



## Questions & Answers Session 1

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 Cindy Schmidt (cynthia.l.schmidt@nasa.gov) or Amber McCullum (amberjean.mccullum@nasa.gov).

Question 1: For the NDVI question, i've always wondered if what your referring to would apply to cheatgrass (*Bromus spp*) since it greens up so early compared to native species

Answer 1: Yes - that's a great question. There's actually been a lot of studies done using remote sensing to look at cheatgrass and we can find some of those papers for you and give you information on where to locate that information. But you're right, a key component of looking at cheatgrass is when it greens up - because it tends to green up at a different time than other grasses or shrubs around it. So one approach would be to look at an NDVI time series and compare the timing of green up of cheatgrass compared to other grasses.

Example of paper:

[https://www.researchgate.net/publication/43183158\\_Remote\\_Sensing-Based\\_Time-Series\\_Analysis\\_of\\_Cheatgrass\\_L\\_Phenology](https://www.researchgate.net/publication/43183158_Remote_Sensing-Based_Time-Series_Analysis_of_Cheatgrass_L_Phenology)

Question 2: How authentic is Habitat Suitability model for predicting the potential area of occurrence of any threatened plant species?

Answer 2: That is a difficult question to answer because it is dependent on a lot of different factors. The quantity and quality of ground information plays a big role in the accuracy and usefulness of a habitat suitability model. ARSET will likely have a webinar just on habitat suitability modeling & RS sometime in the next few years. You'll hear more about some current projects on Thursday in the biodiversity session.

Question 3: How do you monitor Guano? As temperature anomalies, monitoring of bacterial activity gases or something else?

Answer 3: That's another great question - so, in the case of penguins, Adelie penguins and other penguins nest on the rocks in the Antarctic, they don't nest on the snow. The contrast between the rocks and guano is apparent in the satellite imagery because there are so many penguins in a colony. One of the things the scientists are trying to



do in addition to detecting the guano is look at the spectral response of guano. One of the scientists is getting spectral information on the guano and which will give them information on the food the penguins are eating, such as whether they're eating krill or other food in the ocean to give them an idea about the diet of the penguins.

Question 4: Do you have more information about removing false positives for Nirops Viirs data?

Answer 4: I don't have the specific info about the process for removing false positives, but we can get you info on that. If you go to the VIIRS Active Fire website, there's quite a bit of info about how they remove the false positives. If that isn't enough info, we can get you in contact with the people that do that processing. Please contact us afterwards about that.

Earthdata: <https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms/viirs-i-band-active-fire-data>

- At the bottom of this website, there are links to papers about the algorithm and development

Question 5: What algorithm or bands does the fire detection tool use?

Answer 5: The fire detection tool - I think you're asking about the satellite imagery - both VIIRS and MODIS have a thermal band. It can detect heat that's emitted from the earth and it can penetrate cloud cover and smoke and so forth. It's a longer wavelength - it's longer than the NIR and both of those sensors use that band.

Question 6: Out of curiosity, do they send an email notification when there is more data to analyze?

Answer 6: (This Q is regarding Snapshot Wisconsin) Yes, if you sign up in zooniverse. - It's free, and then you provide your email, and when more photos are available for the next season, they'll contact you via email.

Question 7: How does the team avoid double counting individuals? If the same individual is captured on two different nights, are there ways to avoid double counting?

Answer 7: I'll have to ask the team about that - maybe we can take your q, and I'll contact them and ask how they do that. I *think* that they probably take that into account.



Question 8: How do they ensure they are not over-estimating populations in the areas that have cameras? Are the cameras located uniformly across some kind of grid system?

Answer 8: This is very much related to Q8. In this case, the cameras in Wisconsin have been rolling out over a period of years. There's a challenge to putting out cameras, and a lot of them need to go on private lands, which requires permission. Over time, the private land of owners have been supportive of getting the cameras out. But because of those restrictions, they aren't being put out on a regular grid and they haven't been spread uniformly throughout the state. When they do the occupancy and modeling they have to take all that into account. Even if there's a chance for overestimation or that the pop estimates aren't uniform, they're still getting better info than they did before they used this approach.

Question 9: Using sea surface temperature data to forecasting the firecast, is it because it affected by the great conveyor belt that influence the weather/climate?

Answer 9: That's exactly right - I can get you more info from CI about the process used and why they're using SST. It has to do with about how weather influences SST and vice-versa and how that impacts the weather on the land.

