Questions & Answers Session 1

Please type your questions in the Question Box. We will try our best to get to all of your questions. If we don't, feel free to email Pawan Gupta (pawan.gupta@nasa.gov).

Question 1: From which source we can take ABI and AHI data to use in research purpose?
Answer 1: In Powerpoint there are a couple of sources for ABI & AHI images, but these are just images. In week 2 & 3, we'll learn more on how to get the actual data that are relevant for air quality applications. So hold on for those weeks - we'll learn more about the datasets and how to get them.

Question 2: Will we get practical training on MODIS data and how to use this data for aerosol monitoring?
Answer 2: No - not in this webinar series. This webinar series is only focused on geostationary satellites. If you're interested in MODIS data, we've conducted a number of webinars and in-person trainings and materials are available at https://arset.gsfc.nasa.gov/airquality - you can download and watch recordings of those webinars

Question 3: is there a particular reason to use these specific angles in GOES 15,16, 17?
Answer 3: If you are asking about their position at the equator - yes. The specific reason for using GOES 16, 17 - or any GOES - is so you can get the required geographical coverage for monitoring various weather events. GOES satellites are specifically designed for weather monitoring, but due to recent technological advancements, we've been using them for air quality applications as well.

Question 4: What is the spatial resolution of air quality data?
Answer 4: From the geostationary satellite, it will depend on the algorithm - the specific algorithm - used. The spatial resolution of sensors varies from 500 m to a few km - most aerosol data will come into 4-10 km resolution. We'll talk about those things in weeks 2 & 3.

Question 5: is there a method to calculate the uncertainty of remote sensing in each application?

Answer 5: There's no one method that can be used. Each uncertainty in each retrieved quantity has to be retrieved in certain ways depending on that quantity, depending on ground truth data, and the method applied. There's no one method that can be used across different parameters.

Question 6: Do you know any geostationary satellite providing AOD data for Turkey?
Answer 6: Satellites - ESA satellites should also cover Turkey. They have some AOD data products, but not as familiar with those products yet. Please try to tune in on week 4, where we'll talk about INSAT series of satellites, and there you should be able to see if Turkey is covered by that satellite or not.

Question 7: What is the use of radiometric resolution in RS. is it depends on satellite hardware?
Answer 7: Yes - satellite radiometric resolution depends on hardware. It is the precision at which you want to record the measured radiance. The more radiometric resolution you have, the better you can distinguish between two recorded values (energy level) more accurately.

Question 8: Does pollution level at place affect the radiometric resolution if the image?
Answer 8: No - the radiometric resolution is fixed for a specific channel and specific sensor. It doesn't depend on level of pollution.

Question 9: how you convert the satellite data into ug/m-3 concentration
Answer 9: This has to be done using some kind of modeling, either physical or statistical modeling. We have a number of webinar series on this topic, and you can find the material on the ARSET website.

Question 10: What is the accuracy of the calculated surface PM2.5 based on AOD?
Answer 10: It depends on what method - which part of the world you're using - which AOD data you're using. It varies. If you're interested in more, we've conducted a number of webinar series, specifically on those topics.

Question 11: How we can obtain quantitative information on the wildfires e.g. intensity and area burned etc. ?
Answer 11: A specific product from different sensors- we have this product from polar orbiting satellites from MODIS and VIIRS - we also have this product from Geostationary satellites like GOES-R and Himawari. In respect to the satellites, these products will include locations of the fire where the fire has been detected - lat/lon - confidence level (e.g. high confidence, low confidence) - and calc the burned area in

pixels. These are all the products available. If you want a little more on that, ARSET's land applications training program has done several trainings on those topics, and those materials are also available on the ARSET website: https://arset.gsfc.nasa.gov/land/

Question 12: what is the difference between ascending and descending satellite ?
Answer 12: Basically how the satellite is moving - whether it's moving from North to South or South to North. It's mostly applicable to polar orbiting satellites. Terra is a descending satellite - it's going from the North to South.

Question 13: Does the mesoscale view from GOES 16 record in all 4096 pixel intensity levels?
Answer 13: Yes. Irrespective of which mode it is, all the 16 channels of GOES East record those values and those different intensity levels.

Question 14: Aerosol-cloud interaction can be studied by Himawari?
Answer 14: Short answer: yes. But won't comment yet - this is more of a climate question, and we aren't covering climate in this training.

