



Applied Remote Sensing Training (ARSET) Program

Advanced NASA Earth Observations and Tools for Active Fire, Smoke,
and Post-Fire Monitoring

Homework Questions

Question 1

The MODIS burned area product will not be available once Terra and Aqua are decommissioned, which burned area product will provide continuity with the MODIS burned area record?

Answers: (bold correct)

- a. The Sentinel-2 adjusted reflectance BRDF (false color - vegetation)
- b. VIIRS burned area product (VNP64A1)**
- c. Landsat NDMI - Normalized Difference Moisture Index

Feedback:

The VIIRS (Visible Infrared Imaging Radiometer Suite) instruments (currently onboard the Suomi-NPP, NOAA-20, and NOAA-21 satellites) provide continuity for MODIS observations because VIIRS has similar spectral bands, spatial resolution, and daily global coverage capabilities. The Landsat and Sentinel-2 sensors have finer spatial resolutions and lower revisit frequencies.

Question 2

The Normalized Burn Ratio (NBR) leverages bands that are sensitive to vegetation health and moisture content and is ideally suited to identify burned areas and provide a measure of burn severity.

Answers:

- a. **True**
- b. False

Feedback: The Normalized Burn Ratio (NBR) is used to identify burned areas and provide a measure of burn severity.

Question 3

On June 4, 2025, smoke from fires in Canada reached Europe. Using the SNPP OMPS Aerosol Index (AI) layer in the Smoke/Aerosols mode in FIRMS, along with the timeline, identify the date that shows the initial fires and smoke plumes.

Answers:

- a. 19 May 2025
- b. 1 June 2025
- c. **24 May 2025**

Feedback:

Using the timeline, you can click on previous dates and step backward in time. Doing this reveals that the fires that impacted Europe began on 24 May 2025.

[FIRMS Smoke/Aerosol Map, 24 May 2025](#)

Question 4

You're monitoring a fire event using the Smoke/Aerosols mode in FIRMS and the standard OMPS AI shows values of 5.0 with some data gaps. What should you do next?

Answers:

- d. Continue using the Standard AI product
- e. **Switch to the PyroCB AI product**
- f. Only use true-color imagery
- g. Wait for better weather conditions

Feedback:

A standard OMPS AI value of 5 indicates dense smoke and heavy aerosols. Values above 5 are screened out in the standard OMPS layer. Switching to the PyroCB AI product shows values >5, indicating dense smoke higher.

True-color imagery will not provide any additional information about the aerosols, therefore, waiting for better weather conditions will also likely not help to monitor the event effectively.

Question 5

Using the location tool in the Experimental mode of FIRMS Global and the Industrial and Power Plants layers in the Static Thermal Anomalies dropdown menu, what kind of Static Thermal Anomaly (STA) is located at coordinates 42.914 N, 74.873 E (enter 42.914, 74.873 into the location tool)?

Answers:

- a. Gas-Fired Power Plant
- b. Cement Plant**
- c. Volcano
- d. Coal-Fired Power Plant

Feedback:

Entering the coordinates into the FIRMS Global location tool brings you to Ysyk-Ata Rayonu, Chuy Region, KGZ. By turning on the Industrial Plants and Power Plants layers, the icon at the coordinates matches that of a cement plant.

[Link to Coordinate Location](#)

Question 6

Using the location tool in the Advanced mode of FIRMS Global and the 2024 VIIRS Burned Area annual product for reference, how close did fires burn, based on the burned area product, in 2024 to the STA located at coordinates 20.736 S, 139.478 E?

Answers:

- a. Approximately 50 km
- b. Approximately 5 km**
- c. Approximately 1 km

Feedback:

Entering the coordinates into the FIRMS Global location tool brings you to Mine Road, Mount Isa, Queensland, 4825, AUS. By turning on the layer showing VIIRS Burned Area annual product for 2024, you can see where VIIRS observed areas burned. Using the Measure tool, and choosing distance, you can draw a line from the closest burned area polygon to the STA coordinate. Doing this shows a distance of ~5 km.

Questions 7 and 8 will use the Jupyter Notebook provided as part of the training. You can access the notebook via the ARSET Github repository for this training, [LANCE FIRMS 2025](#). Once you have accessed the notebook, **scroll down past 'Conclusions' to locate the Homework portion of the notebook** that will be used to answer the following two questions.

Question 7

Using the Q1: Bounding Box Exploration cell use the following conditions, bounding box: (-77.871094,38.212288,-74.794922,39.715638), number of days: 4, start date: '2025-05-14', and satellite data type: MODIS standard processing, to answer the following question. (Hint: Look through the notebook documentation to locate the correct string name for the MODIS standard processing data.)

Based on the interactive map, the majority of fires are located in which U.S. state?

Answers:

- a. Virginia
- b. Maryland**
- c. Delaware
- d. Pennsylvania

Feedback:

By entering the stated information into the correct variables in the first few lines of the cell:

```
boundingBox = (-77.871094,38.212288,-74.794922,39.715638)
```

```
dateString = '2025-05-14'
```

```
satelliteDataType = 'MODIS_SP'
```

```
numberOfDays = 4
```

And then running the cell, you will produce a map, which shows that the U.S. State Maryland shows the most active fire detections.

Question 8

Using the Q2: Palisades Fire (California Bounding Box) cell use the following conditions, bounding box (bbox_lq):(-121.662598, 32.546813, -115.224609, 35.835628), number of days: 10, start date: '2025-01-05', and satellite data type: MODIS standard processing, to answer the following question. (Hint: Look through the notebook documentation to locate the correct string name for the MODIS standard processing data.)

Looking at the bar chart that is generated, which day shows the highest number of active fire detections?

Answers:

- a. January 5, 2025
- b. January 6, 2025
- c. January 8, 2025**
- d. January 10, 2025

Feedback:

Running the cell produces a bar chart showing the number of fire detections each day from January 5-14.

January 8th is shown to have the highest number of active fire detections.