Question & Answer Session 2

Please type your questions in the question box. We will try our best to get to all your questions. If we don't, feel free to email Amita Mehta (amita.v.mehta@nasa.gov)

Question 1: I see there are different band emisors: like C-Band, L-Band P-Band Ku-Band. These are related with the wave length they are emitting. In terms of accuracy, I can imagine these depends on which variable we are looking for. So some band radars can be better than others, depending each different variable, TRUE? there is any classification according the type band and variable to measure?
Answer 1: The wavelengths will determine how deep the signal penetrates through the medium. Depending on the application, you will use diff bands. For example, shorter wavelengths such as C or X band would be better suited to detect flooding when there is vegetation having low biomass or herbaceous vegetation. A longer wavelength is such as L-band is better suited to detect flooding under high biomass vegetation.

Question 2: How can I difference the urban areas to the flooded vegetated areas....maybe using optical sources for delimited the urban areas?
Answer 2: Optical and Lidar can be used for differentiating urban land cover from flooded area. In SAR, urban areas have similar backscatter to flooded vegetation. One way to help differentiate them is to apply a texture such as entropy, which measures the level of inhomogeneity of pixels within a given box. Flooded areas tend to be more inhomogeneous than urban areas.

Question 3: Are the LiDAR topography Data available for all countries or only for U.S?
Answer 3: The open source LIDAR data we talked about in the webinar are available only for the U.S.

Question 4: Is the data downloadable in erds and GFMS?
Answer 4: Yes, ERDS in Tif format and GFMS data in binary format.

Question 5: In case of presence of clouds, what would be the type of image displayed from the data capturing tool?

Answer 5: SAR will ‘see” through clouds. But sensor like MODIS image will only show clouds and the flood product we talked about would be blank (no data).

Question 6: How are we defining "near-real-time?" Is it minute, hours?
Answer 6: NRT depends on the sensor used. For example, IMERG precipitation data are available every 30h minute, TRMM every 3 hours, MODIS is daily. Please see https://earthdata.nasa.gov/earth-observation-data/near-real-time for more information about availablity and latency of ‘near-real-time’ data.

Question 7: How the threshold is determined (GFMS)?
Answer 7: It is based on deviation from TRMM Climatology. The GFMS documentation has more details.

Question 8: Is this Kind of data (flooding) available for Guyana, South America? I was trying to use the tools we covered in Session 1 but couldn't get flood data for my country.
Answer 8: See ERDS, MODIS NRT, and (Dartmouth Flood Observatory) DFO, and GFMS will all be available. If it is very cloudy then MODIS and DFO will not show any information.

Question 9: From where we can get modis data for flood monitoring and which modis data?
Answer 9: MODIS images and reflectance data can be found on the LPDAAC webpage. https://lpdaac.usgs.gov/dataset_discovery/modis/modis_products_table

Question 10: Will they correct the historical data?
Clarification: From the Historical events of DFO) the flood extension is very coarse and sometimes are exaggerated. I want to know if they will correct that historical data?
Answer 10: You may direct this question to Robert.Brakenridge@dartmouth.edu

Question 11: What is the technological methodology created for capturing the data about the located individuals i.e the minute visualizations from the farther placed satellites?
Answer 11: This question is clear to me.

Question 12: Can you download data in GFMS?

Answer 12: Yes, flood intensity (Depth above threshold) can be downloaded from http://eagle2.umd.edu/flood/download/

Question 13: How accurate is NRT modis data for flooding ?
Answer 13: Depends on cloud cover. In cloudy conditions inundation will not be accurate. Cloud shadows and terrain shadows also introduce inaccuracies.

Question 14: Is the satellite able to detect plastic debris in the ocean?
Answer 14: It is potentially possible but we are not aware of any work on that. It will depend on the size of the plastic debris.

Question 15: How the knowledge of this webinar can be used for rural setting?
Answer 15: All the data and tools we talked about can be used and can be applicable in rural areas.

Question 16: In which projection should we open the data?
Answer 16: WGS 84

Question 17: This webinar given brief intro...if any publication is suggested to get detailed understanding on the same would be of great help.
Answer 17: In the presentation there are a couple references. Please refer to those.

Question 18: The raster called Impervious areas has numbers between 0-200 I checked and places with 200 correspond to park. The name of the raster should not be permeable areas? (since higher numbers means higher infiltration)
Answer 18: Basically the data show percentage of impervious areas (if it is 0% then it can be considered permeable). In this case 200 is for undefined data.

Question 19: Is there any product of modis or any other sat sensor data for historical analysis?
Answer 19: MODIS and Landsat are long term satellite missions. MODIS since 1999, Landsat since 1972.

Question 20: Could you please send me the link for downloading sentinel 1 sar?
Answer 20: You can download Sentinel-1 SAR data from the following site: https://www.asf.alaska.edu/sentinel/

The data is freely available, however you will need to register.

Question 21: Regarding Homework 1 (write down the elevation range near Hiroshima) should we submit that too somewhere in the final assignment?
Answer 21: No submission for HW 1. Just to practice and register for Earthdata. HW 2 is a google form and due Aug. 15.

Question 22: What is the best (open source) and the best spatial resolution to use at tropical places as (ecuador) to give DRR local advices to flood management planning, with poor local data to be combined?
Answer 22: That is the challenge in the tropics because of cloud cover. Precipitation will be the best data source to monitor flooding. ERDS is another go to source for a forecasting component and SAR for inundation. Flood modeling in tropics will also be beneficial.

