

**Joint Satellite Conference 2019**  
**Air Quality Training Courses**  
**Reference Guide for Hands-On Activity #1: Accessing Prepared Satellite Imagery from NOAA's**  
***AerosolWatch* and *JSTAR Mapper* Websites**

**Objectives:**

- Learn what websites display ABI, VIIRS, GOME-2, and TROPOMI prepared imagery
- Explore the strengths and limitations of prepared imagery
- View ABI and VIIRS aerosol products on the *AerosolWatch* and *JSTAR Mapper* websites for a specific fire/smoke event

*Slide numbers refer to the accompanying PowerPoint file that shows screenshots of the relevant websites, for reference.*

**Introduction**

Depending on your specific data product needs, there may be times when you want to quickly view current – or archived – satellite imagery. **Slide 2** shows the prepared air quality-related satellite products that are available. This activity will guide you through some of the options for accessing prepared satellite imagery on NOAA websites.

**AerosolWatch: ABI and VIIRS Imagery**

- Open the *AerosolWatch* website: <https://www.star.nesdis.noaa.gov/smcd/spb/aq/AerosolWatch/>
  - For best results, use **Google Chrome** as the web browser.
  - The home page default display is the current (most recent 2 hours) of GOES-16 ABI GeoColor imagery in the CONUS view (**slide 3**).
- Since the ABI is on the GOES-16 and -17 geostationary satellites, there are many observations each day. Use the **animation time range selection** tool (**slide 4**) to select the time period of ABI observations to display.
- Use the **animation buttons** (**slide 5**) to control the speed and progression of the ABI observations
  - Note the time stamp (in UTC) in the black box to the left of the animation buttons
  - The forward arrow (square) starts (stops) the animation
  - The double forward (backward) arrow speeds up (slows down) the animation
  - The forward/line (backward/line) arrow lets you step forward (backward) one image at a time
- To select the **satellite products** to view, click on the name of the satellite in the grey menu on the right-side of the page (**slide 6**). A drop-down menu will open under each satellite with the available products. Click on a product name to visualize.
  - Green means the product is visible (displayed)
  - Red means the product is hidden
- You can view **only 1 color imagery layer** at a time (from any satellite) (**slide 7**):
  - True color (VIIRS) or GeoColor (ABI),
  - Dust RGB, or
  - Fire RGB

- You can overlay as many **data layers** as you want (**side 7**):
  - AOD
  - Smoke/dust mask
  - Fire (FRP)
  - Observed PM<sub>2.5</sub>
  - Labels/boundaries
- To **zoom in/out**, use the + and – buttons on the upper left-side of the page (**slide 8**). You can also use the scroll bar on your mouse.
- To add **labels and boundary lines** to the satellite imagery, click on “**Labels Layer**” in the grey menu on the right-side of the page (**slide 8**).
  - Select the “Boundary Layer” to add county, state, and country boundary lines
  - Select the “Labels Layer” to add the names of cities, states, countries, and water bodies
- To add **surface PM<sub>2.5</sub> (fine particulate matter) observations from the AirNow network**, click on “**PM<sub>2.5</sub> Layers**” in the grey menu on the right-side of the page (**slide 9**).
  - Displayed in units of µg/m<sup>3</sup> on the color-coded AQI scale
  - Higher PM<sub>2.5</sub> concentrations (e.g., orange, red, purple, maroon dots) indicate smoke, dust, or pollution at the surface
  - Lower PM<sub>2.5</sub> concentrations (e.g., green and yellow dots) indicate generally clean conditions
  - Select “**Hourly PM<sub>2.5</sub>**” to see the latest 1-hr average PM<sub>2.5</sub> concentrations
  - Select “**Daily PM<sub>2.5</sub>**” to see 24-hr average PM<sub>2.5</sub> concentrations (corresponds to U.S. health standard)
- ABI imagery is available in **CONUS** and **Full Disk views**. Use the green buttons at the top right-side of the page (**slide 10**) to switch between CONUS and Full Disk (currently limited to GOES-16 imagery; GOES-17 imagery is coming soon).
- *AerosolWatch* includes an **image archive**. To access imagery from past days, click on the **calendar** in the top center-left of the page (**slide 11**). You can quickly select the year, month, and day of interest. Note that the archive begins in September 2017 and not all imagery is available for all time periods.
- To **save** a static image or an animation (loop of multiple images), click on the button with the little camera in the top center of the page (**slide 12**). A window will open at the top left of the screen; use the cursor to draw a box around the region you want to save, and click on the “submit” button. The saved image or animation will open in a new tab. **ABI animations can take several minutes to load – be patient!** You can save the following image options:
  - Single ABI image
  - Single VIIRS image
  - Animation of multiple ABI images for the same day
  - Animation of multiple VIIRS images over consecutive days (be sure to choose the start and end dates in the “save image” window)
- To open the **48-hour aerosol trajectories** tool, click on the button with the little squiggle in the top center right of the page (**slide 13**). A new tab will open, showing the trajectories. You will see an

