore, we are developing a project to protect the historical heritage

represented by the Fortress of Nossa Senhora dos Prazeres—located on Ilha do Mel in Paranaguá Bay (southern Brazil)—under the responsibility of the National Institute of Historic and Artistic Heritage (IPHAN) and with financial support from the Paranaguá and Antonina Port Administration (APPA).

The planned activities include the continuation of studies in areas affected by natural and anthropogenic disasters associated with gravitational mass movements. They also entail the maintenance of the landslide disaster database—including significant events that occurred during the period—and the presentation of scientific papers on the topics under study. One of these papers will be presented at WLF-7 in India in late 2026.

We continue to face the challenge of obtaining more financial support for the activities.

3) Beneficiaries of Project for Science, Education and/or Society (15 lines maximum)

The main beneficiaries of the project continue to be the communities living in landslide-prone areas in Brazil, especially the poorest, who feel safer when served by CENACID's emergency scientific support missions.

In the municipality of Juiz de Fora (567,730 inhabitants) alone—part of the disaster that struck the state of Minas Gerais—thousands of people benefited from the project's studies on landslide-related geological risks.

Through reports and the exchange of ideas and knowledge, scientific groups from Brazilian universities and other bodies, such as Civil Protection, planning bodies and municipalities, use research aimed at disaster preparation and prevention.

4) Results (15 line maximum, e.g. publications)

We have produced or are preparing various technical reports, including the report on the major landslide disaster in the state of Minas Gerais (February 2026), and have carried out various activities under the Fortres project.

Some specific results:

- 01 (one) scientific seminar in February 2026 on Ilha do Mel.
- 03 (three) technical field visits in the Serra do Mar region, focusing on strategic federal highways such as the BR-277.
- 08 (eight) technical visits by boat to study landslide risks on Ilha do Mel, an island threatened by potential landslides that could cause significant damage to Brazilian historical heritage.
- 02 (two) presentations at geology associations and geology congresses.
- Technical reports: landslides in the Serra do Mar, proceedings of the seminar on the island in Paranaguá Bay, bimonthly project reports, etc.
- The scientific paper "Analysis of the impact of the recent 'epidemic' of disasters associated with landslides in Brazil" was approved for publication in Progress in Landslide Research and Technology Book Serie, KLC Vol. 5.

- The scientific paper titled "Identification of landslide processes that pose a risk to the historic fortress on Ilha do Mel, Brazil" was prepared and submitted for presentation at WLF7 and publication in KLC Progress in Landslide Research and Technology Book Series.
- Professor Renato de Lima was invited to participate in the ICL-IPL meetings in KLC Seminar at UNESCO in Paris and gave an oral presentation during the discussions of the Technical Session: Landslide Research and Knowledge Mapping.

8. Attachments:

Some examples of studies, reports and documents produced by the team during the period. The titles are translated into English ([in blue translation of the titles to English](#)), but the full texts are in Portuguese (black)

- Selected parts of Proceedings of the 13th Symposium on the Geology of Southern Brazil and the 1st Mercosur Congress on Geology and Mining (ISBN 978-85-99198-37-7), both organized by the Brazilian Geological Society (SBG) and published in the second half of 2025. See attachment.

- Report of the Scientific Seminar – “Relatório de Atividades desenvolvidas - Seminário de Estudos CENACID - fev2026. XII Seminário CENACID-UFPR “Apoio Científico em Desastres” - Projeto "Avaliação de Vulnerabilidade Ambiental decorrente de Processos Naturais Isolados e/ou Associados a Ações Humanas na Fortaleza Nossa Senhora dos Prazeres – Ilha do Mel – Paranaguá/PR” - Informe especial. 8pgs. [Report on Activities Carried Out – CENACID Study Seminar – Feb 2026. 12th CENACID-UFPR Seminar “Scientific Support in Disasters” – Project: “Assessment of Environmental Vulnerability Resulting from Natural Processes—Isolated and/or Associated with Human Activities—at the *Fortaleza Nossa Senhora dos Prazeres* \(Fortress of Our Lady of Pleasures\) – Ilha do Mel – Paranaguá/PR” – Special Report. 8 pages.](#)



Figure 1 – Landslides affecting the urban area of the city of Juiz de Fora during CENACID's emergency mission in response to the disaster that struck the state of Minas Gerais. CENACID provided scientific support to the municipality during this major disaster in February 2026.



