

HMS Fire and Smoke Exercise

Introduction

For this exercise, we will focus on combining datasets that identify wildfire locations and smoke plumes. The National Oceanic and Atmospheric Administration's (NOAA) Office of Satellite and Product Operations (OSPO) manages and directs the operation of facilities which ingest, process, and distribute environmental satellite data and derived products to domestic and foreign users. The Hazard Mapping System (HMS) has products that provide fire locations and smoke plumes for the United States.

The HMS products show detected hot spots and smoke plumes indicating possible fire locations for the United States. These products are blended and use algorithms from the Geostationary Operational Environmental Satellite (GOES) imager, the Polar-orbiting Operational Environmental Satellites Advanced Very High Resolution Radiometer (POES AVHRR), and the Moderate Resolution Imaging Spectroradiometer (MODIS). The fire detections are quality controlled. The significant smoke plumes detected are outlined by an analyst and provide an estimate of the thickness of the smoke plume (light, medium, and heavy smoke) but do not provide concentration values. These graphical products are available once daily.

For more information on all the NOAA fire and smoke products, visit the website: <http://www.ospo.noaa.gov/Products/land/fire.html>. For this exercise, we will be using multiple data files that identify smoke and fire locations in California during July 2016.

Objectives

- Become familiar with NOAA Fire and Smoke Products
- Understand how to find and download HMS data
- Examine HMS fire locations and smoke plume data in Google Earth
- Use HMS data to track fire progression and identify potential regions affected by burning and smoke hazards
- Obtain the tools and tips necessary to access NOAA Fire and Smoke Products to meet future workplace needs

Downloading Data from NOAA's HMS

Begin by downloading imagery from the HMS and view it in Google Earth

- First, open **Google Earth**
- If you do not have Google Earth you can download it here:
<https://www.google.com/earth/>

Visit the Hazard Mapping System Fire and Smoke Product website:

<http://www.ospo.noaa.gov/Products/land/hms.html>

There are many different data types to choose from. Many of them are real-time imagery from the NOAA GOES satellites discussed earlier in the training.

The main page of the HMS lists the current fire and smoke analyses and provides locations where you can view GOES data and links to download other products.

- Under the **NESDIS Products** section, click on the **Archived Fire Products (6 months)** link
 - Under **WHAT FIRE PRODUCT?** select **HMS**
 - Under **WHAT FORMAT?** select **KML**
 - Under **TIME PERIOD?** Select **Longer Term Archive** then click **Submit**

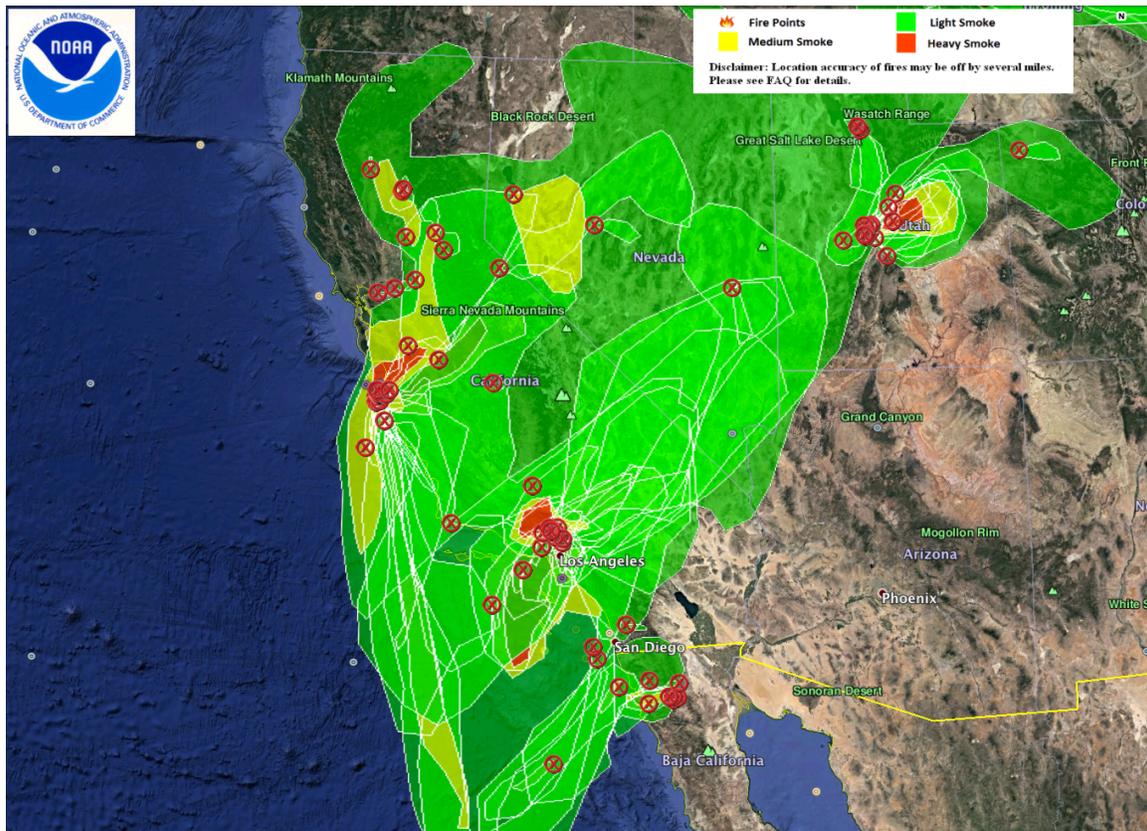
Fire Products Archive

Select the following options to view or download products:

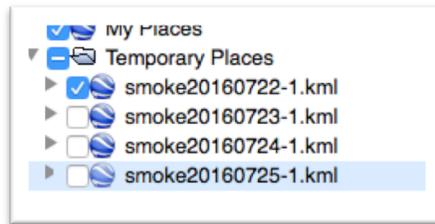
The screenshot shows the 'Fire Products Archive' web interface. On the left, there are four satellite imagery thumbnails labeled HMS, ABBA-GOES, FIMMA-AVHRR, and MODIS. On the right, there is a form with three sections: 'WHAT FIRE PRODUCT?' with a dropdown menu set to 'HMS', 'WHAT FORMAT?' with a dropdown menu set to 'KML', and 'TIME PERIOD?' with a dropdown menu showing 'Current Day', 'Last 2 Days', 'Last 7 Days', and 'Longer Term Archive' (which is highlighted). Below the form are 'SUBMIT' and 'RESET' buttons.

You will then be taken to a screen that has a long list of smoke and fire KML files. When you click on one of these files it will automatically download. All files are named based on the product (smoke or fire locations) and the date. For example, the fire location data for September 24th is *fire20160924.kml*.

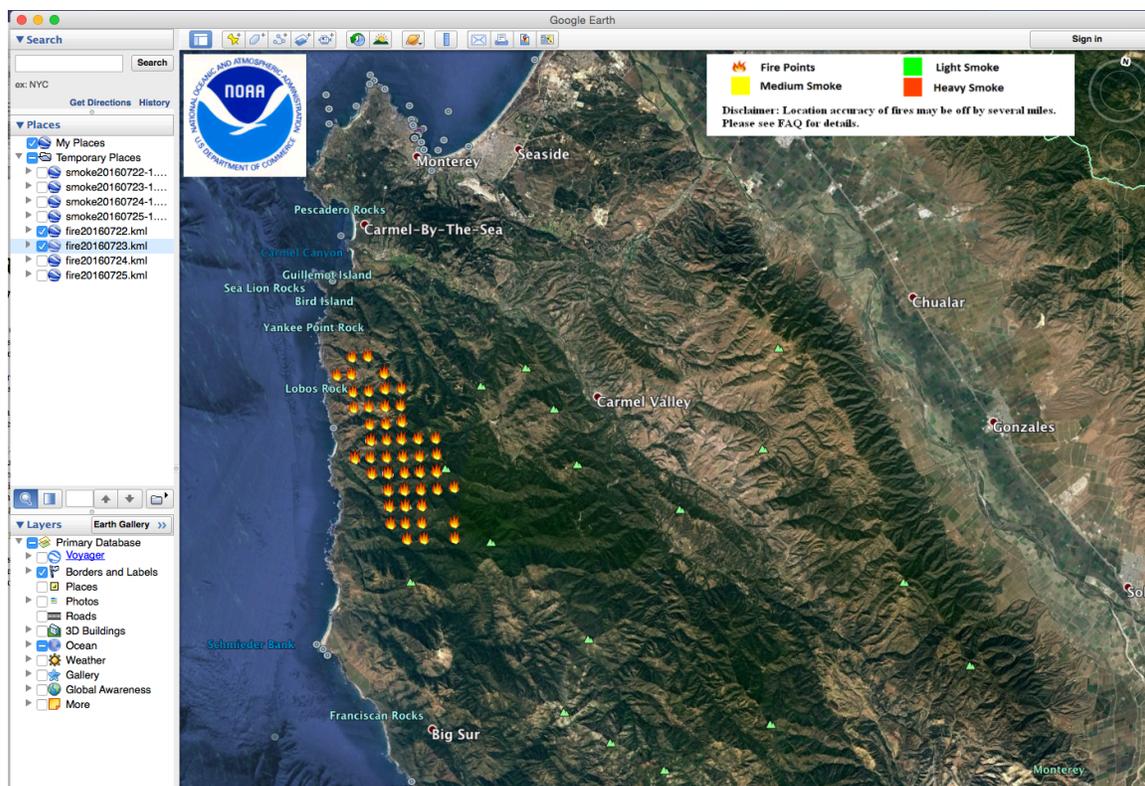
- Find July 22, 2016 on the data list. You will need to scroll about half way down the page.
- Download the smoke data for these days:
 - July 22, 23, 24, and 25, 2016
 - You will need to download each image separately by clicking on the link to that file
- Open these data files in Google Earth and zoom into California. You will notice multiple large smoke plumes in California during this time.



- Turn off all the layers except for July 22, 2016. You can do this by unchecking the box next to the file name in Google Earth.



- You can see how the smoke plumes progressed by first clicking off the July 22nd file and on the July 23rd file, and continue with that for each consecutive day
 - You will notice two major smoke plumes contributing to the widespread plume across the U.S.
 - Do you know which major fires contributed to these smoke plumes?
- Turn off all the smoke layers in Google Earth
- Go back to the HMS page with the list of KML smoke and fire files
 - Download the fire location data for the same dates (July 22-25, 2016)
 - Open these in Google Maps
 - These may open automatically in Google Earth if it is currently open on your computer.
 - Zoom into the fire located just south of Monterey, CA
 - Turn off all fire and smoke layers except for July 22nd
- You can see how the active fire detections change from July 22-25 if you turn on and off each consecutive day



- Now display both the active fires and the smoke plumes each day to see how the fire locations and smoke plumes progress simultaneously
 - You will notice some red X's on the edges of the smoke polygons. These are not fire locations, and can be ignored or turned off if you would like.
- The fire you are viewing is the Soberanes Fire that burned over 130,000 acres near Big Sur and destroyed at least 41 homes. Here is more information about the fire specifics: <http://inciweb.nwcg.gov/incident/4888/>
- Repeat the same process of viewing the time series progression of fire locations and smoke for the fire northeast of Los Angeles. This was the Sand Fire that burned over 41,000 acres and destroyed at least 18 homes. You can also see the progression of the smoke from this fire in the first few days of ignition. More information about the Sand Fire: <http://inciweb.nwcg.gov/incident/4878/>

This concludes the NOAA HMS exercise. The HMS provides easily accessible data that can be used in Google Earth as an initial examination of fires and associated plumes. Further, complimentary analysis can be conducted using additional tools such as the VIIRS Active Fire Web Map or the U.S. Forest Service LANDFIRE data.

Additional Optional Exercises

Option 1: Complete the same exercise as above for another date range or specific fire of your interest. Here are some recent 2016 major fires that may be of interest:

- Russian Fires, September 28, Krasnoyarsk Region and Evenkiya
- Bolivian Fires, August 24, east of Lake Titicaca
- Multiple Portugal wildfires, August 10-14, western mainland and Madeira Islands
- Pioneer Fire, July 18 (start date), northeast of Boise Idaho
- Fuller Fire, June 29 (start date), north of Kiabab National Forest, Arizona
- Fort McMurray Wildfire, May 1 (start date), southwest of Fort McMurray, Alberta, Canada

Option 2: Explore the US Forest Service's Active Fire Mapping Program here: <http://activefiremaps.fs.fed.us/>

- Click on **Fire Data in Google Earth**
- Click on the **VIIRS button** at the top of the page

- Read the description of the VIIRS data
- Click on **Large Incidents---Historical** below the Google Earth image
 - Scroll down to nearly the bottom of the page and find the file named **conus_lg_incidents_20160926.kmz**
 - Click on it to download the file and open it in Google Earth to compare with your other fire and smoke data products
- Zoom in on California and see if the large fires you were examining are labeled. Are both the fires listed?
 - This can provide an additional tool for identifying large fires, however it may not include all large fires, and only labels large U.S. fires
- Go back to the Fire Data in Google Earth webpage. Make sure you are still viewing VIIRS data.
 - Click on **Fire Detections (VIIRS 750m)---Historical**
 - Scroll down to the file name **conus_20160922.kmz**
 - Click on it to download the file and open in Google Earth to compare with your other fire and smoke data products
- If you completed the Optional exercise 1 and selected a U.S. fire, download additional fire detection data from the Active Fire Mapping Program that corresponds to the same date range for that fire and compare the data.
- Continue to explore this website by clicking on the **Latest Detected Fire Activity** tab on the left side of the main window. Are there any

current fire warnings in the U.S.? What is the forecasted fire danger for the U.S.? Are there any regions that are under Very High or Extreme warnings?

