



# **Case Studies of Recent Aerosol Events using ABI and VIIRS**

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# At a Glance: NRT Aerosol Products

Data Characteristic		ABI	VIIRS
Orbit		Geostationary	Polar-orbiting
Observation Time		Continuous during daylight	~1:30 PM
Data Coverage		Centered on 75 °W	Global
Temporal Resolution		5 min (CONUS view)	1 per day
Latency		20 min (on AerosolWatch)	2-3 hours (on eIDEA)
Spatial Resolution	RGB	1 km (synthetic RGB, CONUS view)	750 m
	AOD	2 km (CONUS view)	750 m

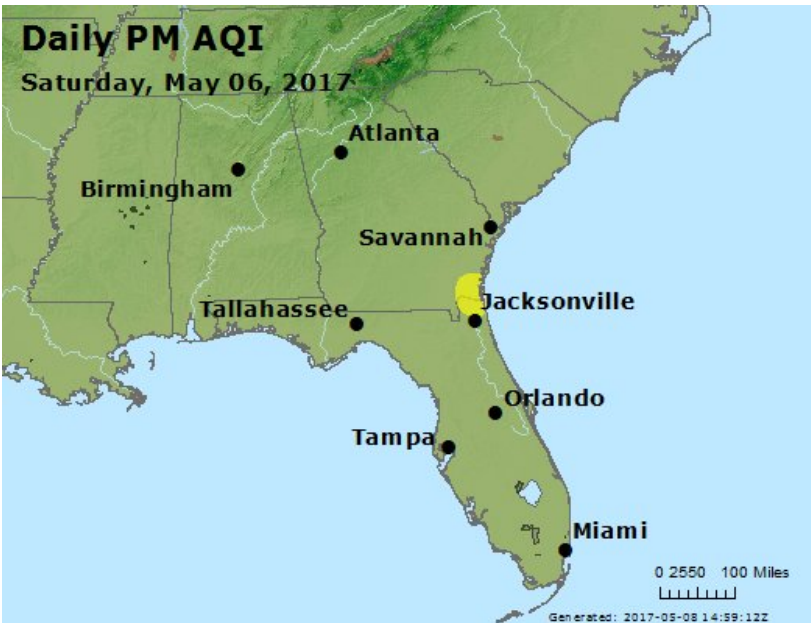
# ABI vs VIIRS: Strengths/Limitations

- ABI
  - Nearly continuous observations, including in morning
  - High temporal resolution (many images per day)
  - Low latency (data available quickly)
  - Additional RGB products (dust, natural color)
  - Limited data coverage; US west coast at edge
- VIIRS
  - Global coverage, including US west coast
  - Highest spatial resolution for AOT and RGB
  - True color RGB (has green band)
  - Only one observation per day, in afternoon
  - Higher latency (data available too late in day for some operational applications)