Question 10: There are so many datasets/products available, but there doesn't seem to be any single portal for searching for what's available to support specific research or for obtaining the information. Instead, we have to use multiple portals. Is there any plan for integration or provision of a single entry portal?

Answer 10: That is a fantastic question and it seems to be one that many, many, many people are asking out of frustration for trying to find info you want in one spot. And you're absolutely right. There is no one place you can go to find everything you need. There's lots of reasons for that. You'll see on Thursday when we do our session on biodiversity, there are *many* biodiversity portals and one of the things that GEOBON is trying to do - the geo biodiversity observation network - is to try and pull all that info to one spot for biodiversity that will lead you to other portals. But that's biodiversity, it isn't all these other things. I'm not sure there's ever going to be one spot. But I know it's an issue, and I wish we could do something about it too - we have the same problem too, when we try to find data.

Question 11: Again, in camera trapping, how is abundance calculated?



Answer 11: I would have to refer you to the people that have actually calculated the abundance. Abundance and occupancy are not easy to calculate for that particular project, but they do have some papers out I can refer you to. If you want more specific info, we can give you the contact info for the scientists that work on that project.

Question 12: Is it correctly understood that remote sensing should not stand alone?

Answer 12: I assume what you mean by that question is that you need to use ground information, or other info, along with RS to figure out whatever question you're asking. And, in my opinion, the answer is yes. You need other info in addition to the RS info to figure out what's going on. I have taught intro to remote sensing for a long time and I always tell my students that sitting at your computer processing satellite imagery only gives you part of the answer. You really need the ground info and tie that to the satellite imagery to get the full picture.

Question 13: I'm working on Komodo dragon conservation, and my study concern to climate change impact to the dragon behavior. Could you give me more advices about datasets variable to predict the impacts?

Answer 13: We would need more info on Komodo habitat. Please send us an email to discuss further.

Question 14: Can we use VIIRS for Urban land cover assessment?

Answer 14: VIIRS is fairly coarse spatial resolution. I think for urban land cover assessment you need a higher spatial resolution, at the very minimum, Landsat at 30 m. The spatial resolution will really depend on your objectives.

Question 15: Can RS for fire monitoring differentiate between wild fires and firebreaks (to prevent the spread of wild fires)?

Answer 15: Wildfires are detected using thermal anomalies on the ground, and a fire is flagged for the entire pixel where this anomaly is detected. Natural fire breaks, like ridgelines, could be identified using elevation data, like a digital elevation model. Depending on the spatial resolution of your remote sensing data, you may be able to identify roads, which can also act as a firebreak. Additionally, you could tie in vector data layers, like roads to identify these as well.

Question 16: Do you have any specific model to model forest growth?

Answer 16:



Here is a nice article about measuring forest productivity and growth using remote sensing and other data: <https://link.springer.com/article/10.1007/s40725-015-0020-x>

Here is a paper that describes the use of the 3-PGS model for forest growth that incorporates remote sensing:

[https://www.researchgate.net/publication/253582436\\_Improving\\_predictions\\_of\\_forest\\_growth\\_using\\_the\\_3PGS\\_model\\_with\\_observations\\_made\\_by\\_remote\\_sensing](https://www.researchgate.net/publication/253582436_Improving_predictions_of_forest_growth_using_the_3PGS_model_with_observations_made_by_remote_sensing)

Question 17: Is it possible to differentiate between different species of plants using remote sensing? Say to distinguish between rubber plantations from natural forest?

Answer 17: This depends on the spectral resolution of the satellite data, and how spectrally different the plants are. If you had a hyperspectral sensor you may be able to use different bands that have a very small spectral range to identify one species compared to another. Check out these references for more information:

- <https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1749-8198.2008.00182.x>
- [https://www.researchgate.net/publication/264422171\\_Hyperspectral\\_Remote\\_Sensing\\_of\\_Vegetation\\_and\\_Agricultural\\_Crops](https://www.researchgate.net/publication/264422171_Hyperspectral_Remote_Sensing_of_Vegetation_and_Agricultural_Crops)
- [https://www.researchgate.net/publication/262840259\\_hyperspectral\\_remote\\_sensing\\_of\\_vegetation](https://www.researchgate.net/publication/262840259_hyperspectral_remote_sensing_of_vegetation)

Question 18: How we can monitor Ganga Dolphins Population in an inland water system like River Ganga , India?

Answer 18: Since you can't "see" the dolphins using any kind of remote sensing imagery, you would need to use a radio collar or eDNA to determine the location of the dolphins in the river. You could then potentially relate that to environmental variables (including water temperature, etc..) to develop a species distribution model

Question 19: Could you get spectral info from an animal to be able to track its movements using sensor on drones?

Answer 19: No, most people use drones to visually locate animals (or habitat), not spectral information.

Question 20: How was forest structure data quantified? Was it field based or remote sensing based?



Answer 20: Lidar can be used (stay tuned for the second session on that). The Chimpanzee study did not use RS. The new GEDI datasets will assist in this too. Please see this article on forest height measurements:

<https://www.sciencedirect.com/science/article/pii/S0034425716300530>

Question 21: Which is the dataset that include population density data?

Answer 21: There are several. This dataset (GRUMP) came from SEDAC (Socioeconomic Data Center) <http://sedac.ciesin.columbia.edu/>

Question 22: We are concerned with zebra mussels at the Bureau of Reclamation, are there RS studies on this species?

Answer 22: The problem with that species is they are underwater. Nothing we can think of offhand. We will look into this further. See below.

\*\*\*Here is a paper about remote sensing in the Great Lakes (it also mentions zebra mussels): [https://bioone.org/journals/journal-of-great-lakes-research/volume-33/issue-4/0380-1330\(2007\)33%5b828%3aTIWCOT%5d2.0.CO%3b2/Trends-in-Water-Clarity-of-the-Lower-Great-Lakes-from/10.3394/0380-1330\(2007\)33\[828:TIWCOT\]2.0.CO;2.short](https://bioone.org/journals/journal-of-great-lakes-research/volume-33/issue-4/0380-1330(2007)33%5b828%3aTIWCOT%5d2.0.CO%3b2/Trends-in-Water-Clarity-of-the-Lower-Great-Lakes-from/10.3394/0380-1330(2007)33[828:TIWCOT]2.0.CO;2.short)

\*\*\*This one is a bit older and uses AVHRR imagery:

<https://aslopubs.onlinelibrary.wiley.com/doi/abs/10.4319/lo.2001.46.2.0213>

Question 23: Any remote sensing data on deep water characteristics in coastal and ocean habitats near west coast U.S.?

Answer 23: Similar to the Zebra Mussel Question. Sea surface temp, height, Chl A are available but most close to the surface.

Question 24: Did this camera trap project have any issues with private lands and hunters not wanting to share photos?

Answer 24: There were not many problems with that actually. Most volunteers were hunters. They were very interested in assisting because it helped them to get an accurate picture of animal populations.



Question 25: How can remote sensing be used in stream monitoring with pixel area less than 3 km square? This is as opposed to lakes or coastal areas.

Answer 25: This is a big challenge for satellite remote sensing data. The data are coarse for stream studies, but many people use the satellite data to characterize the land cover around the streams. Drones may be used as opposed to satellite data.

Question 26: Which software do you use to estimate the distribution of the species? maxent?

Answer 26: There are many. Maxent is popular. But next session (Thursday) we will cover R code that can be used too. Look for a webinar series in 2020 for spp distribution modeling.

Maxent website: [https://biodiversityinformatics.amnh.org/open\\_source/maxent/](https://biodiversityinformatics.amnh.org/open_source/maxent/)

NatureServe also does species distribution modeling:

<http://www.natureserve.org/conservation-tools/species-distribution-modeling>

Question 27: Where can I get up-to-date environmental data (1960 - 2018) for species distribution modelling?

Answer 27: Satellite imagery can be found going back to the early 80's (Landsat) or photography.

Question 28: We have a high deer population on a small remote island. It is important to know what the population size is and the impact it has on the vegetation and the runoff it causes to the near shore marine ecosystems. Can this technology help to assess our situation?

Answer 28: The camera trap method should help. Depending on the size of the island, higher spatial resolution satellite imagery could be used to characterize habitat. Cloud cover may be a limitation though. Aircraft mounted sensors are an option.

Question 29: Can remote sensing be useful to quantify species change with change in land use? e.g. a site that has been impacted by mining activities when you do not have the data before the occurrence of impact?

Answer 29: RS data will only give you information on the environment. So you will have to make an inference to species.



## Remote Sensing of Conservation & Biodiversity

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Question 30: i would like to know if it is possible to measure the behavior of contaminants in lakes and their travel

Answer 30: Water quality in lakes: it depends on the contaminants and the size of the lake. If they change the color of the water, RS can be used. Turbidity will also be an indicator.

A paper about RS and lake water quality: <https://www.mdpi.com/2072-4292/9/5/409>

A tool using RS in the great lakes for water quality:

<http://www.greatlakesremotesensing.org/>