

Introduction to Remote Sensing for Scenario-Based Ecoforecasting

Please type your questions in the Question Box. We will try and get to all your questions, but if we don't, feel free to email Amber Jean McCullum your question at amberjean.mccullum@nasa.gov

Session 1 Q&A Transcripts

Question 1: Why are there so many different datasets and thus different classifications?

Answer 1: That really depends on the region of interest that's the focus for whichever agency is doing the classifications. It depends on the data they're using. It might be useful to think of your ROI and which classification scheme is focused on that area. There are some commonly used ones (mentioned in the presentation) and it might depend on your interest and what kinds of designations are made and if those designations are informative for you within your research.

Question 2: Can you repeat spatial resolution of FAO?

Answer 2: At 1 km - they have 11 different classifications on their portal at a resolution of 1 km

Question 3: Will ESA also create a land cover with sentinel in the future?

Answer 3: Can't give yes/no answer, but would imagine they would use Sentinel data for land cover classifications as it's similar to Landsat.

Looks like the ESA will support this in the future, here are two resources:

<https://sentinel.esa.int/web/sentinel/thematic-areas/land-monitoring/land-cover-use-and-change-detection-mapping>

http://www.esa.int/Our_Activities/Observing_the_Earth/Improving_land_cover_mapping_with_Sentinel-2

Question 4: High resolution Worldview imagery has been around for sometime now. Is anyone using that for land cover products rather than the coarse products discussed here?

Answer 4: Worldview data can be very useful, as the spatial resolution is higher. If you have data available for your region, it is something that could be very useful for you. You have to think of the limitations of commercial satellite data: depending on your affiliation and region, you may need to pay for the data. The data are also collected on basis of request (as far as I understand it) so there may not be data available in your region that you are interested in. Yes, there's the benefit of higher spatial resolution, which might allow you to ID different classifications of land cover more specifically, or designate with higher accuracy, but there are limitations. The data isn't globally, freely available and they might be provided at a different temporal resolution depending on your study area. If you can get the data - it can be really useful.

Question 5: In the NDVI equation: why -1 to 1?

Answer 5: NDVI is essentially a ratio of red band and near infrared band - if you look back at the presentation, the formula is on slide 34. We obtain a ratio, essentially, so you get a value between -1 and 1 and anything <0 means there's no vegetation, and as you increase from 0 to 1 you see the highest density of vegetation when you get closer to 1 for NDVI.

Question 6: So will there be a gap in MODIS DATA between 2013 and 2017?

Answer 6: No gap in data availability between 2013 and 2017 - NASA is creating a new version. For each version of data releases there are algorithm updates, things like cloud masking is improved. With version 6 all data will be available, they just haven't released the v6 data for use yet. Those data will be available for that time range, so there isn't necessarily a gap in MODIS data availability.

Question 7: Why aerial surveys in U.S. if satellites can detect areas of tree mortality?

Answer 7: This goes back to the conversation about spatial resolution vs temporal resolution. The Pros/Cons of things like aerial vs. high-resolution imagery vs. moderate satellite imagery. The aerial surveys, when taken over specific locations in the U.S. usually have much higher spatial resolution so they can id smaller areas where tree mortality might be occurring. It might not be identifiable by coarser resolution satellite imagery. So the aerial imagery might be a meter or sub-meter pixels, but, for example Landsat imagery is 30 m. If you have tree mortality occurring in an area < 30 m, you might not be able to detect with satellite imagery. So aerial can provide additional benefit. However, because they're on aircraft, they can't get the global resolution on a temporal basis. With MODIS, for example, you can get an image *nearly* every day at the same location, but with an aerial survey you have a specific location but higher resolution

Question 8: I noticed the NBR image of the Rim fire illustrates less burn severity in valleys and canyons. Does this data accurately reflect the burn severity, or could this be an artifact of the topography such as shadows and solar zenith angle?

Answer 8: Topography can be a factor in burn severity, which may be shown on the map in this presentation. Here is a link for more information:

https://www.fs.fed.us/rm/pubs_journals/2015/rmrs_2015_birch_d001.pdf

Question 10: What is the approved software that can be used to analyze the downloaded Tree Cover Mortality Data?

Answer 10: There are many types of software that can be used for geospatial analysis. These vary in terms of the features and how they are used. For our trainings, we try to focus on open-source software like QGIS, but you can also use ArcGIS, Eradas Imagine, and ENVI.

Question 11: What is the spatial resolution of images of insect disturbance?

Answer 11: This type of disturbance is generally mapped by Landsat, especially on a global scale, which is at a resolution of 30 meters.

Question 12: I am very interested in using this algorithm to identify the age of forests. Could I do it with this methodology (Landtrendr)?

Answer 12: Landtrender is used to identify change in forests, not necessarily forest age. Here is the website: <http://landtrendr.forestry.oregonstate.edu/>. It utilizes Landsat imagery to identify change at 30 meter spatial resolution, and only for the temporal length of available Landsat imagery, so unless the forest is very young or recently burned, it would be difficult to infer forest age.

Question 13: The global data sources are fine for continental analysis, but for regional and local analysis (Colombia and Colombian regions in my case), how do we get climate information for calibrate models to include in the analysis, for example?