**Let's Look at Some Recent Examples!**

# West Mims Fire, FL/GA: April-June 2017

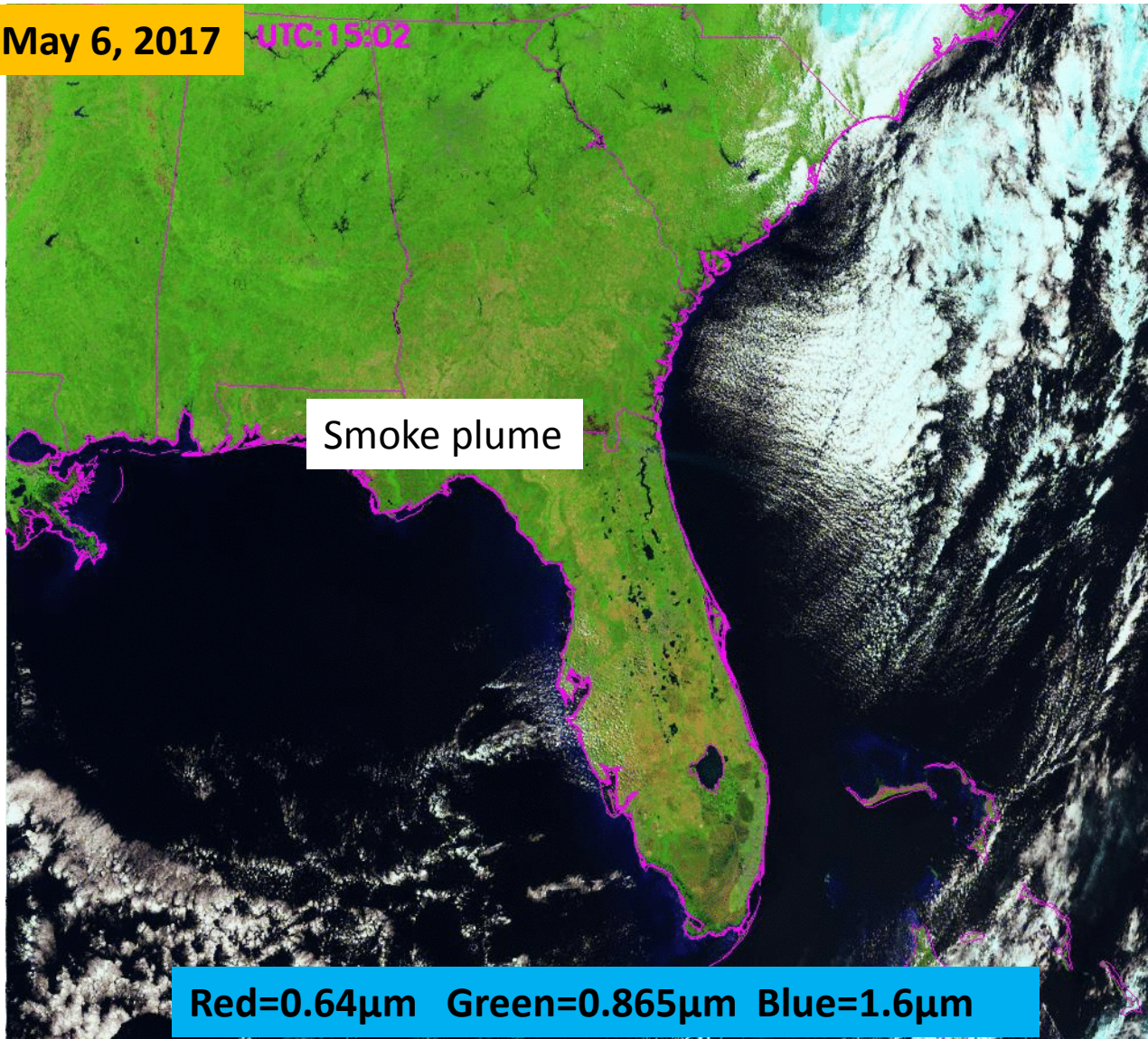
- Began: April 6, 2017
- Cause: lightning
- Okefenokee National Wildlife Refuge in Georgia
- Burned 152,515 acres
- Degraded PM<sub>2.5</sub> air quality locally (Moderate range)



