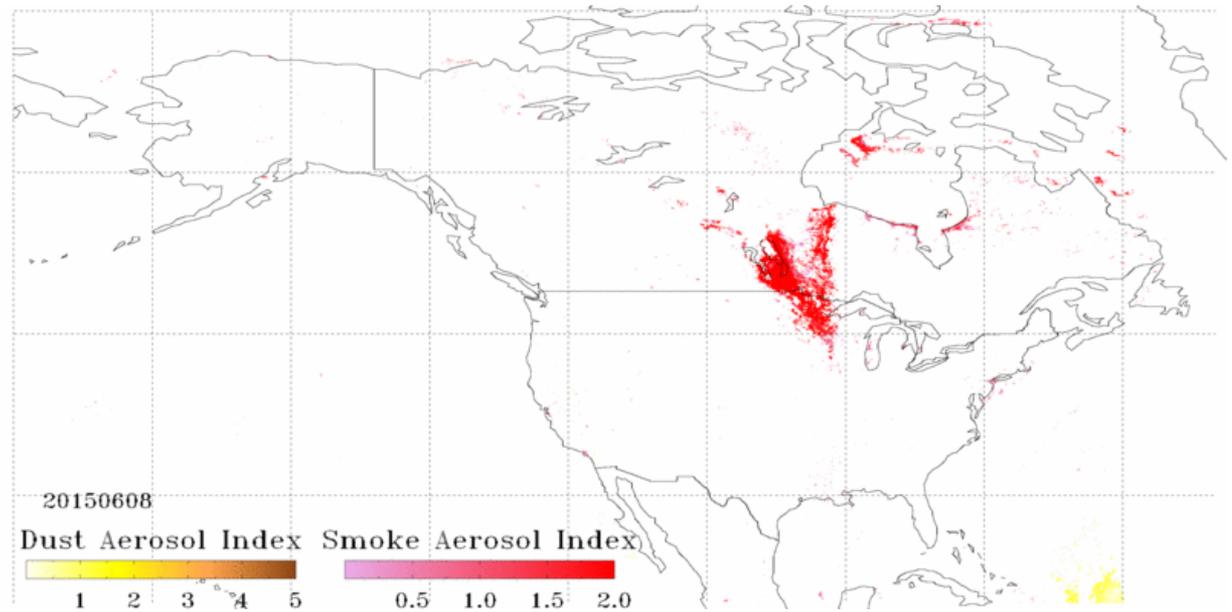


JPSS Proving Ground Project "Fire and Smoke Initiative"

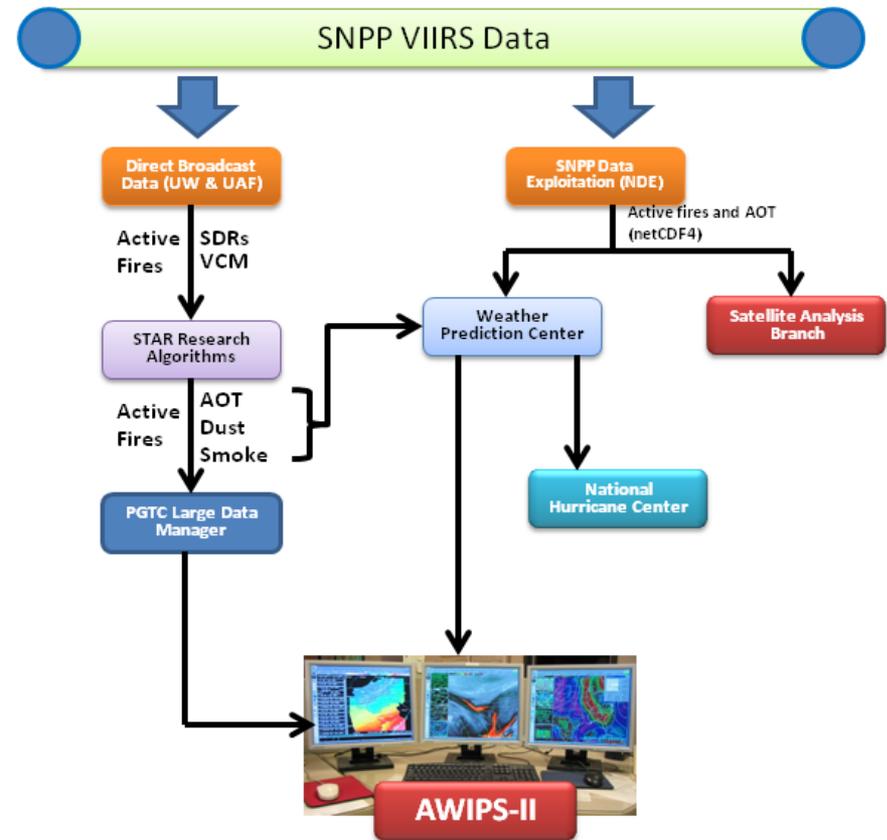
Shobha Kondragunta and Ivan Csiszar
NOAA/NESDIS