animation loop of forward trajectories (magenta, pink, and white streaming lines) initiated at locations of high AOD (>0.4, overlaid with wind vectors (white arrows) and 3-hr accumulated precipitation (yellow shading) for the current day (**slide 14**). The trajectories run for 48 hours in 3-hr time steps, beginning at 12 UTC. The trajectories are initialized at 50 mb, 100 mb, 150 mb, and 200 mb above surface level in locations with high AOD (>0.4). The air parcel trajectories are run using 12 UTC NAM model forecast output. The pressure levels of the trajectories are plotted in mb and colored to a magenta-white scale. As the forecast trajectories progress in time, darker pink/magenta colored trajectories indicate a flow of air towards the surface, with a potential similar movement of the aerosols. White colored trajectories indicate upward movement in the air flow, away from the surface. 850 mb wind field vectors (white) are plotted to show wind direction and speed. Areas where forecasted 3-hr accumulated precipitation is greater than 2kg/m<sup>2</sup> are shaded yellow and represent the potential for wet deposition in areas of high aerosol loading.

- The trajectories give you an idea of the transport of aerosol-rich air into a given region (**horizontal** transport), and the potential for mixing of that aerosol plume into the boundary layer (**vertical** transport)
  - Use the **calendar** at the top center of the page to select a day of interest
  - Choose to initialize the trajectories using **GOES-16/ABI or VIIRS AOD** (green buttons at top left of page)
  - Use the blue **animation buttons** at the top center-right of the page to start/stop and advance the trajectories in the 3-hr increments
  - Click on the blue button with the little file on it at the top center right to **save** a trajectory animation
- Access **additional supplementary information** by clicking on the buttons with the little link (to access a list of **external web links**) or the little document (to access **document files**) (**slide 15**).

### JSTAR Mapper: VIIRS and TROPOMI Imagery

- Open the *JSTAR Mapper* website: <https://www.star.nesdis.noaa.gov/jps/mapper/>
  - The home page default display is current day of global SNPP VIIRS true color imagery (**slide 16**).
- Up to **3 layers of data** can be displayed at the same time. To select the different data layers, use the pull-down menus under “**Layer 1**,” “**Layer 2**,” and “**Layer 3**.” Don’t forget to click the “**Show**” button to visualize the data, and you can change the opacity of a layer with the slider bar (**slide 17**).
  - There are a variety of data options available; for air quality/fires select:
    - Suomi NPP or NOAA-20
      - Aerosols: Aerosol Optical Depth or Smoke/Dust Mask (**slide 17**)
      - VIIRS Imagery: VIIRS True Color (**slide 18**)
      - Land: M-Band Fire Radiative Power or I-Band Fire Radiative Power (**slide 19**)
    - Sentinel 5P (**slide 20**)
      - TROPOMI products: Carbon Monoxide or Nitrogen Dioxide
- To **save** an image, left-click anywhere on the image and select “Save image as...” (**slide 21**).

- To access the **image archive**, select the month/day/year using the calendar tool at the top left of the home page. To change the **projection of the imagery**, use the pull-down menu under “Projection” at the top left side of the home page, next to the calendar tool (**slide 22**).
- To **zoom in/out**, use the + and – buttons on the upper left-side of the page (**slide 23**). You can also use the scroll bar on your mouse or double click to zoom in.