Answer 13: You may want to refer to local in-situ climate data for model calibration and validation. You may also be able to find climate data on Climate Engine here:

<http://climateengine.org/>

Question 14: How do you select variables to include from appEEARs, "Select the layers to included in the sample"

Answer 14: You can click on the info button to see a complete list of available layers. Once you find what you're looking for, go back and copy the product name into the search bar. You should be able to select the appropriate layer from there.

Question 15: I'm little bit worried about the spatial resolution of each data that we get. Is there will be a problem when working with different spatial resolution?

Answer 15: Spatial resolution is definitely a factor for selecting data. Many of the NASA data products are at moderate to coarse spatial resolution, and I would suggest thinking about how those data can inform your specific question. Depending on the application, you may be reliant on the spatial resolution of the most coarse product you are using in a model. You can also consider resampling techniques.

Question 16: Are those MODIS land cover products corrected for clouds?

Answer 16: Some of them are - check the **MODIS Land Cover Type QA Science Data Set** subsection under **Layers** here (https://lpdaac.usgs.gov/dataset_discovery/modis/modis_products_table/mcd12q1) for more information on how you can tell which data has been corrected.

Question 17: Are we going to use these data in this course for any modelling hanson?

Answer 17: Because this is an introductory-level training, there will not be opportunities to practice modeling hands-on. However, you can refer to some of the other more advanced Land trainings. There may also be an in-person follow on workshop for scenario modeling. More information to come in the following months.

Question 18: Can I get Terra Modis land cover data for north east india?

Answer 18: Yes. Reference slides 57-59 in the powerpoint.

Question 19: I was wondering if the AppEEARS tool can be used to extract values at points outside the U.S.?

Answer 19: Yes

Question 20: I just wonder any tool and data for animal detection? eg. elephants, panda,

Answer 20: Yes there are a variety of tools out there, depending on the animal of interest. Check out the Ecological Forecasting Area at NASA's Applied Sciences website here: <https://appliedsciences.nasa.gov/programs/ecological-forecasting-program>

Question 21: Can we download geotiff file from global forest watch?

Answer 21: Yes. Here is more information about the products available for download: http://earthenginepartners.appspot.com/science-2013-global-forest/download_v1.3.html

Question 22: Could you share literature (books, journals) containing the steps for normalized cup of burning, or post-fire maps ?

Answer 22: Here is a quick reference sheet: https://burnseverity.cr.usgs.gov/pdfs/LAv4_BR_CheatSheet.pdf

Here are a few more resources:

https://www.fs.fed.us/postfirevegcondition/documents/publications/keeley_ijwf_2009.pdf

<https://www.fs.fed.us/postfirevegcondition/documents/MillerThodeRse2007.pdf>

Question 23: What tools do you offer for incorporating other information, e.g., ground truth data from other sources?

Answer 23: You can incorporate your on in-situ data into your research using a variety of geospatial software like QGIS, ArcGIS, Erdas Imagine, and ENVI.

Question 24: How can we have information regarding tree mortality for specific species?

Answer 24: Identification of vegetation species usually requires the use of hyperspectral imagery. Here are a few resources:

<https://academic.oup.com/jpe/article/1/1/9/1132900/Remote-sensing-imagery-in-vegetation-mapping-a>

<https://landsat.usgs.gov/sites/default/files/documents/Thenkabail-LST-hyperspectral-final.pdf>

Question 25: I'm wondering if MODIS provides date of spring onset or green-up with some of its phenology products? Or if that is a variable that is typically estimated by the researcher?

Answer 25: MODIS has an NDVI and an EVI product. You can search for them via NASA Earthdata Search. Here is another helpful link: <https://modis-land.gsfc.nasa.gov/vi.html>

Question 26: Is there a link where to find further information on the Landtrendr algorithm?

Answer 26: Landtrendr quickstart guide:

<http://landtrendr.forestry.oregonstate.edu/content/landtrendr-quickstart-guide>

Question 27: Do all land cover products require ArcGIS software for processing after download or can they be processed using online GIS platforms?

Answer 27: I think ArcGIS has an online platform, see more information here:

<http://www.esri.com/software/arcgis/arcgisonline>. I would suggest viewing them within some type of geospatial software like QGIS or ArcGIS.

Question 28: We have been talking about the ecosystem that is on land. Any method on the aquatic ecosystem?

Answer 28: We have other trainings pertaining to water resources, please see the ARSET Water Resources website here: <https://arset.gsfc.nasa.gov/water>

Question 29: In one of the slides, it is explained that the burnt area cannot be detected by satellites if the affected area is small. How large should be the affected areas to be detected by sensors? Any examples.

Answer 29: It depends on the spatial resolution of the sensor being used. For example, Landsat has a spatial resolution of 30 meters, meaning you obtain one value for the entire pixel. MODIS has a spatial resolution of 250 or 500 meters, thus the burned area would need to be much larger.

Question 30: Is there any way to identify/quantify the biomass burning? In India, there are a lot of biomass burning events which is causing severe problems in air pollution in winter season?

Answer 30: If you would like more information on air quality monitoring (including biomass burning), check out our 2016 webinar [Introduction to Satellite Remote Sensing for Air Quality Applications](#). Our 2017 training, [Satellite Derived Annual PM2.5 Data Sets in Support of United Nations Sustainable Development Goals](#), also contains some information on monitoring biomass burning.