August 27, 2015



Objective

- To quantify key socio-economic impacts of fires and smoke using SNPP VIIRS products.
- To enhance product distribution generated from SNPP VIIRS direct broadcast (DB) data for CONUS and Alaska for targeted regions to end users.
- To port SNPP VIIRS fire and aerosol products into AWIPS-II in collaboration with University of Maryland Proving Ground and Training Center (PGTC).

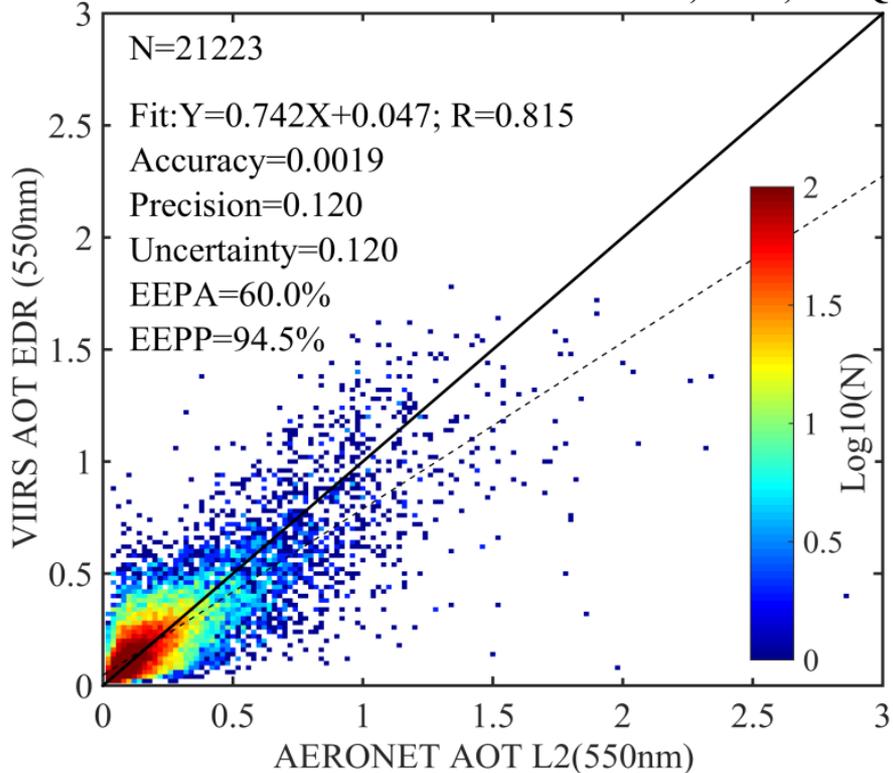


PGTC lead is Scott Rudlosky

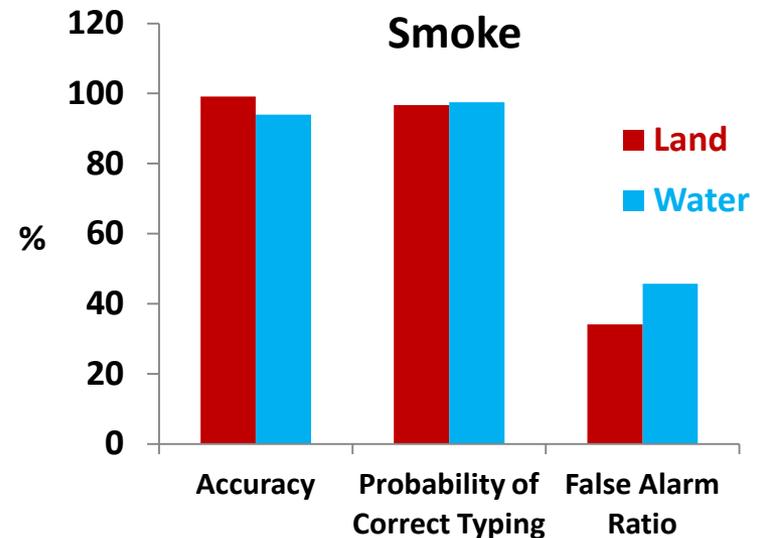
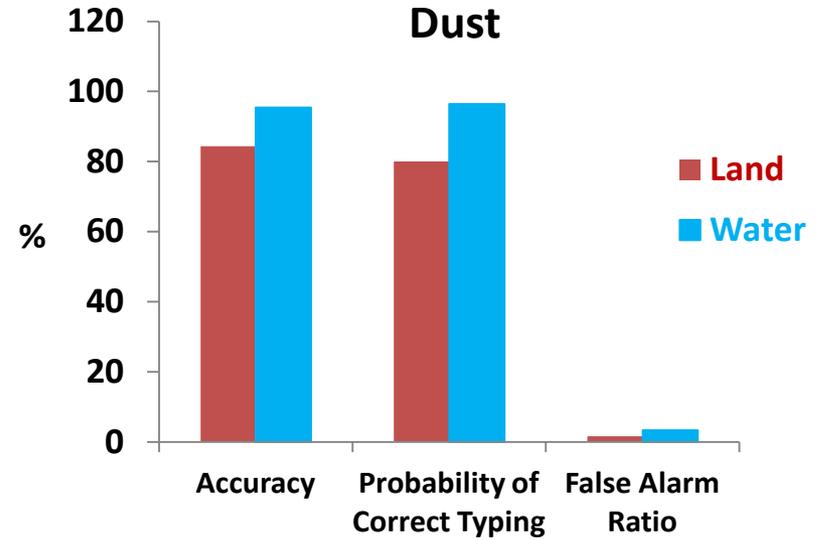
AOT (within IDPS) and smoke/dust mask (Direct Broadcast data and within NDE by January 2016) are well validated and at a mature stage.

Courtesy of VIIRS aerosol cal/val team

LAND AOT: VIIRS EDR vs. AERONET, M2M, best QA



VIIRS vs. CALIPSO



Wildfires have detrimental effect on human health and economy: **May 2014 San Diego Fires as a specific example**