# ABI Natural Color RGB Animation

May 6, 2017

UTC:15:02

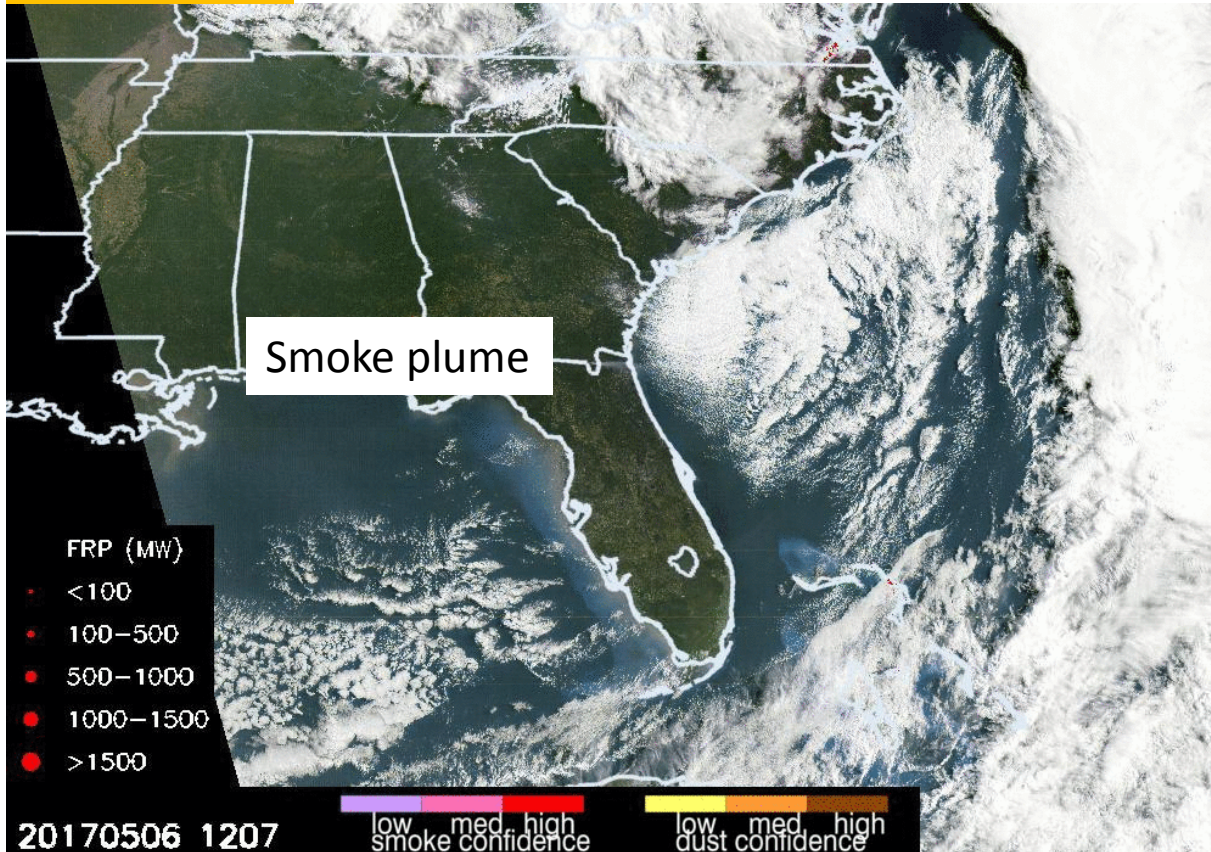


15-min animation



# ABI Smoke Mask, Synthetic RGB, FRP Animation

May 6, 2017

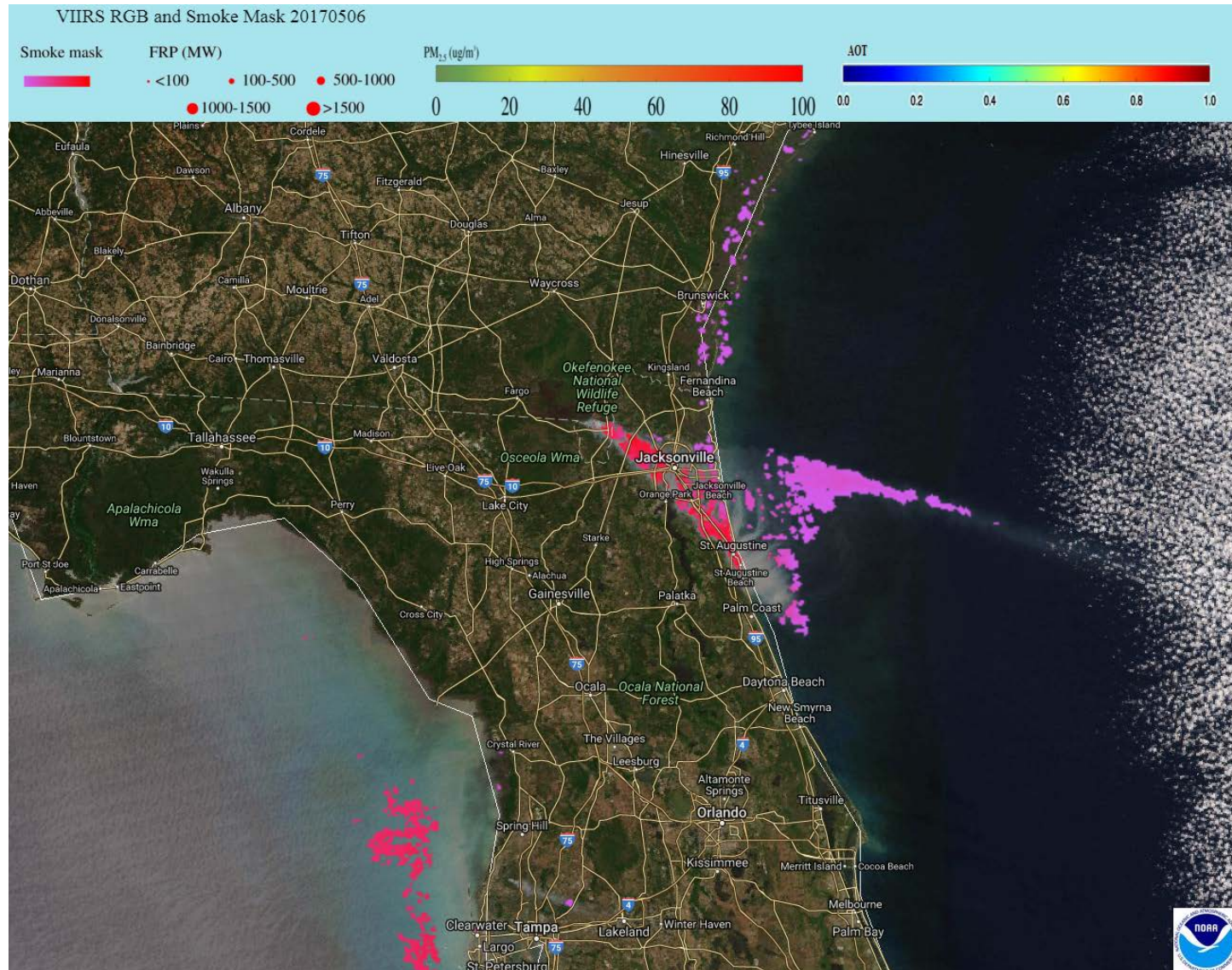


15-min animation

- First implementation of smoke detection for a geostationary satellite sensor
- Parts of smoke plume detected
- Algorithm upgrades to tune spectral threshold tests pending
- False smoke over shallow water regions; Shallow water test to screen pixels pending
- Angle dependencies of various spectral tests still being investigated



