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A situational awareness tool for landslide hazards using satellite data: lessons learned and the path forward

Dalia Kirschbaum (1) and Thomas Stanley (2)

(1) NASA Goddard Space Flight Center, 617 - Hydrological Sciences Branch, Greenbelt, United States (dalia.b.kirschbaum@nasa.gov), (2) Universities Space Research Association/GESTAR, 7178 Columbia Gateway Dr, Columbia, Maryland 21046

A Landslide Hazard Assessment for Situational Awareness (LHASA) model was developed to indicate potential landslide activity in near real-time. LHASA combines satellite-based precipitation estimates with a landslide susceptibility map derived from information on slope, geology, road networks, fault zones, and forest loss. Rainfall data from the Global Precipitation Measurement mission have been used to generate landslide nowcasts since June 2016. Each nowcast is a map of landslide potential with a 1-km resolution. In order to make the nowcasts more accessible via the web, the information has been simplified to polygons that can be republished via an applications programming interface, as well as downloaded or browsed individually.

LHASA is intended to provide situational awareness of landslide hazards in near real-time using primarily satellite-derived, open data products. The model provides a flexible, open source framework that can be adapted to other spatial and temporal scales based on data availability. Over the past two years of operation, there have been numerous extreme precipitation events that have generated catastrophic and widespread landsliding. One example was Hurricane Maria in September 2017, where heavy rains triggered hundreds of landslides in Puerto Rico and other Caribbean Islands and caused several deaths. The LHASA model has also been consulted by the U.S. Army Corp of Engineers and the Rio de Janeiro City Government to improve their awareness of potential landslide activity. In each case, stakeholders consulted the landslide nowcast, due to its convenience and timeliness.

This presentation will provide an overview of the LHASA model, its current performance as a near real-time system, and the opportunities for characterizing longer-term potential landslide variability at the seasonal to decadal time scale. There are also many future opportunities to advance this system, including incorporation of other triggering variables and improving the validation catalogs used to calibrate and validate the model variables. Lessons can be drawn from how the LHASA system is administered as a web portal for disasters, which requires a substantial effort to ensure that the web-based near real-time system is current. The accuracy and applicability of this model also depends on the intended outcome of the user and the quality and resolution of the data being used to evaluate the system. This presentation will also discuss a new initiative to grow the availability of open landslide inventories for these types of studies utilizing citizen science.

The current LHASA model is operating in near real-time at: https://pmm.nasa.gov/precip-apps.