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 Pawan Gupta (pawan.gupta@nasa.gov) or Melanie Follette-Cook (melanie.cook@nasa.gov).

Question 1: Where can we download data for average daily values of AQI in popular cities? Is it available for India and neighbouring countries?
Answer 1: Openaq.org allows users to download air quality data from global locations, including India.

Question 2: Is land cover also a factor that contributes to air quality? Especially if the surface cover is a sink or absorber of pollutants?
Answer 2: Yes, land cover, land use, and topography can directly or indirectly affect air quality. They can also be the source of emissions, pollution could be deposited on them.

Question 3: Would it be correct to say that the effect of meteorological factors on PM concentrations cannot be inferred from one country to another?
Answer 3: Not sure if I understand the question correctly but the meteorological conditions more or less affect pollution in the same way irrespective of country but can vary by other environmental factors such as emission sources, topography, etc. Those can vary from one country to another.

Question 4: Is the Persistence method based on transitional probability?
Answer 4: I'm not familiar with transitional probability theory, but the persistence method is based on the idea that the best predictor of tomorrow's weather/air quality is the weather/air quality today.

Question 5: If Low pressure means good air quality, then if a cyclone hits and low pressure is formed, can this create good air quality?
Answer 5: Under cyclone conditions, other than pressure, rain and winds will have significant impacts on pollution. There are research studies out there where the impact of aerosols on cyclone formation is being studied.

Question 6: Is there any relationship between chemical elements which are considered as pollutants with other natural pollutants from emissions, clouds etc,...?
Answer 6: Yes, all kinds of particles and gases interact with each other in the atmosphere depending on their optical or chemical properties and environmental conditions. This often happens irrespective of their origin.

Question 7: In using satellite data for research, is it acceptable to use purely remote sensing data, without in situ/ground measurements? How can we prove the accuracy of these satellite data?
Answer 7: It depends on the purpose and app of the research. Most of the time you need in situ to ground truth the satellite data. You can also try to intercompare the satellite or modeled data for consistency check.

Question 8: Can satellite data for air quality forecasting be visualized in google earth engine through coding?
Answer 8: GEE currently does not have NASA's forecasting data yet but it may become available in near future. You can upload your own forecasting data (or NASA forecasts) to GEE and analyze.
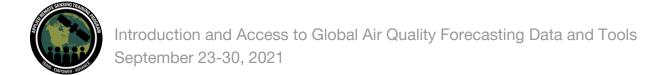
Question 9: Can I access CMAQ, WRF and other models interactively to download a dataset? Where can I download the model data for a city or town?
Answer 9: CMAQ does have some output generated and downloadable, and available to the public. The link is given in the ppt. Some WRF outputs are also available, refer to WRF-Chem website given in ppt. In Sessions 2 and 3, we will show how to download data from the NASA GEOS and ECMWF CAMS global model forecasts.

Question 10: How about the capability of satellite data of air pollutants in local scale analysis?
Answer 10: The operational satellite data has been used to address many local AQ concerns. The current satellite data on aerosols are about 1 km2 scale whereas trace gases are at 3 to 5 km3 resolution.

Question 11: While the high resolution (1KM) observations like MCD19A2 (MAIAC) for AOD is retrieved at time of satellite pass (orbit wise data), and the models like WRF

gives output in a fixed time step (3hrly,6hrly, daily etc). How should we correlate these two datasets, if we are interested in air pollution modelling at urban scales?

Answer 11: Typically there are many different ways in which satellite observations, ground measurements and model outputs can be spatiotemporally collocated. In one of the ways, you can choose the nearest hour to satellite overpass time to the model to match the temporal window. For larger spatial scale analysis, this approach can be more flexible but for local and urban scales, you will have to make sure the spatial and temporal scales match to the best possible extent.

Question 12: In this data example from the exercise, does it matter if the time is local or all for a specific timezone? are the stations in the same or different timezone?

Answer 12: When comparing model output and ground data, it is best to choose the model output time that is closest to the time of observation. It is critical to ensure model and ground data represent the same time zone.

Question 13: I have a 1km x 1km grid PM concentrations derived from dispersion modeling I want to correlate with measurements from a monitoring station. Should I do the correlation with the corresponding grid concentration, or do I first do kriging interpolation of the grid concentrations before correlating with the ground measurement?

Answer 13: The simplest way would be to locate the nearest grid cell to the ground station. Kriging or interpolation should not be necessary but depending on the purpose an appropriate method can be evaluated.

Question 14: Exactly how to carry out the temporal matching? Say, if the ground measurement is taken at 09 45 hours, is it mandatory to have the satellite pass or the model forecast for the same time only? or the predicted values at ± 30 minute (or any such temporal period) from the ground measurement time can be considered for validation?

Answer 14: Yes, we use a +/- 30 minute window to average the data.

Question 15: From which value of correlation can we consider we have good forecasted values?

Answer 15: The significance of correlation depends upon how many data points you have. There are parameters such that the p-value can be calculated to assess correlation further.

Question 16: How do you deal with missing data ? (1-3 months of data gaps)
Answer 16: Not sure in relation to what, we can't really do anything about missing data. There are some methods to fill in, but don't recommend especially if over a long time period.

Question 17: Ozone is considered as a pollutant in the lower atmosphere but not when it is present in the stratosphere. Is there any mechanism by which ozone can move to the stratosphere from the troposphere or deposit to ground like in the case of aerosols?
Answer 17: Stratosphere-troposphere exchange can happen during tropopause folding events. These events, and the associated transport of high-ozone stratospheric air to the troposphere, can contribute to ozone exceedances at the surface, typically in mountainous regions at high altitude. Dry deposition of ozone is an important factor. Ozone pollution can be harmful to ecosystems.

Question 18: How can we apply global models to forecast for local areas where ground monitoring stations are very few?
Answer 18: We will address this topic in Parts 2 and 3.

Question 19: How can we do uncertainty analysis while forecasting emissions?
Answer 19: Typically, air quality forecasting does not include forecasting of emissions itself but concentration in the atmosphere.

Question 20: How does a wildfire affect the air quality of the near region? How long does the pollution persist? Could we build a model to measure and predict that?
Answer 20: Yes, wildfires do affect air quality at varying spatial and temporal scales. Transports follow weather patterns. Smoke can stay in the atm for day to sometimes week. Most AQ models use satellite based fire emissions to account for the smoke emissions.

Question 21: I found the OMI SO2 data in DU but our available ground data is in ug/m3. How to convert between them?
Answer 21: The Dobson unit is a column quantity. You will need information about the column profile of that species. There is not a direct conversion without the vertical information.