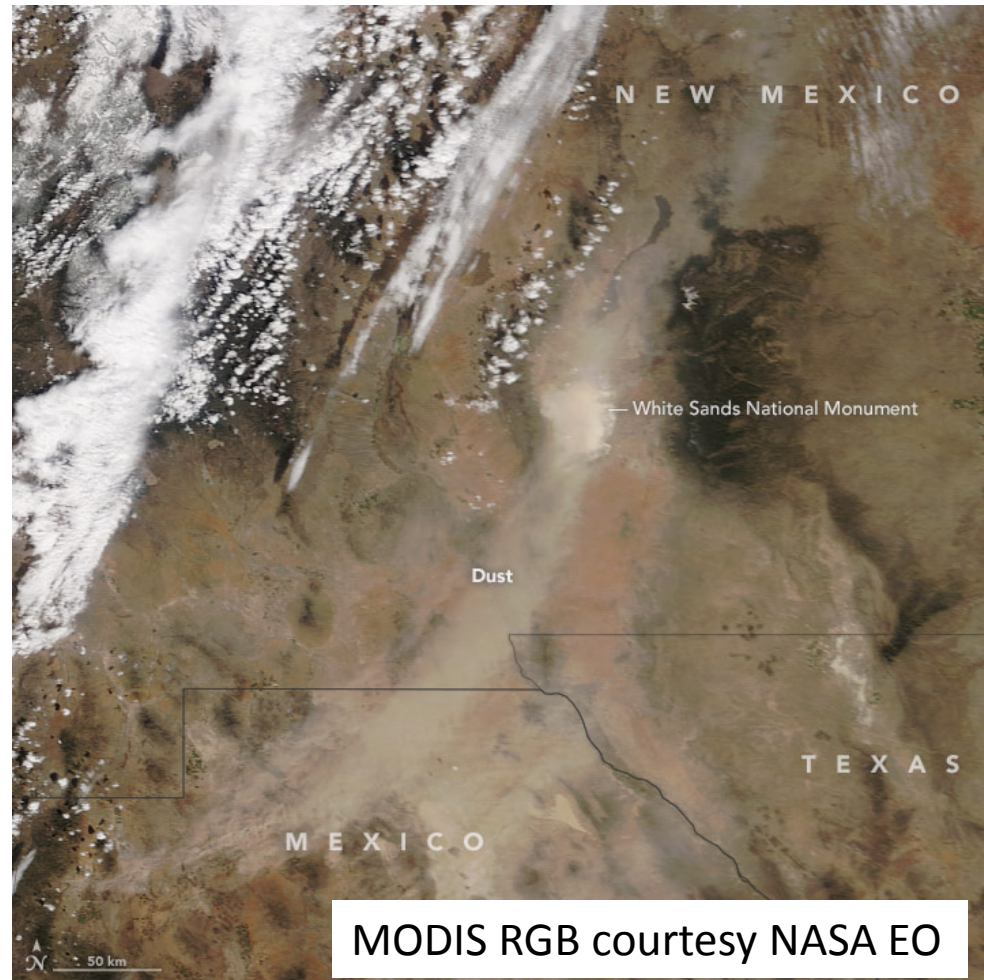
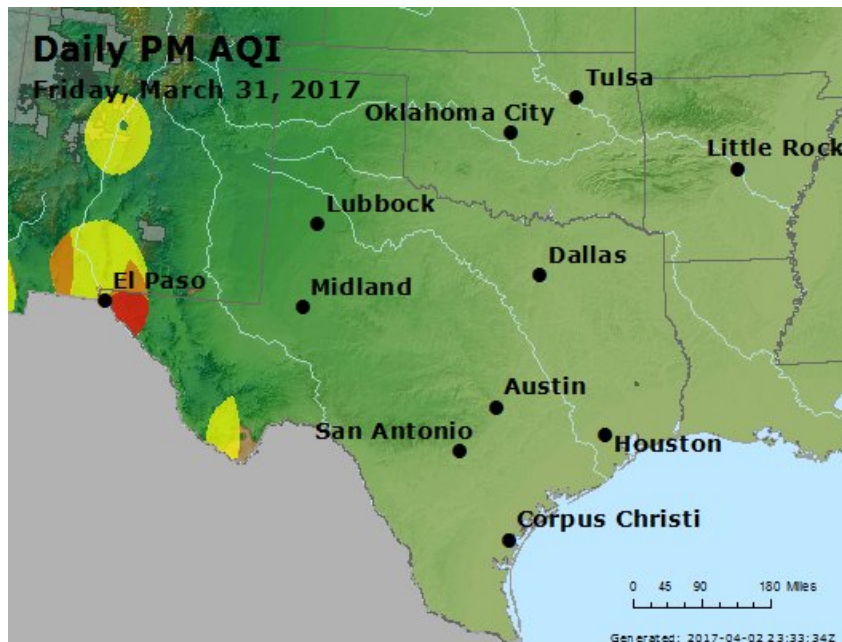
# VIIRS RGB and Smoke Mask