Figure 2 - Low-income neighborhood affected by gravitational mass movements in Juiz de Fora, Minas Gerais (2026).



Figure 3 - Discussions during the seminar on the protection of historical heritage, and, alongside, an image of the historic fortress on Ilha do Mel (Honey Island), Paranaguá Bay,

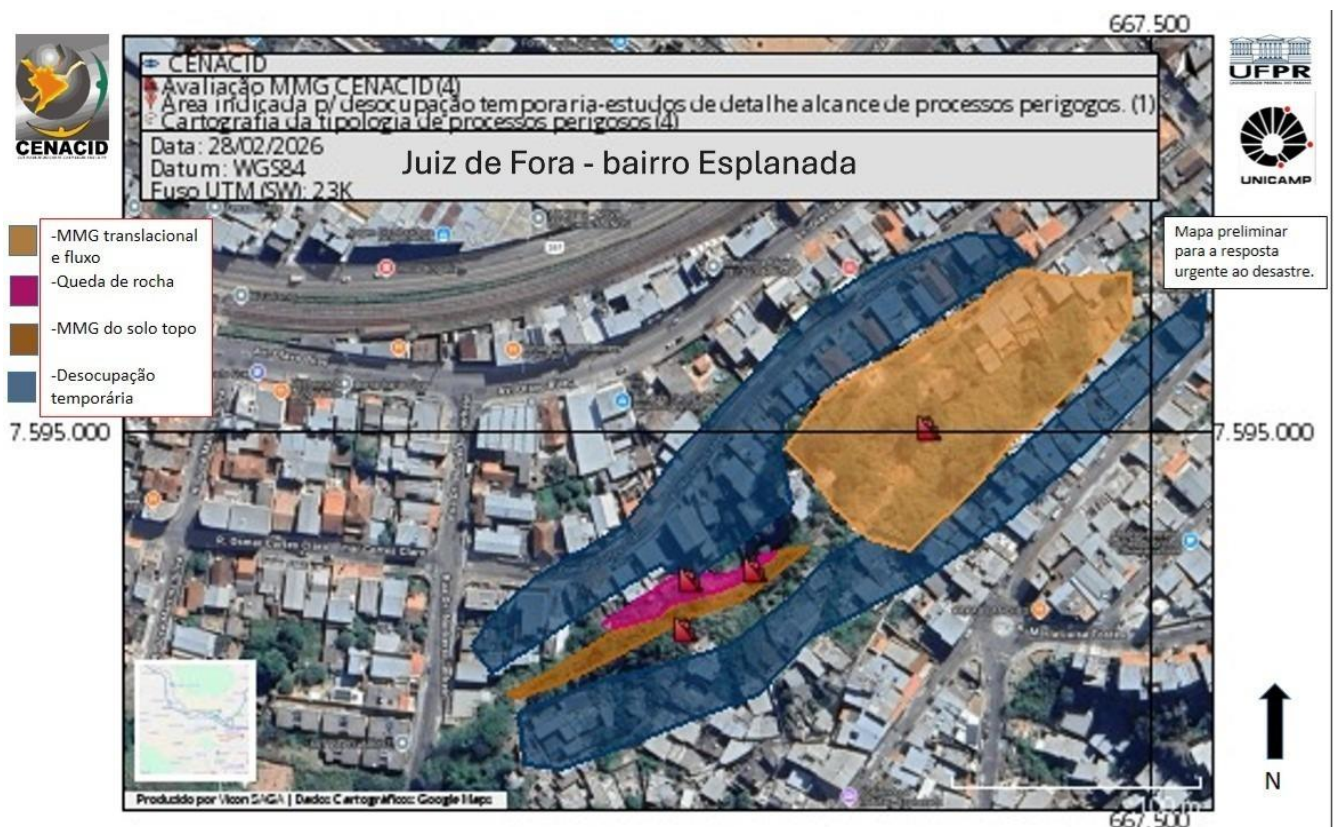


Figure 4 - Example of an emergency map to support disaster response in Minas Gerais. (CENACID, Feb 2026)

Note:

- 1) If you will change items 2-6 from the proposal, please write the revised content **in Red**.
- 2) Please fill and submit this form to [ICL Network <icl-network@landslides.org>](mailto:icl-network@landslides.org)
- 3) Reporting year must be one or two years (Maximum).