Smoke can be seen rising from the 8,000-acre Pulgas Fire on Camp Pendleton on May 16, 2014. San Diego-area fires prompted a smoke advisory in areas to the north. (Credit: KSWB)

Estimated Cost to Local Governments of Responding to Fires

Agency	Estimated Cost* (millions)
County of San Diego	\$3.9
City of Carlsbad	\$12.5
City of San Marcos	\$10.4
City of San Diego	\$1.3
Other Agencies	\$0.4
Total	\$28.5

*Estimated costs represent revised estimates submitted to the State of California Office of Emergency Services. Initial cost estimates of \$27.9 million were later revised to include the County's cost of debris removal.

<http://www.readysandiego.org/aa/r/may-2014-san-diego-county-wildfires/May-2014-San-Diego-County-Wildfires.pdf>

14 fires

26,000 acres burned

149,000 evacuation orders

65 structures damaged

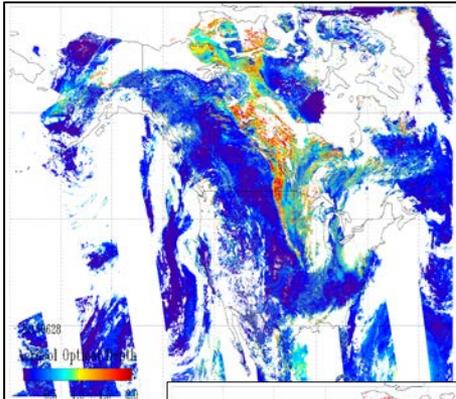
\$29.8 million loss to private property owners