# Mexico/NM/TX Dust Storm: March 31, 2017

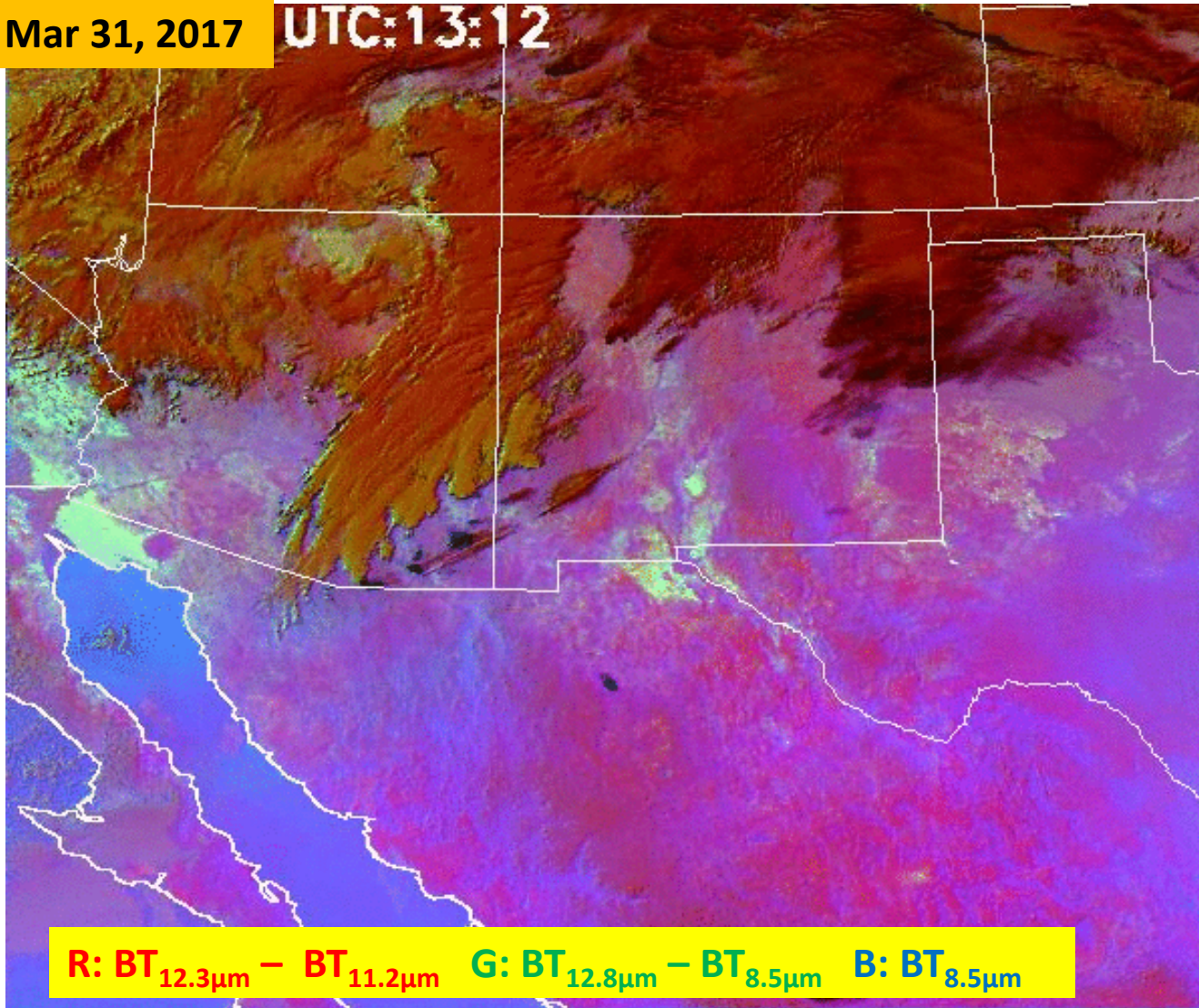
- Blowing dust originating from farmland in northern Mexico
- Plumes of thick dust blew into nearby NM and TX
- Degraded PM<sub>2.5</sub> air quality in El Paso, TX area (Code Orange and Red)



# ABI Dust RGB Animation

Mar 31, 2017

UTC:13:12



- Dust: magenta
- Thin cirrus: deep blue
- Thick cirrus: red/orange
- Water cloud: brown/orange
- Warm surface: cyan/blue
- Cool surface: pink

15-min animation



# ABI Synthetic RGB Animation



Blowing dust

Smoke plumes

Mar 31, 2017

1802

15-min animation



# VIIRS RGB

VIIRS RGB 20170331

Smoke mask



FRP (MW)

