Date of Submission	July2024

IPL Project (IPL-Number) Annual Report Form

Period of activity under report
from 1 January 2022 to 31 December 2023

1.   Project Number and Title: 242

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 I

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

3.   Name of Project Leader

Prof. Renato Eugenio de Lima

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Core members of the Project:

1.   Prof. Lazaro Valentim Zuquette(CENACID –USP-SCar)

2.   Prof. Tiago Marino(CENACID –UFRRJ)

3.   Prof. Luis Gustavo de Castro(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 evaluate all the most prone landslide areas in Brazil, and is planned to develop detailed studies in the States of Paraná, Rio de Janeiro and Santa Catarina. **During 2022 and 2023 we are developing studies in the States of Minas Gerais, Rio Grande do Sul, and São Paulo.**

6.   Project Duration

-7 years (2019 to 2025).

7.   Report

1)   Progress in the project (30 lines maximum)

During the period 2022-2023, the group of CENACID responsible for the project IPL-242 promoted scientific activities, including in December 2022 the National Meeting of the center's members, with participants from six federal universities and one State Geological Service in Brazil. 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), new equipment like the center tracker, and one new applicative usefull to assess and investigate landslides.

During the period, the team developed capacity for studies and assessments of landslides on strategic highways, working in partnership with the National Department of Transport Infrastructure.

Members also continued with short videos and virtual information on disaster response associated with gravitational mass movements, in addition to several interviews with national media outlets.

Studies in various landslide and disaster situation locations have so far indicated high-intensity rainfall lasting 12 to 36 hours as the main triggers of major disasters associated with landslides in the country.

We have also made progress in qualifying the impacts caused by landslides in Brazil, highlighting the impacts on human life (deaths), loss of housing and impacts on strategic systems, mainly transport and energy.

As one of the objectives of the center, emergency missions were carried out to assess, study and provide emergency scientific support to respond to landslide-related disasters in the country. In

many situations mass movements can be classified as translational landslides and gravitational flows. As usual in the group, all the landslides evaluated were classified using the Relative Rapid Landslides Analysis (RRLA) methodology. These landslides were also included in the GIS software "VICON-desastres" developed by the members of CENACID. Gravitational mass movements in karst areas (collapses and subsidences) continue to be studied, especially in the regions of the State of Paraná, which have been frequently affected by these processes.

In 2022 and 2023, the team updated the database on the main disasters associated with landslides in Brazil. As proposed in this project, the database provides information on the distribution, typifies and classifies the most significant gravitational mass movements in Brazil.

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

- Maintaining the landslide disaster database, including significant landslide disasters during the period, and presenting a scientific article analyzing the data obtained over two decades of information.

- Continuing studies of specific areas affected by natural and anthropogenic disasters associated with gravitational mass movements.

- Promoting virtual scientific meetings with the members of the center.

- We are in the initial phase of participating in a Federal Government project to study landslides in urban areas with poor and vulnerable populations.

- We intend to intensify the partnership with federal government agencies that are dealing with the increasing losses that accidents caused by landslides have caused in the country in recent years.

- We continue to face the challenge of obtaining more financial support and have approved a project to study landslides that threaten the national historical heritage.

- We are beginning an effort to increase the group's publications in international journals, especially in "landslides".

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

The main beneficiaries of the project continue to be communities living in landslide-prone areas in Brazil, especially the poorest, who are safer when served by CENACID's emergency scientific support missions. In these missions, the team applies the scientific knowledge developed in the group's research.

During this period, we added managers of national strategic systems, especially federal highways, as a new group benefiting from our research and activities.

National, state and local government authorities, who are responsible for coordinating prevention and response to these dangerous geological processes, also benefit.

Through the exchange of ideas and knowledge, scientific groups from Brazilian universities involved in the project's activities are direct beneficiaries of the project.

Other agencies, such as Civil Protection, planning agencies and municipalities, can use the

studies for disaster preparedness and prevention. Other direct beneficiaries are the students involved in the project's activities.

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

The CENACID-UFPR research group has a unique profile, prioritizing the immediate application of its research results to support scientific responses to landslide-related disasters. The years 2023 and 2024 were unusual, with an extremely high number of landslide-related events and disasters. The application of the CENACID group's scientific research in emergency response missions to areas affected by landslides in the states of São Paulo, Paraná and Rio Grande do Sul resulted in specific reports that were presented to local authorities and communities, and became essential instruments for the protection of affected communities.

The center has also organized scientific seminars and technical field trips to discuss landslide processes. Some specific results:

-01 (one) scientific Seminar in November 2022

-01 (one) technical field trip in the "Serra do Mar" mountains.

-01 (one) technical field trip to study the strategic federal highways BR-277 and BR-376 affected by landslides that that killed people and interrupted vehicle traffic for months

-Conferences at the Geological Associations and state departments.

-09 (nine) Technical Reports (blue in Portuguese – black translation of the title to English)):

Figura 1 - Field research in the State of São Paulo 2023 (left). Seminar with the government of Minas Gerais State authorities in 2022 (right).

Note:

1)   If you will change items 2-7 from the proposal, please write the revised content in Red.

2)   Please fill and submit this form to ICL Network <icl-network@landslides.org>

3)   Reporting year must be one or two years (Maximum).