



## Part 2 Questions & Answers Session

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 Carl Malings ([carl.a.malings@nasa.gov](mailto:carl.a.malings@nasa.gov)) or Pawan Gupta ([pawan.gupta@nasa.gov](mailto:pawan.gupta@nasa.gov)).

**Question 1: At the portal of AERONET, I have downloaded the radiative forcing data over Kanpur, India. In this dataset, TOA is in negative which is good but BOA is in positive while various papers have mentioned BOA data in negative. Why?**

Answer 1: We will have to look at the data and consult with our radiation scientist to provide specifics. You can also email your question to Schafer, Joel S. ([joel.schafer@nasa.gov](mailto:joel.schafer@nasa.gov)).

**Question 2: What are the main environmental effects of air pollution? How does air pollution spread and how can we handle this?**

Answer 2: Please refer to [ARSET's previous introductory training](#) for an overview of air pollution.

**Question 3: What are the "ARM" sites?**

Answer 3: Atmospheric Radiation Measurement (ARM) is a US Department of Energy (DOE) facility. More details are available at <https://nvcl.energy.gov/user-facilities/arm>.

**Question 4: What is AERONET's spatial framework? When lat/long and elevation are supplied, what datum, ellipsoid, etc. do these exist within? I was expecting that to appear in the system description someplace, but I might be overlooking it or looking in the wrong place.**

Answer 4: AERONET station lat-lon represents point location with single value.

**Question 5: What is an aerosol? What is the difference between aerosol and particulate? What is aerosol in one word? What are the two types of aerosols? What is the classification of aerosols?**

Answer 5: Please refer to Part 1 of this training for an overview of aerosol basic concepts.



**Question 6: On the AERONET download tool, what is the meaning of the level of data being downloaded (AOD level)? What would be the implications of using a certain level?**

**Question 7: What is level 1, 1.5, and 2 data?**

Answer 6-7: AERONET provides data in three different levels 1.0, 1.5, and 2.0. The Part 1 slides discuss these in more detail. Level 2.0 is the recommended data for scientific research.

**Question 8: Is Aeronet interested in more Solrad-net data? Can we submit data for this?**

Answer 8: No, we don't accept data from other sources unless they are quality controlled by AERONET protocols.

**Question 9: I am a PhD Student and I have discussed with my supervisor that we want to run some sites which are not working anymore. A few years ago some sites were going off and we want to fix that. My question is, who should we ask to go to these Cimels? Can we try to fix them? Or send me to colleagues in Spain? What should we do to fix them?**

Answer 9: There are many factors which play a role in maintaining a specific AERONET site. Each site is unique. Please email [pawan.gupta@nasa.gov](mailto:pawan.gupta@nasa.gov) if you have interest in a specific site.

**Question 10: Does the data cover a large part of the atmosphere?**

Answer 10: Yes, most AERONET data products cover the entire vertical column of the atmosphere. Please refer to Part 1 for an overview of AERONET.

**Question 11: Is there a specific reference value for AOD according to the type of aerosol (fine or coarse, sea salt or biomass burning), or must we use the angstrom exponent along with AOD?**

Answer 11: AOD represents the amount of all types of aerosols in the atmospheric column, therefore AOD alone does not provide any indicator of aerosol types. The angstrom exponent can give an indication of dominating aerosol size distribution. For example dust (more coarse particles) or smoke (more fine particles for fresh smoke).

**Question 12: Would you happen to know the criteria allowing data to move from level 1.5 to level 2?**



Answer 12: Final calibrations and additional quality control are necessary. The instrument must return to a calibration facility for post-field calibration before the data moves to level 2.0.

**Question 13: How do you get the angstrom exponent for pure dust (AE\_dust) in order to find AOD for black carbon (BC\_AOD)?**

Answer 13: It is very hard to identify pure dust using AERONET data alone. If the aerosol type is known from other sources, then the AE calculated will represent that particular type of aerosol.

**Question 14: What is the wavelength of AOD in Aeronet?**

Answer 14: AERONET measures AOD at multiple wavelengths; please refer to Part 1 for details.

**Question 15: On this tool ([the Data Explorer Map](#)), what times are used? GMT or local?**

Answer 15: GMT. We provide all data in GMT for global consistency purposes. In this tool, the web browser uses your computer's local time to display this on the interface, showing data for the last hour.

**Question 16: Which data product we should use for inversions like almucantar or hybrid based?**

Answer 16: They are very comparable at the larger solar zenith angles (SZAs) (50-75 deg) when both are made, as [Sinyuk et al. \(2020\)](#) have shown. The Hybrid scans can be made down to an SZA of 25° SZA, while almucantars are limited to 50° SZA. Therefore the Hybrid scans provide retrievals very near to satellite overpass times, which is a significant advantage for comparison/validation.

**Question 17: Why is there one station Ilorin in Nigeria? Do you partner with private organizations to provide more stations**

Answer 17: Please email [pawan.gupta@nasa.gov](mailto:pawan.gupta@nasa.gov) if you have interest in establishing a new site.

**Question 18: What would be the easiest way to port/adapt the Google Colab notebooks to JupyterHub?**



Answer 18: These codes should operate in JupyterHub as long as you have all the dependent packages listed in the first cell. You can download \*.ipynb file from Google Colab and upload to your hub. You would need to update the file and folder directories, from pointing to Google Drive to pointing to a local directory on your machine.

**Question 19: How do you handle NAN (Not-A-Number) values in the AOD data?**

Answer 19: NAN is used for missing data. Different programming languages can handle this data in different ways. Here is an example for Python:

[https://pandas.pydata.org/docs/user\\_guide/missing\\_data.html](https://pandas.pydata.org/docs/user_guide/missing_data.html). The fraction of data which can be NAN values and still provide a meaningful result is very dependent on the application.

**Question 20: What is a reason I could obtain a high value of AOD during monsoon season? If this is due to clouds, then how can we filter these data?**

Answer 20: Depending on the location, many factors can contribute to high AOD values. If it is an urban site and dominated by hygroscopic particles, then under high humidity conditions, their extinction properties can change and enhance AOD values. There can be cases of cloud contamination, specifically cirrus clouds. Cloud masking varies case by case and requires looking at the data more closely.

**Question 21: Referencing the AOD time series plots, suppose I see an unexpected, single day spike in AOD (i.e., not part of a known event such as a wildfire). What would be some possible next steps for identifying the source of the spike?**

Answer 21: There could be many things occurring to cause the spikes. It could also be cloud contamination. It could also be a small part of the air mass with smoke plume or dust. From the data perspective, AERONET provides the data in many wavelengths, and you can try checking other wavelengths to see if the spike is present across all wavelengths.

**Question 22: Is it necessary to modify the URL to download and play with lunar (i.e., AERONET measurements taken at night) data? In other words, are lunar data available from the API?**

Answer 22: Yes. All the APIs are very similar in nature. There is a keyword that can be used to search the night versus daytime data.



**Question 23: I tried to download data from Jaipur station in India but most of the data is missing. Also I was not able to get the Refractive index and other parameters, only AOD and AE are visible.**

Answer 23: The refractive index and other physical parameters can be found in the “Download Tool” button under “AEROSOL INVERSIONS (V3)” tab. You must have clicked on the Aerosol Optical Depth tab, which contains AOD/AE/SDA/Water Vapor. The size of the data depends on the time specified and the level of data. The reason why a lot of the data might be missing is because some stations are not transmitting data on a daily basis due to environmental or technical factors. Monsoon season in India may affect some stations such as Jaipur, where data may not be recorded for days and even weeks. Longer periods of data missing can also be associated with instrument problems or site maintenance issues.

**Question 24: Expanding on Question 21, regarding spikes in AOD. The answer to 21 focused on data quality. Suppose the measurement is an accurate reflection of a local event. How would one attempt to identify the source of the spike? For example, a local refinery discharge.**

Answer 24: Looking at the wind speed and direction at the time of the spike might give an indication of the source. Looking to see if there is available satellite data from the same time and location might also reveal something. If the AERONET site happens to be co-located with an MPLNET site, this would give an indication of where vertically in the atmosphere the aerosols might be concentrated; we will learn about MPLNET in Part 5. Finally, looking at any camera footage from the area or interviewing people who live and work there might reveal something as well.