



Questions & Answers Session Part 1

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 Natasha Sadoff (sadoffn@batelle.org), Amy Leibrand (leibranda@batelle.org) or Meredith Fritz (fritz@batelle.org).

Question 1: What kind of data is used for glacial lake outburst floods?

Answer 1: Glacial lake outburst floods are a type of flash flood that occurs when ice or sediment dams collapse beneath glacial lakes. Landslides, avalanches, earthquakes, and volcanic eruptions often trigger GLOFs. Images of glacial lake outburst floods (GLOFs) can be viewed via Landsat imagery.

<https://earthobservatory.nasa.gov/images/90185/as-glacial-lakes-grow-so-do-the-risks> Various datasets useful in assessing glaciers (as well as ice and snow) are also available through NASA National Snow and Ice Data Center (NSIDC):

<https://nsidc.org/data/search/#keywords=glaciers/>.

Question 2: For the fire data from earthdata, in which format data will be downloaded?

Answer 2: Fire data are available in a variety of data formats. FIRMS data are available via NetCDF, HDF-EOS, Shapefile, KML, CSV. Burned area data (MODIS & VIIRS) are available in HDF-EOS format. Burned area images (Landsat) are available in GeoTIFF and other formats. MODIS and VIIRS smoke data are available in HDF and HDF-EOS5. Information on file formats can be found in each tab of the StoryMap.

<https://itcanbedone.maps.arcgis.com/apps/MapSeries/index.html?appid=f3f5aa31bd5f4eb7b3abe033a403ab4f>

Question 3: What format is most of this data available in?

Answer 3: Data formats vary by product or dataset; however, some of the most common types include NetCDF, HDF, GeoTIFF, and Shapefile. In the NASA StoryMap (<https://arcg.is/0SPqqk>), data formats are specified for each product and dataset.

Question 4: Are all those data available for download in google earth engine? If not, do you have a list of NASA data on GEE?

Answer 4: Not all of the datasets presented here are available on Google Earth Engine. However, there are many datasets available on GEE, including data on elevation,



precipitation, ice, land cover, leaf area, MODIS burned area, FIRMS data, surface reflectance, land temperature, vegetation indices, thermal anomalies, snow cover, forest canopy height...and more!

<https://developers.google.com/earth-engine/datasets/tags/nasa>

There's also an ARSET course coming up on using Google Earth Engine for land monitoring applications - the course is scheduled for June 16, 23, & 30.

<https://appliedsciences.nasa.gov/join-mission/training/english/arset-using-google-earth-engine-land-monitoring-applications>

ARSET also offered trainings on flood mapping using GEE. Videos of previous trainings are available on the NASA Video YouTube channel

https://www.youtube.com/channel/UC_aP7p621ATY_yAa8jMqUVA.

Question 5: Sea Level change data is Pathfinder only USA or Global?

Answer 5: The Sea Level Change Pathfinder includes multiple datasets across many variables, most of which are global. Data availability is dependent on the specific variable assessed. See here to find out more about the variables.

<https://earthdata.nasa.gov/learn/pathfinders/sea-level-change>

Question 6: Is this data available in shapefile and tiff format?

Answer 6: These data are available in a variety of file formats, and many data are available in formats compatible with ArcGIS and other analytical software (including Shapefile and TIFF). Information on data formats specific to each product or dataset can be found in the StoryMap in the individual dataset tabs.

<https://itcanbedone.maps.arcgis.com/apps/MapSeries/index.html?appid=f3f5aa31bd5f4eb7b3abe033a403ab4f>

Question 7: How accurate is data from NASA POWER? For precipitation data download, which source is better, Giovanni or NASA power?

Answer 7: Validation information for data via POWER can be found here:

<https://power.larc.nasa.gov/docs/methodology/validation/>

The POWER solar data is based upon satellite observations from which surface insolation values are inferred. The meteorological parameters are based upon the MERRA-2 assimilation model. Validation information is listed via meteorological parameters. Parts 3 & 4 of this training series will go over uses of POWER - please join us! Giovanni also contains MERRA-2 data products and many other satellite based data products. POWER specifically customizes parameter units and data formats for



energy sector applications whereas Giovanni provides the products directly from the data providers.

Question 8: Will there be new types of datasets for Electric Utility Applications in the future provided by NASA?

Answer 8: We hope this area will continue to grow and be invested in. There are always new satellites and datasets being produced for a variety of societal benefit areas.

Question 9: What spatial resolution is best suited to work with for application in the Energy sector?

Answer 9: This largely depends on end user need, for example, whether the user is assessing trends over time or responding to an immediate issue. Some examples of how to use NASA EOs for the energy sector, and how to use specific spatial resolutions, will be provided in the remaining sessions of this webinar series. If you are looking at something with fine res, NASA data may be too coarse. Take a look at the datasets we present and see if it begins to address your needs.

Question 10: Is it possible to know how to integrate these datas with ArcGIS?

Answer 10: NASA provides many tutorials on how to get started with GIS, including <https://arcg.is/GSOof1> and <https://earthdata.nasa.gov/learn/gis>.

Question 11: Are the datasets available through APIs?

Answer 11: Some datasets are available through APIs. In the StoryMap, see the last column in the overview table in each Dataset tab to identify which datasets can be accessed through API: <https://arcg.is/0SPqqK>. For example, the POWER web services tools has a complete API serving all it's featured parameters. Webinar 3 will describe the POWER API in more detail.

Question 12: Biomass resource assessment, particularly including movement of biomass (Ex. charcoal) how to do, from green cover and other means?

Answer 12: NASA currently has a mission to to support aboveground biomass research, called MAAP. <https://earthdata.nasa.gov/esds/maap>

No single tool or sensor allows us to see the full picture of biomass in an area, so a combination of data products is needed. MODIS can provide measure of tree cover and canopy density. Lidar data from the Ice, Cloud, and Land Elevation (ICESat)



satellite can be used to create a vertical map of the forest structure. The PALSAR sensor from the Japanese Advanced Land Observation Satellite can penetrate clouds and gain more information on the forest canopy.

<https://earthdata.nasa.gov/learn/sensing-our-planet/seeing-the-forest-for-the-carbon>

We are not aware of tools that monitor the movement of biomass from one state to the other. This may be something that could be modelled, however.

Question 13: Using EO, is it possible to find the best locations for solar farms in a country? And if a solar farm is not efficient as forecasted, do you think it could be possible to determine what went not as expected ?

Answer 13: Yes, Earth observation data can be used for solar siting. This will be covered in Parts 3 and 4 of the session in the discussion of the POWER product - we hope you join us to learn more! Datasets on surface reflectance, solar radiation, and others can be used for solar farm siting.

Question 14: Regarding the groundwater and soil moisture data products: are you aware of any use cases that tried to incorporate them in risk analysis for open pit mining dams?

Answer 14: We will look into this and get back to you!

Question 15: Thank you very much to the speakers. My question is, how often are these data sets updated?

Answer 15: The StoryMap contains URLs that point to datasets stored on external sites. As those datasets are updated, it is expected that URLs will be redirected to updated resources. It will depend upon the product.

Question 16: Hi. Is the Battelle Grant exclusive to businesses/research groups in the US? Or can European Space SMEs access this grant while using NASA EO data to address energy management across various zones?

Answer 16: If you are referring to the StoryMap (<https://arcg.is/0SPqqK>), anyone can access it and use it for your region.

Question 17: What kind of data is used for Crop yield productivity?

Answer 17: Landsat can be used to monitor dozens of crops, including corn, wheat, soy and cotton. More data are also available from USDA, although we are unsure if these data are available globally, but will find out! Although not highlighted in this



webinar series, the POWER web site does provide support for time series of meteorological and solar insolation information aimed for the agricultural community in formats that support crop modeling (DSSAT).

Question 18: As each dataset has its own method to be assessed. Is there any tool within this application which can combine and provide a holistic summary?

Answer 18: There is not a tool to combine datasets in the StoryMap; however, the StoryMap includes Case Studies that combine datasets and later in this webinar series we will walk through how datasets can be used together. The goal of the StoryMap is to raise awareness on the data and applications.

Question 19: Hello, is it possible to produce rainfall induced flooding from the data sets?

Answer 19: Hypothetically, we think this should be possible. You might be able to use datasets available in Google Earth Engine to model rainfall induced flooding.

Question 20: Are any U.S Utilities or industry groups partnering with NASA to find innovative ways for Utilities to utilize this data? As many smaller Utilities do not have the resources or technology to investigate the use of this data.

Answer 20: As far as we know, there are no utilities currently partnering with NASA to find innovative ways to use these data. However, the grant that brought about this training series aims to connect electric utilities to NASA datasets. We have found that utilities have a wide range of capabilities in terms of using these data. As you note, many smaller utilities may not have the bandwidth to explore these datasets and uses. We hope this training can start to raise awareness of the potential benefits, make the data more accessible and used. We are also open to additional suggestions on how to improve access or uptake of the data presented beyond this training series.

Question 21: What kind of data can we download and process from Flood analysis and prediction? Is there any limitation for download data?

Answer 21: Flood datasets (and details about those data) are available in the Surface Water & Flooding tab in the StoryMap (<https://arcg.is/0SPqqk>). There are no access restrictions -- the data are freely available. Limitations about Earth observations in general are discussed on the Home tab.



Question 22: Do you know if the surface water data products are well suited to give rough estimates for water level estimates for reservoir lakes?

Answer 22: Yes, there is one product in particular that is suited to evaluate water level: Inland Water Surface Height (ICESat-2). Please see the Surface Water & Flooding tab in the StoryMap (<https://arcg.is/0SPqqK>).

Question 23: Can these data be used for web application development as an API?

Answer 23: Yes. NASA also has an API Portal to make NASA data more accessible to application developers: <https://api.nasa.gov/>. Also refer to Question 33 for using an API to download data.

Question 24: Do we have any remote application by which we can see deep into earth's subsurface?

Answer 24: We believe that hyperspectral imagery can be used to see into the Earth's subsurface. Hyperspectral imaging (HSI) is a technique that analyzes a wide spectrum of light instead of just assigning primary colors (red, green, blue) to each pixel.

Hyperspectral data available from NASA may be relatively limited, but this is an area that is growing currently.

Question 25: What features are unique to NASA datasets that motivates us to use NASA dataset over dataset available from other satellites?

Answer 25: Many NASA satellites -- for example, MODIS -- have been in orbit for decades and provide a good opportunity for assessing historical trends. Also, NASA EO data is free and available to the public and mostly available globally, which may not be the case with satellite data from other organizations. In general, NASA's satellites provide global/near-global coverage with consistent, continuous, large-scale coverage; satellites orbit continuously, providing consistent measurements over decades. Combining these data with other sources of EO and/or ground data can be beneficial.

Question 26: For MODIS in specific (for aerosols data), can we get the data in geotiff/shapefile?

Answer 26: Research quality MODIS data products for measuring AOD can be accessed via Earthdata Search and are available in HDF or NetCDF format.

https://search.earthdata.nasa.gov/search?q=MYD04_3K,

https://search.earthdata.nasa.gov/search?q=MOD04_3K,

<https://search.earthdata.nasa.gov/search?q=MAIAC&fi=MODIS&fst0=Atmosphere>



Question 27: Which dataset is more accurate when it comes to monitoring Air Pollution?

Answer 27: Air pollution datasets are not currently included in the NASA StoryMap. However, there are many NASA datasets appropriate for assessing and monitoring air quality:

<https://earthdata.nasa.gov/learn/pathfinders/health-and-air-quality-data-pathfinder>

Question 28: I want NASA datasets on solar radiation and reflectance for academia. How can I get it?

Answer 28: The POWER web site may be able to help you with climatological averages and time series for solar parameters including relevant meteorological quantities. We have a complete API and provide an interactive user interface. Please join Webinars 3 and 4 to learn more!

Question 29: Thanks for the information, Is there any 3D data example in which NASA data has been used for prediction or analysis?

Answer 29: Yes, there is a recent example of using a 3D mapping technique to improve landslide hazard prediction: <https://www.nasa.gov/feature/jpl/new-3d-mapping-technique-improves-landslide-hazard-prediction>. The model combined multiple datasets from the subsurface, ground surface, air and space to create a mechanical framework to quantify different features and movements of a landslide.

Question 30: What kind of dataset can be used to get information on HAQ Index?

Answer 30: NASA has a Health and Air Quality Data Pathfinder for finding data related to HAQ that provides details on the type of datasets available and their applications:

<https://earthdata.nasa.gov/learn/pathfinders/health-and-air-quality-data-pathfinder>

Question 31: What is a data granule? Can Worldview and Giovanni be used for data processing and analysis as well? Here you make reference to visualization only.

Answer 31: A data granule is the smallest aggregation of data which is independently managed (i. e. described, inventoried, retrievable). Granules may be managed as logical granules and/or physical granules. Note that granule is often equivalent to [Data Set](#). Worldview and Giovanni are visualization tools. However, data from each of these tools can be downloaded for processing and analysis in external tools, such as ArcGIS. It is up to the user to determine which datasets are most appropriate for your work.



Question 32: How often are these fire products updated?

Answer 32: It varies. FIRMS temporal resolution is 5-min, daily, and 8-day, depending on the data set. Burned area (MODIS & VIIRS) is updated monthly. Burned area images via Landsat are updated every 16 days. It will always be data product specific.

Question 33: Is there a way to download data using python code or API?