Question 15: What are the most useful sensors to evaluate the fluctuations of air parameters??
Answer 15: Not sure if I understand this question properly - if you rephrase, I'll be happy to answer.

Question 16: is it fair to say that LEO satellites have more products related to Air Quality than GeoStationary?
Answer 16: At present, yes. Because there are more LEO satellites in orbit, operating for a number of years - almost 20 years for some of them. So they have more products for air quality monitoring. Geostationary for air quality monitoring is a new generation of satellite. They're developing more in current time, and in the next five years, there will be more products. In today's conditions, yes, LEO has more products.

Question 17: what new campaigns are in the works to disentangle data within the column from the satellite measurements? Particularly air quality measurements?
Answer 17: Not sure if you're talking about field campaigns - there have been a number in the past (e.g. DISCOVER-AQ, SEAC4RS, KORUS-AQ). Some are in partnership, specifically between NASA and Korea - to try and understand this column/surface relationships.

Question 18: Can we use the satellite data to study the local air quality like a city or a part of a country?
Answer 18: Yes, currently air quality data from satellite are available at 750 m to 10km spatial resolution. Therefore, local to city level pollution monitoring can be done provided cloud/snow/ice free conditions.

Question 19: What is Kappa Coefficient and How to calculate it?
Answer 19: Not sure what that is - we haven't talked about that.

Question 20: what is the difference between geostationary and geosynchronous?
Answer 20: As mentioned in the presentation, slide 17

Question 21: does cloud cover interfere with the satellite data and if so how it's managed?
Answer: Yes. Cloud cover does interfere. Specifically, the satellites that make measurements in the visible part of the solar spectrum. If there's a cloud, you can't make AQ measurements from passive sensors. All the data that are taken during cloud cover conditions are masked for AQ applications and we don't retrieve any information for AQ from those spots.

Question 22: How to get wind speed and direction data?
Answer 22: Not sure - there are ways to get that from geostationary and polar, but we aren't covering that here.

Question 23: Will we get some advice or tools on how to download gridded data and how to open it up. I am asking because satellite data usually comes in difficult specialized formats..

Answer 23: Not in this series. This series is introductory for geostationary and their data products. Currently, we don't have any gridded level 3 data products from geostationary satellites. But geostationary data are from fixed orbit, so they are already gridded - they are fixed in terms of their spatial position on the Earth. In one sense, they're already gridded data. We'll look at how to get some of that data in next week and beyond.

Question 24: Which is the best for Cloud and PM 2.5 AHI or ABI
Answer 24: Both are almost identical - AHI makes measurements in Asia, ABI makes measurements in America - but both have similar capabilities except few minor band changes.

Question 25: Is it possible to scale-down the AOT estimates (4-10km) to a somewhat finer spatial resolutions, say 500m or lower

Answer 25: In theory, yes. But there's no operational product for such a thing. You can do that on a research basis and develop a mathematical technique. Some people call it over-sampling. You use temporal resolution info and improve spatial resolution in that process.

Question 26: concentration of gasses from emission sources don't diffuse through atmosphere according to Brownian movement? so how can I measure more precisely emission points, or we just estimate average concentration of gasses on atmosphere?

Answer 26: Don't understand that question fully but say this - satellites estimate emissions or concentrations of certain quantities for the entire pixel for the column of the atmosphere. If pixel size is 1 km or 10 km, you'll see an average value for that large area.

Question 27: how active sensor helps in Air quality monitoring ?? Is there any open data for it?

Answer 27: Yes. Again, this has been covered in a number of previous ARSET webinars. All of the NASA air quality data (and other applications) are open and can be downloaded from various websites. So try and look over some of the other material on ARSET website to learn more: https://arset.gsfc.nasa.gov/ . CALIPSO is one example of active sensor.

Question 28:: can the satellite data of AOD be used for hyperlocal or micro level community studies? what is the field of view covered by 1 pixel?

Answer 28: I believe you're asking about spatial resolution - for geostationary satellites it varies from 500 m - 2 km resolution. From polar we have aq data from 750 m - 10 km resolution.

Question 29: How is AOD converted into PM2.5 concentration?

Answer 29: There is a previous ARSET webinar series addressing this specific topic.

Question 30: There are other NASA training programs that cover taking L3 data from other sources and use python to plot the data and enable exporting for other use scenarios.

Answer 30: