



Questions & Answers Session 2

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: What general preprocessing and calibration needs to be performed while analyzing TROPOMI data?

Answer 1: If you are using Level 2 data (NO₂, aerosol index), you should be aware of the calibration, but you do not have to make any additional changes. If you are doing your own retrieval algorithms...

Question 2: Can we transform the NetCDF4 format (TROPOMI data format) into a simpler tabular format like csv files? If we can, do we lose any information while doing that?

Answer 2: Yes, you can. We will be doing that using Python on Monday and also with Panoply.

Question 3: Are you aware and can you cite examples of OMI and TROPOMI data products application in air quality management by national and regional public organizations?

Answer 3: OMI data has been used by various agencies specifically to look for trends in NO₂. EPA uses OMI in their own work. Can also be used to monitor oil and natural gas activities. Also integrated into Copernicus program. Depends on the needs of agencies.

Question 4: Any timeline on GEMS AND TEMPO launch date from NASA/ESA side.

Answer 4: GEMS is a Korean satellite that will be launched in 2020/2021. TEMPO launches in 2021/2022.

Question 5: Can we retrieve an approximated value of NO₂ concentration for a specific lat long from TROPOMI NO₂ product or is it just visualizations?

Answer 5: Yes, you can get specific values of NO₂ in a specific location. Will be shown on Monday.



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Question 6: Does the data from TROPOMI can be used to do the Air Quality Modeling for small scale area?

Answer 6: Yes. It will depend on what small area you are talking about and what AQ monitoring you want to do. Can be used to compare model outputs and various other tasks.

Question 7: Can we access data through API?

Answer 7: Yes. I do not have an exact link. Go on the TROPOMI website and refer to tools.

Question 8: If there are rectifications to be made on the TROPOMI instrument when it is on the runtime environment, how are these corrections made in the instrument of the TROPOMI?

Answer 8: I am not sure I understand. There are instances when the instruments runs continuously and there are effects.

Question 9: TROPOMI data provided in the www.tropomi.eu and <https://disc.gsfc.nasa.gov/> are same?

Answer 9: Yes. They are the same.

Question 10: For analytics: Panoply does not help much. Is there any other tools such as ArcGIS Pro can be used?

Answer 10: If you can open a NetCDF file in ArcGIS then yes. Refer to the Monday Session.

Question 11: Does sentinel O₃ product cover the whole globe?

Answer 11: Yes. If you are talking about TROPOMI then yes.

Question 12: On slide 16, can you please explain why CH₄ look high concentrate in Cambodia?

Answer 12: I am not sure why, but look into the sources. Fossil fuel burning and industrial agriculture can contribute to high levels of CH₄. Not familiar.

Question 13: NRTI vs OFFL Data streams, what's the difference explained in detail and their applications?



Answer 13: NRTI is near real time. Produced within 1-2 hours after passing. There are additional parameters may not be available in near real time. They are designed to work faster. Offline is more robust and are delayed by several days. NRTI are used for specific applications (natural hazard mapping, forecasting). For long term analysis, you need more accurate data sets, which OFFL is used.

Question 14: Why are there negative aerosol index (color in blue)?

Answer 14: Aerosol index is a quantity calculated based on cloud cover. When you see negative values, it can be attributed to cloud cover.

Question 15: In your opinion, did the calibration performed for the NO₂ data have enough validation to be applied to South America without additional modeling?

Answer 15: Current calibrations work fine, but not sure about South America. Look up resources relating to your region.

Question 16: How to separate the tropospheric NO₂ from the stratospheric NO₂?

Do the bright surface reflectance affect the NO₂ retrieval?

Answer 16: Yes, bright surface reflectance does affect NO₂ retrieval. Use OMI based reflectivity, but will incorporate TROPOMI. For separation, you have to use a global model and is converted to two pieces of information.

Question 17: Can you please explain the difference between the near real time, offline and reprocessing versions of the data again?

Answer 17: Just answered the question relating to that.

Question 18: How to calculate Aerosol height?

Answer 18: Aerosol height is measured in 700nm range of spectral range. Not really sure about algorithm details, but refer to TROPOMI website for info.

Question 19: could you give a signification on a UV AER 380 index and how we can use it to calculate measures such PM₁₀ concentration?

Answer 19: In general, UV aerosol index are sensitive to height. Not really used.

Question 20: How are the QA value measurements created? Is there a specific mathematical computation?



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Answer 20: Created based on certain decisions based on data processing. Steps like cloud clearing, noise masking, etc. They are calculated into the values. QA shows the performance of the algorithm. In case of TROPOMI, don't know specific factors.

Question 21: Can we analyze the data in R?

Answer 21: Not sure, but through NetCDF yes.

Question 22: Any gaseous mercury data is there

Answer 22: Not familiar with data.

Question 23: What are the cloud screening criteria for CO and NO₂?

Answer 23: Cloud screening done using standard method and used from VIIRS data. Not familiar with finer details.

Question 24: Is it possible to subset the resultant Model image to the smallest shape file one has?

Answer 24: Not sure I understand the question. You can convert image into shapefile.

Question 25: How do you apply the QA value filter?

Answer 25: Just answered question. Refer to presentation.

Question 26: Question about the August 2016 AOD plot. I wonder if you happen to know the general wind direction and can point out the wildfire location? Seems fires should be at location of most intense AOD and decrease with distance from fires, is that a correct assumption?

Answer 26: There is a significant difference between the two products. You should see higher values closer to the source, but can vary when observation was made. Depends on the level of observation and time.

Question 27: Which spectral data we are supposed to take for Aerosol?

Answer 27: Aerosol index uses two indexes (354 and 388) (340 to 350).

Question 28: How to extract NetCDF data with latitude & longitude? Panoply through saved .csv data giving only data.

Answer 28: Explain on Monday.



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Question 29: When it is useful to use TROPOMI data rather than OMI data?

Answer 29: If you are looking for high resolution, TROPOMI

Question 30: can where retrieve emission data instead of column concentration?

Answer 30: There are methods that can be used, but not available on an operational basis.

Question 31: What percentage of error is happened due to cloud while processing NO₂ data?

Answer 31: I'm not sure. Refer to documentation.

Question 32: How much is the correlation between the satellite-derived product and ground-based observational data?

Answer 32: One of the validations has a correlation of 0.76. Check validation website and make sure the numbers are up-to-date.

Question 33: How large settlements can be monitored with TROPOMI NO₂?

Answer 33: I'm not sure if I understand. It depends on the size of the source.

Question 34: Is there homework for this session?

Answer 34: Yes. HW is to install Python and download datasets.

Question 35: how many molecules/cm² OMI NO₂ = molecules/cm² TROPOMI? What is the calibration correlation? If the PBL is 1km approx. how much no₂ is near the surface to make ozone? ~40ppb? I was told anecdotally OMI $10 \times 10^{15} = 3 \times 10^{15}$ TROPOMI? Would I be better emailing this question for you? This is for the NYC/Long Island Sound area

Answer 35: Not sure if I understand.

Question 36: Can we transform abundance or density of NO₂ molecules into concentration (ppm, ppb)?

Answer 36: I think so. There are ways to convert into different units.

Question 37: Will we be able to look at 7x7 pixels over NYC for an isolated power plant on the south shore of Long Island?

Answer 37: Yes. We will cover on Monday.



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Question 38: Looks like PANDORA and MAX-DOAS calibration uses ground-based air column spectroscopy. Are they using any other ground-based air quality monitoring data such as AIRNOW?

Answer 38: So PANDORA and MAX-DOAS use the same calibration. May be some conversion for data and imagery.

Question 39: Can we get PM_{2.5} and PM₁₀ from TROPOMI?

Answer 39: There is no such product. Use aerosol optical depth for PM₁₀. No future plans.

Question 40: When converting to image in PANOPLY for example .jpg the result is a geo-referenced image (raster)?

Answer 40: Yes image is geo-referenced. The map is the same.

Question 41: Can we convert TROPOMI data format into .tif format?

Answer 41: Yes. Can be done using Panoply or GIS software.