Answer 33: Yes, though this varies by dataset. Whether data can be accessed via API or web service is noted in the overview table in each of the Dataset variable tabs (in the storymap). If looking for solar or surface meteorological parameters, the POWER web services tools has a complete API serving all it's featured parameters. Webinar 3 will describe the POWER API in more detail - we hope you will join us for that session!

Question 34: FIRMS seems like an excellent source of wildfire analysis. If one wants to analyze time series, let's say decadal/annual changes in wildfire intensity in California. What is the data range for this record/ past record and frequency of update. Can we access data for 2021 fires in California?

Answer 34: FIRMS is a tool that can be used for near-real-time fire monitoring. Data is available starting from 2000 (MODIS) and from 2012 for VIIRS data, so yes, decadal/annual changes could be analyzed using FIRMS data. Data for 2021 fires is also available. In Part 2, we discuss a case study that highlights the development of FIRMS and how it was used in a utility application - we hope you will join us to learn more!

<https://firms.modaps.eosdis.nasa.gov/map/#d:2021-05-31..2021-06-01;@0.0,0.0,3z>

Question 35: Can Worldview and Giovanni data products be considered as analysis-ready data?

Answer 35: Worldview and Giovanni are visualization tools. However, contained in these tools are links to find, access, and download data. The data available in these tools are at a variety of processing levels (L1-L4). This level varies by individual data set.

Question 36: Any application or example on how NASA EO can be combined to assess the impact of weather extremes events on transmission lines? Any link will be welcome.



Answer 36: In Part 2, we will discuss a case study on wildfire impact on transmission lines and a tool developed to make wildfire monitoring easier for a utility. Vegetation management around transmission lines is a key priority area in which Earth observations can also be used. We will look for an example of use of Earth observations for the impact of weather extremes on transmission lines (hurricanes, monsoons, etc). Please join us for Part 2 to learn more!

Question 37: In what format is the data available for downloading, e.g netCDF, HDF, etc?

Answer 37: These data are available in a variety of data formats. Information on data formats specific to each product or dataset can be found in the StoryMap in the individual dataset tabs.

<https://itcanbedone.maps.arcgis.com/apps/MapSeries/index.html?appid=f3f5aa31bd5f4eb7b3abe033a403ab4f>

Question 38: Are there any future projection datasets of wildfire?

Answer 38: NASA has not produced its own fire projection dataset, however one can use different conditions (soil moisture, vegetation cover or greenness, precipitation, weather patterns, drought conditions, or other variables) to develop a model to make these predictions. More information on wildfire data available from NASA, including data applicable for forecasting, is available here:

<https://earthdata.nasa.gov/learn/pathfinders/wildfire-data-pathfinder>

Question 39: Can we find Precipitation SPI and dry periods data in Giovanni?

Answer 39: Precipitation and drought data are available in Giovanni, although we will get back to you about precipitation SPI, specifically. The NASA Drought Severity Assessment - Decision Support Tool (DSAT) is a tool for determining SPI and dry periods: <https://software.nasa.gov/software/LAR-18731-1>.

Question 40: Landsat derived Land classification data is downloadable? Can you provide the link to download?

Answer 40: Landsat Land Classification data is available via the Landsat Viewer: <https://landlook.usgs.gov/landlook/>.

Question 41: For water resources, how will EO be useful?



Answer 41: Earth observations can be used to monitor precipitation, rivers, and many other hydro-meteorological parameters. These inputs are imperative to understand for hydropower dams, for example. Additionally, power plants require cooling water to operate. This water must be available and be at the right temperature - NASA EO data can provide insight.

Question 42: Would you say NASA's EO's are more suitable for regional or big scale analysis for energy management?

Answer 42: It depends on what you're looking to get out of the data, although analyses are limited by the geographic, temporal, and spatial resolution of the data. For data that have finer resolution, you'll be able to be more specific about the analyses conducted. The opposite is true for data that have a coarser resolution. That said, NASA EOs are definitely applicable for regional or national scale analysis. Some NASA EOs may have coarse spatial resolution; however, the trade-off is their generally short repeat time, broad coverage, and, in many cases, long historical data record. In addition, depending on the data product, some NASA EOs are only available for select geographic regions. Users should research the resolution, latency, and coverage details of each dataset when considering how to apply them.

Question 43: Do people in government at the highest levels of decision-making have access to this kind of information?

Answer 43: NASA products and datasets are free and available to the public, including decision-makers, policy makers, or government officials. The StoryMap presented, as well as other NASA resources such as ARSET training series, are also freely available. While there are outreach efforts to make government officials aware of NASA EOs, the extent of their utilization is not entirely known. NASA is always interested to learn about real-world applications or uses and ways in which to make data more accessible to a variety of end users.