<100

100-500

500-1000

1000-1500

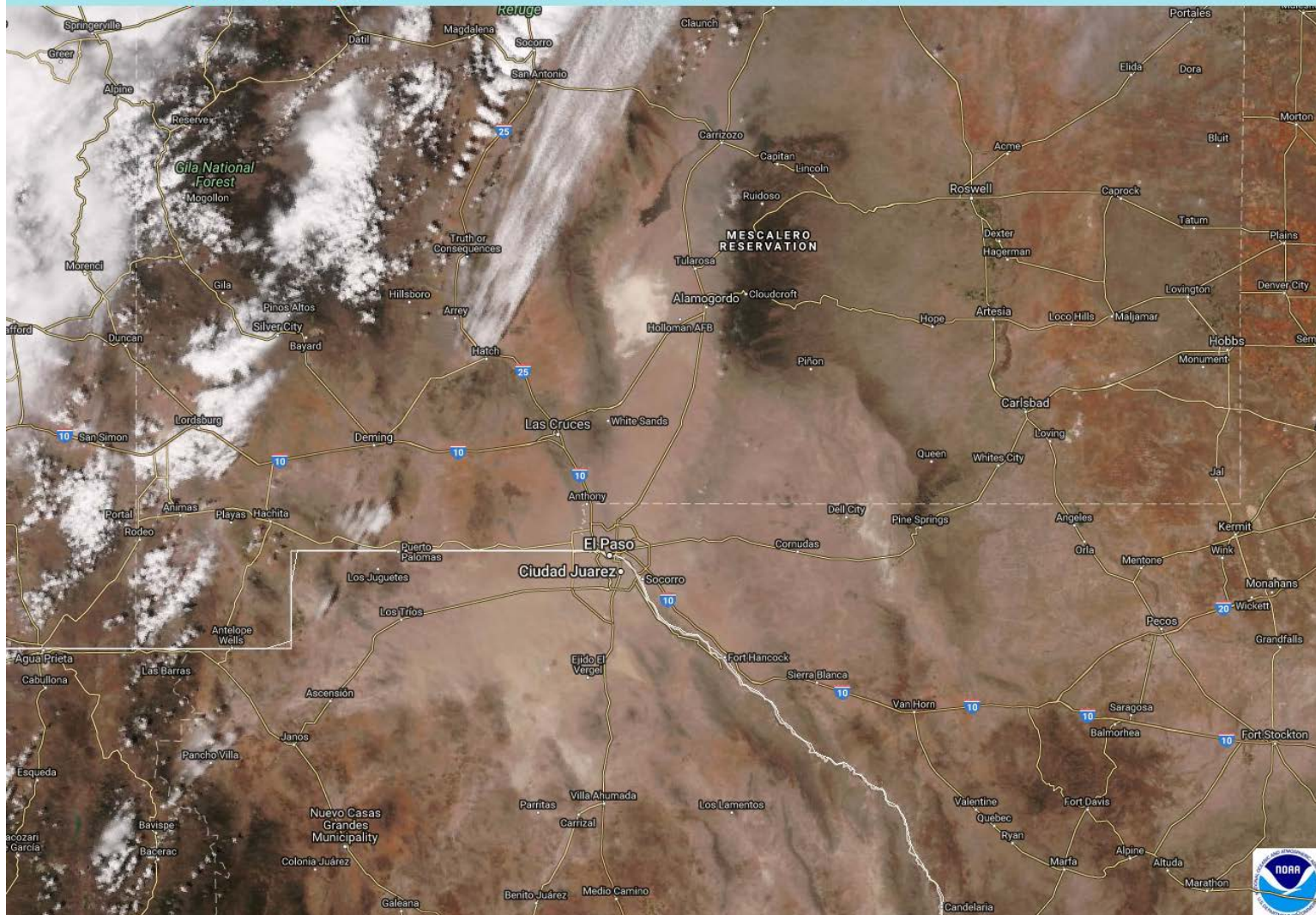
>1500

PM<sub>2.5</sub> (ug/m<sup>3</sup>)

