Questions & Answers Session Part 3

Please type your questions in the Question Box. We will try our best to answer all your questions. If we don't, feel free to email Erika Podest (erika.podest@jpl.nasa.gov), Amita Mehta (amita.v.mehta@nasa.gov) or Sean McCartney (sean.mccartney@nasa.gov).

Question 1: It is very interesting, but I wonder how big of a landslide can be detected? Can the tool detect landslides less than 1 meter in width?
Answer 1: LHASA does not detect landslides directly. Rather, it identifies where landslides are probable, with a 1-km resolution. There are other systems for the direct remote sensing of landslides. For example, the SALaD system uses an object-based analysis of optical imagery to map landslides. Of course, the resolution of the output depends upon the pixel resolution of the input images. You can learn more at: http://dx.doi.org/10.1016/j.enggeo.2021.106000

Question 2: How does one measure or identify the level of hazard by landslide?
Answer 2: If you are looking at an individual landslide, you can consider different types of hazards such as speed (fast moving landslides and slow moving landslides) and size (large landslides can do more damage over a larger area, small landslides less than 1m can still be a hazard).

Question 3: I have registered in PSS but I still can't download IMERG data, what can I do?
Answer 3: There should be a pop-up that asks you to sign in when you first arrive at https://jsimpsonhttps.pps.eosdis.nasa.gov/. If you haven't seen this, you may need to adjust the browser settings. If you still can't access the data, please contact support at https://gpm.nasa.gov/contact

Question 4: Is LHASA data limited to a certain geographic area or is it available for any area in the world? I am from India, is there availability for this region?
Answer 4: LHASA covers the Earth's land surface from 60 degrees North to 60 degrees South, which includes India.

Question 5: Are there certain system specifications to run LHASA?
Answer 5: To run the global model, you need about 2 GB free disk space, and a large amount of memory. However, a local version of the model may require much less computation, and could be run on an older laptop.

Question 6: In the month of July, a huge landslide occurred in Himachal Pradesh, India. Can I know about this using these systems? If yes, then please tell me how.
Answer 6: We don't know for certain that this landslide was caused by rain, but if it was caused by heavy monsoon rains, the LHASA nowcast should have shown elevated hazard and exposure at that location.

Question 7: I have a Mac (Big Sur 11.5.2). I would love it if it's possible to have the tutorial to install the R with LHASA (I'm not familiar with R- code).
Answer 7: We have not tested LHASA on a Mac, but you should be able install R, based on this site: https://cran.r-project.org/bin/macosx/

Question 8: If we want to study the frequency of landslides, what data are required?
Answer 8: This is actually a deep scientific question that we can't answer today. However, I will say that geologists studying this topic try to do fieldwork to determine the ages of historic and prehistoric landslides.

Question 9: Do you use the EMDAT database on disasters in your work? (E.g. in your ML models for LHASA 2.0.)
Answer 9: We do not, but EMDAT is a valuable dataset for understanding the global impacts of landslides. One limitation of EMDAT is that landslides are often recorded under the heading of a connected disaster, such as a hurricane, flood, or earthquake. Thus, it may underestimate the total damage caused by landslides.

Question 10: What are the thresholds to differentiate between high, moderate, and low landslide risk? Are they generic or country-specific? How is the ARI computed?
Answer 10: The ARI is a weighted mean of the last 7 days of precipitation. You can see the exact calculation by looking at the code in https://github.com/nasa/LHASA. For

LHASA version 2.0, we use probabilities of 0.1, 0.5, and 0.9 to separate the hazard categories for its exposure analysis. For LHASA version 1.1, we use the different susceptibility ratings moderate-high to determine risk.

Question 11: I want to work on landslide susceptibility analysis for a small region in India. How can I do this using the tool LHASA?
Answer 11: LHASA version 1.1 is used for dynamic analysis of landslide hazard, rather than susceptibility analysis. You may be interested in reading these papers on landslide susceptibility: http://dx.doi.org/10.1029/2020ef001666 and http://dx.doi.org/10.1007/s11069-017-2757-y

Question 12: Is it possible to develop the accuracy of a landslide susceptibility map with the global landslide susceptibility map?
Answer 12: Landslide susceptibility maps are usually evaluated with reference to an inventory of landslides that have been observed previously. You could use an existing susceptibility map as a validation tool. The global landslide susceptibility map can be used as a baseline for comparison. The local map should be more accurate than the global map.

Question 13: Is it meaningful to predict floods using the rainfall index of a particular area using machine learning unsupervised algorithms?
Answer 13: We don't use an unsupervised algorithm, so we are not sure if it would work.

Question 14: Is it possible to get the slope profile of a particular region from a satellite? Does vegetation affect the intensity of landslides and can we correlate them using data from various satellites?
Answer 14: Slope profile can be obtained from a DEM. The dataset that is most commonly used is SRTM, this is the primary component in the DEM used by both LHASA and the global landslide susceptibility map. Vegetation can reduce landslide hazard, but this is not always the case. Vegetative cover has been examined using various satellite instruments. See https://www.nature.com/articles/s41586-020-2824-5 for a recent example. .

Question 15: Is there any possibility to use these models in local areas? E.g. July 2021 rainfall triggered landslides in the Konkan region of Maharashtra, India?
Answer 15: It is possible to use LHASA or similar models at the regional scale, but they are not appropriate for local site assessment. For assessing hazards for a single building or neighborhood, a geotechnical engineering report should be produced by licensed professionals. IMERG picked up heavy rainfall in Maharashtra, so it is likely that LHASA issued high predictions for the Konkan area. However, we have not verified this. For more information, see: https://gpm.nasa.gov/applications/weather/monsoon-brings-heavy-rains-flooding-parts-western-india.

Question 16: Can we add or compare data from the Landslide Reporter from official national data, e.g. in Indonesia we have InaRisk (https://inarisk.bnpb.go.id/) or from regional data, e.g PDC (Pacific Disaster Center) (https://disasteralert.pdc.org/disasteralert/)?
Answer 16: The Landslide Reporter Catalog is public data, and we encourage you to analyze it with reference to any other dataset; we do ask that you cite both sources when reporting your results.
We welcome the addition of landslide events in Landslide Reporter to the global effort to increase publicly-available landslide information. To register events, please go to https://landslides.nasa.gov/reporter. There are several tutorials at https://landslides.nasa.gov that provide an overview of how to use the system. Please do not share any information in this system that is private as all of the report information is reviewed and then released publicly via our Collaborative Open Online Landslide Repository (COOLR). To learn more about our citizen science efforts you can go to:
https://journals.plos.org/plosone/article/authors?id=10.1371/journal.pone.0218657.