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PRELIMINARY ASSESSMENT OF SPACE WEATHER RISK PERCEPTION IN BRAZIL

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INTRODUCTION

Space weather events are phenomena that originate from the Sun as solar flares or Coronal Mass Ejections (CME). Potential impacts include the damage and disruption of technology systems or critical infrastructure, such as the electric power grid, radio communications and air traffic control. In extreme events, space weather can also damage satellite services and interfere with global navigation satellite system (GNSS) signals with severe consequences for human activities.

RISK PERCEPTION

The perception of space weather risk and how stakeholders understand and perceive the information in the decision-making process create major challenges for early warnings systems and to select mitigating action.

METHODOLOGY

The goal of this research is to comprehend the users' perspective to develop innovative space weather products to support better decisions using semi-structured interviews. The analysis focuses on stakeholders from public and private Brazilian organizations and 82 interviews were conducted during 2017 and 2018.

BRAZILIAN PERSPECTIVE

Previous international researches on natural hazards risk perceptions (e.g., floods) point out several criteria that influence decision-making, such as personal experience and trust in previous management attempts by public authorities. However, space weather is a new issue on Brazilian society, and how stakeholders understand and perceive the impacts of space weather' risk are studies that still in progress.

PRELIMINARY RESULTS

- ✓ From the users' perspective, space weather information (observation and forecasting) still involves uncertainty about the risks and impacts on these technology systems.
- ✓ Several stakeholders can often have different perspectives about the vulnerabilities and impacts of the same event.
- ✓ There is some demand for Decision Support and Early Warning Systems, like tailor-made solutions, especially for geostationary satellite operators and aviation sector (GNSS and communications).
- ✓ On the other segments (e.g., electric power transmission or pipeline operations), the risk of space weather in Brazil is recognized, though is not yet seen as a priority for mitigating plans.

LESSONS LEARNED AND NEW APPLICATIONS

Lessons learned from hydro-meteorological and geological communities could be a good starting point for the space weather community. They have interesting approaches to integrate natural hazard information and early warning systems, such as problem structuring, mental models, decision and risk analysis, multi-criteria decision aids, surveys/questionnaires, and so on. E.g., the Weather Decision Index (WDI):

$$decision = f(impact, probability, lead\ time)$$

FUTURE RESEARCH

- ❖ The analysis indicates several applications in Brazil related to Decision Support System and critical infrastructure protection based on space weather impacts and mitigations.
- ❖ Many approaches and methods could be applied to support a Early Warning Systems and risk communication based on space weather hazards.
- ❖ Also, this research aspires to develop a framework that uses refined public communication about space weather hazards in Brazil.

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