Question 23: Is there any special tool for classification of lidar data?
Answer 23: We are not familiar with that.

Question 24: Are negative SRTM values equivalent to No Data or Null?
Answer 24: Not necessarily as there are places on land around the world that are below sea level.

Question 25: Does data of LIDAR on drones works similar to satellite?
Answer 25: Yes, just a different platform. Most Lidar will be from drone or aircraft platforms.

Question 26: Is there is any special application of saral altika which uses ka band?
Answer 26: The primary application of SARAL/Altika is for ocean altimetry to measure sea surface elevation - some rivers/reservoirs may be observed - please ee https://www.mosdac.gov.in/content/Mission/saral-altika .

Question 27: How the validation is done for SEDAC data, such as impervious/ population data? Is any need to validate at the local level?
Answer 27: For impervious surfaces, see the paper https://doi.org/10.7927/H4P55KKF for details.

Question 28: How do I know if a data-set is in real time?
Answer 28: there will always be some lag for initial processing. In the hours. 4-5 at least. See the NASA LANCE site for all NRT sensors. https://earthdata.nasa.gov/earth-observation-data/near-real-time

Question 29: Are there plugins, applications or other tools that take the various remote sensing data that we covered today (possibly using archive data) and output flood risk of an area?
Answer 29: There may be but we are not aware of any specific pulg-in.

Question 30: Is there any tool to combine geostationary satellites data (GOES 16) with other low earth orbit satellite data to assess flooding?
Answer 30: Yes, since TRMM, there is a multi-satellite analysis combining geostationary data with data from low/polar orbiting satellites. Not certain on specific tools but the techniques exist.

Question 31: This question is for Erica, how do surface water bodies, flooded urban areas, flooded vegetation areas, and polluted water have differ with respect to VH-VV ratio?
Answer 31: The ratio provides a way to ID some of the classes that are confused. Open water has a dark signature due to the smooth surface. A bit of wind roughness on water surfaces can increase the backscatter. Ratios help distinguish them. We will go into detail on this in the coming weeks.
https://arset.gsfc.nasa.gov/disasters/webinars/advanced-SAR-18

Question 32: Does GEOS-5 provide both historic and forecast weather data?
Answer 32: Yes, both.

Question 33: Which polarization is preferred to detect floods with SAR images?
Answer 33: HH polarization is preferred to detect flooded vegetation with SAR because it has greater penetration through the vegetation canopy and is more likely to “see” water at the surface.

Question 34: Are there any global soil moisture data sets based on SAR?
Answer 34: Yes and No. NASA’s Soil Moisture Active Passive (SMAP) satellite measures soil moisture globally with a radiometer operating at L-band (passive

microwave). The mission has created a beta soil moisture product combining passive SMAP data with active SAR data from Sentinel-1. You can access this product here: https://nsidc.org/the-drift/data-update/high-resolution-smapsentinel-1-soil-moisture-data-available/

Question 35: Sentinal data compared to lidar data?
Answer 35: Radar and lidar are different. Lidar gives you structure of individual trees while radar gives you integrated information on structure and dielectric for vegetation.

Question 36: What is the accuracy of using satellite-derived indexes such as MNDWI and NDWI for flood extent detection?
Answer 36: MNDWI has been used. The accuracy depends on the region.

Question 37: Is it a good idea if i use overlay analysis for all data to identify the most prone area from flood by assigning weight value to each data gathered?
Answer 37: In situ data can help in deciding appropriate weights.

Question 38: How does soil moisture impact flooding, particularly in urban areas?
Answer 38: In urban areas, infiltration will occur in non-impervious areas, yes. High soil moisture will increase run off. NASA SMAP mission has been measuring soil moisture since April 2015 and is available globally every 3 days, however, soil moisture has not been retrieved over large urban areas since the algorithm only works for natural environments. Land Data Assimilation Systems (LDAS: https://ldas.gsfc.nasa.gov/index.php) can provide soil moisture information.

Question 39: Is the LIDAR data available outside of the US?
Answer 39: Possibly, they will be regionally focused and not necessarily for free.

Question 40: Is the difference between the two images due to the satellites (aqua and terra) orbit?
Answer 40: Both have different equator crossing time but that is the only reason for the difference in flooding on the ground.

Question 41: How can I recognize that the water indicated by the sensor is flooding and not a river, for example?

Answer 41: MODIS Flood mapping tool uses a permanent water reference database from around the globe. Anything outside of that will be labeled flooded.

Question 42: Can that kind of information be used to know when a dam was built? If so, how?
Answer 42: Looking at historical time series of MODIS/Landsat land cover data may give indications of when a dam was built, but it would depend on the size of the reservoir made by the dam.

Question 43: Do you have examples of where a decision was made from this type of analysis?
Answer 43: In the U.S. FEMA uses satellites and LIDAR data to make decisions. Internationally Red Cross also uses remote sensing. In most cases remote sensing based information is used together with ground-based information.

Question 44: Where can we download the gmis layer?
Answer 44: SEDAC (we had a demonstration to do this in the webinar)

Question 45: How to differentiate flooding water from permanent water?
Answer 45: The best way to separate permanent water from flooded water is to use multitemporal images. This is true for both radar and optical sensor (e.g. MODIS).

Question 46: Is there any specific threshold for radar data in roughness character for flood identification
Answer 46: In radar, flooded vegetation has very high backscatter while open water has very low backscatter.

That information would be very useful for us. If you're willing to talk to us offline, we'd be happy to set up a call with you. Email nasa.arset@gmail.com if you're interested.