SNPP VIIRS Products in Near Real Time

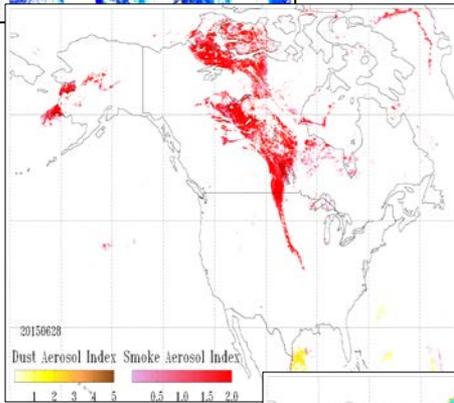
- 1 Fire hot spots
- 2 Area burned
- 3 Smoke aerosols
- 4 Air Quality Index

Operational decision making process by multiple federal, state, and local agencies : **is there a significant smoke associated with a fire**, where is the smoke now and where is it headed, how bad is the air, **should hospitals be evacuated**, **should roads be closed** etc.

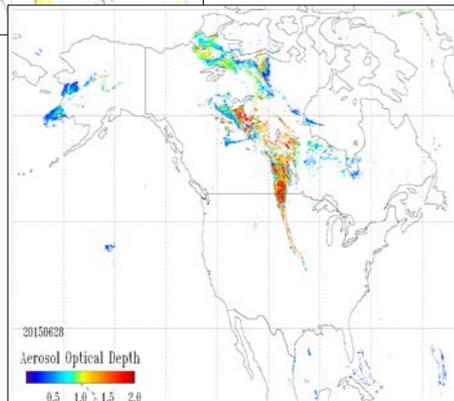
Value Added SNPP VIIRS Aerosol Products



Quantitative Retrieval of "Aerosol Optical Thickness"
Jackson et al., JGR, 2014



Qualitative Retrieval of "Smoke Mask"
Ciren and Kondragunta, JGR, 2014



Quantitative Information of "Smoke Aerosol Optical Thickness"

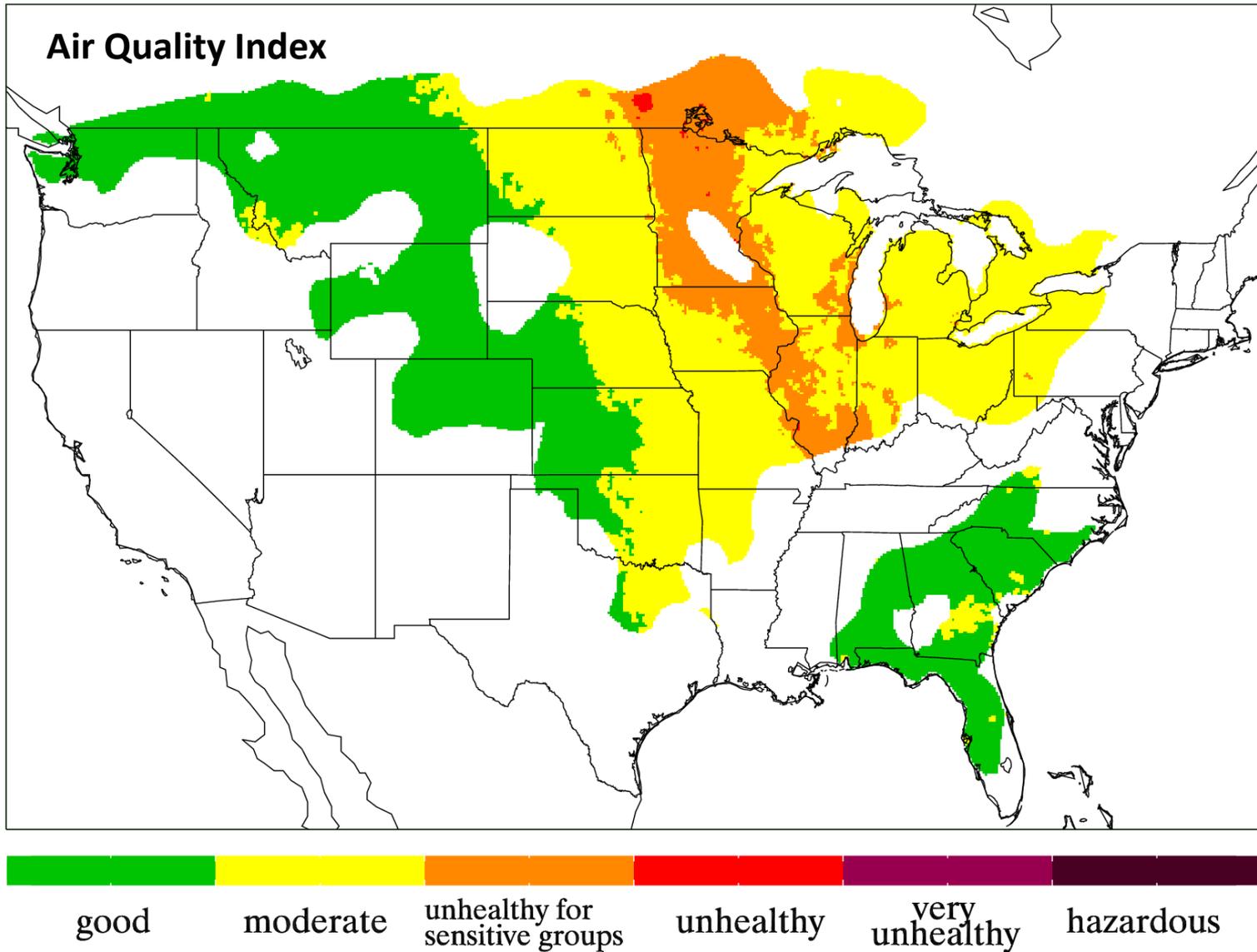
Forecast: NWS WFOs via AWIPS-II

Mitigation: NWS IMETs via web

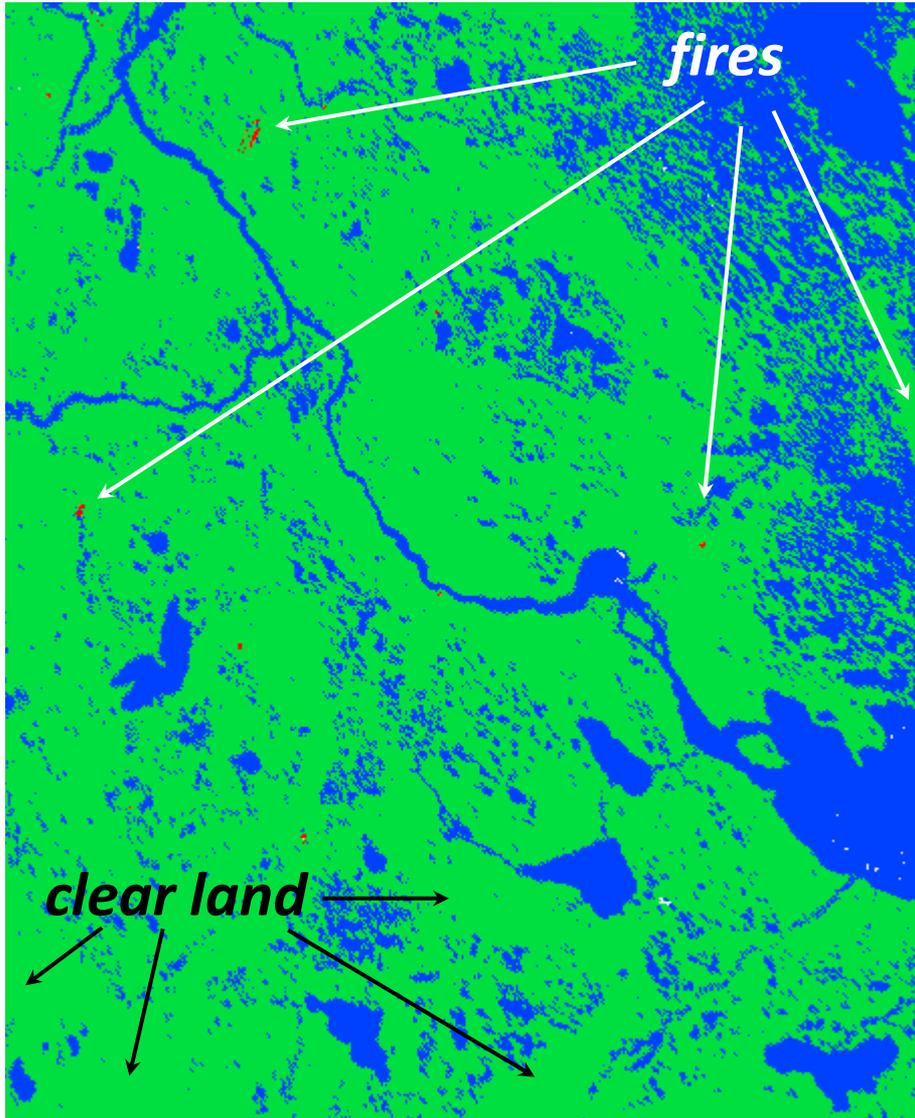
Forecast guidance: NWS NCEP and other models

Monitoring: Local, State, Federal environmental agencies

Value Added SNPP VIIRS Aerosol Products



Value Added SNPP VIIRS Fire Products



MODIS FRP Range (MW)	Category
< 100	1
100 - 500	2
500 - 1000	3
1000 - 1500	4
>1500	5

Ichoku et al (RSE, 2008)

clouds

water

clear land

*VIIRS fire mask over NW Canada
5/29/2015
20:06 UTC*

FRP: 4.9 – 1257.5 MW

VIIRS fire and aerosol products are validated and ready for operational use

www.star.nesdis.noaa.gov/smcd/spb/aaq

The screenshot shows the NOAA Star viewer interface for VIIRS fire and aerosol products. The main map displays a satellite view of North America with overlaid aerosol optical depth (AOD) data. The interface includes a top navigation bar with 'PREVIOUS FORECAST DAY' and 'NEXT FORECAST DAY' buttons, a date selection field set to '20140724', and a 'Go' button. A 'Product Description' button is also visible. On the left, a zoom control panel is annotated with 'zoom in/out'. On the right, a 'Select AOT & Quality' panel offers various product options: 'EDR High', 'EDR High & Medium', 'IP High' (highlighted), 'IP High *', and 'IP High & Degraded'. Below these are sliders for 'RGB Opacity' and 'AOD Opacity', and toggle buttons for 'Dust/Smoke Mask', 'Fire Hotspots', and 'County'. A 'Save Image' button is at the bottom of the panel. A color scale at the bottom ranges from 0.0 (blue) to 1.0 (red), with 'NO DATA' in black. Logos for Google, Dominican Republic, and NOAA are present.

SELECT PLOT

PREVIOUS FORECAST DAY

NEXT FORECAST DAY

select date 20140724 Go

Product Description

VIIRS RGB and IP AOT high quality 20140724

select date

zoom in/out

Select AOT & Quality

EDR High

EDR High & Medium

IP High

IP High *

IP High & Degraded

RGB Opacity

AOD Opacity

Toggle Dust/Smoke Mask

Toggle Fire Hotspots

Toggle County

Save Image

United States

Gulf of California

Mexico

Gulf of Mexico

Cuba

NOAA

Dominican Republic

Google

NO DATA 0.0 0.2 0.4 0.6 0.8 1.0

change AOD and quality flags

change RGB/AOD opacity

visualization options

What has been done so far...

- **Coordination with NWS Western Region, WFOs, IMETs, NWS Alaska (through GINA) to develop a roadmap in line with objectives/VIIRS products highlighted here.**
- **While many smoke forecast models exist, HRRR (High Resolution Rapid Refresh) model and an enhanced IDEA tool will be the focus for this Proving Ground (PG) fire and smoke initiative project.**
- **Ongoing discussions with PGTC to develop plug-in tools that can display VIIRS fire and aerosol products in AWIPS-II**
- **Ongoing discussions with IMETs to enhance IDEA tool to display smoke extent and transport without specifying which satellite is providing the information**
 - **Highest resolution possible**
 - **Clickable layers**
 - **Zoom capabilities**