0 20 40 60 80 100

AOT

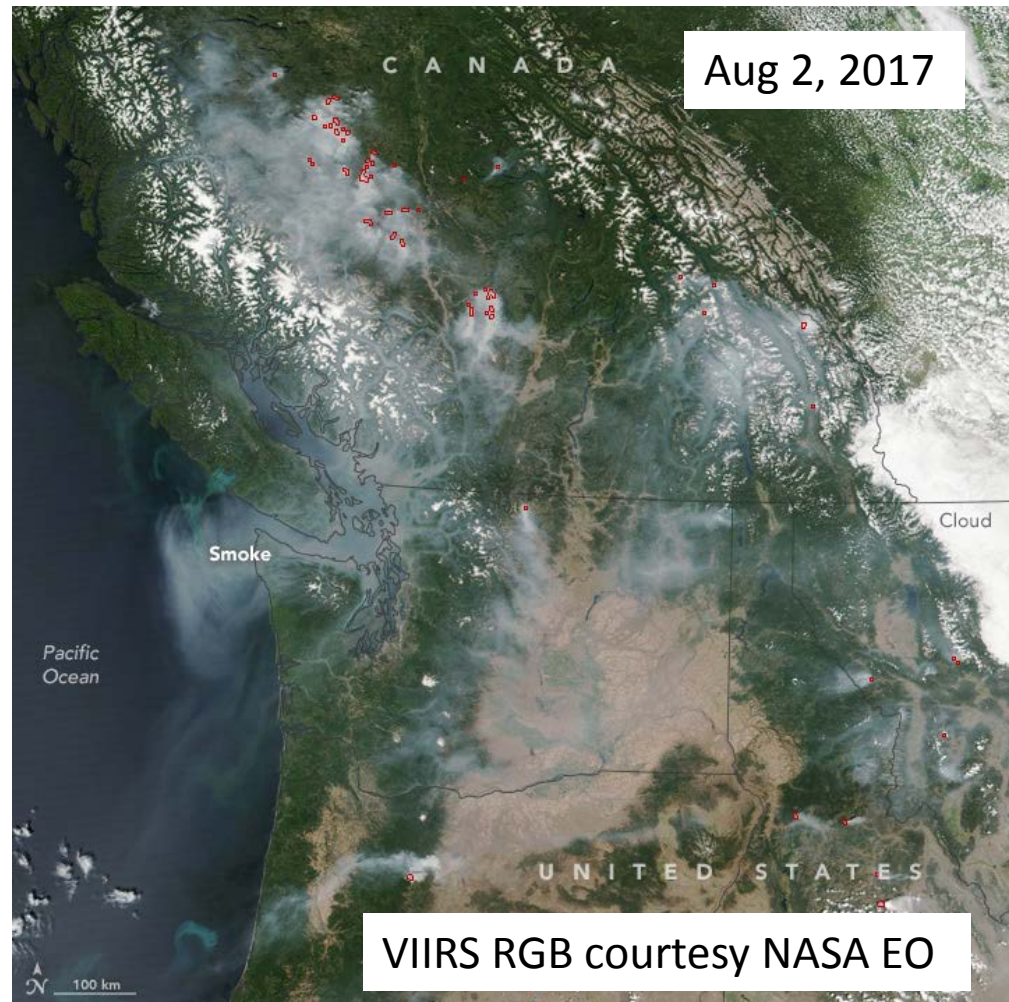
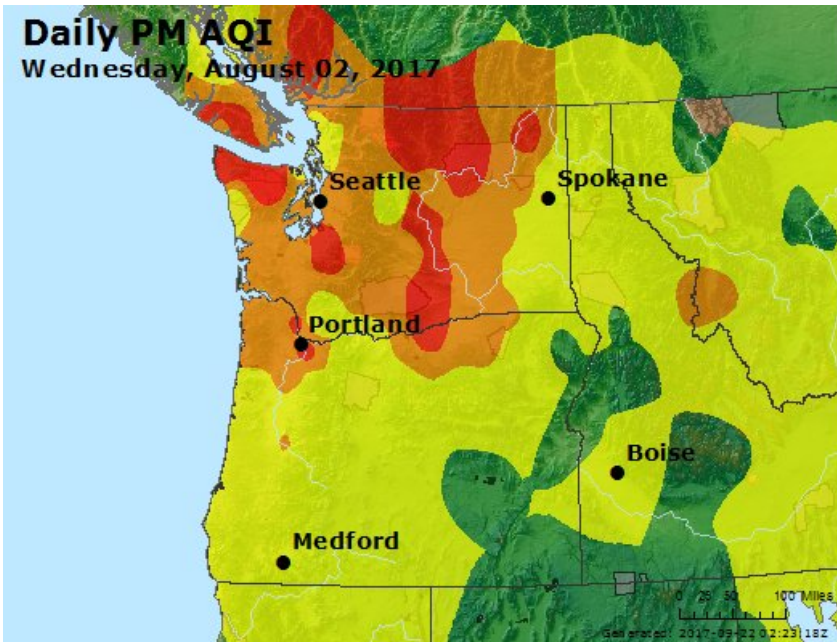
0.0 0.2 0.4 0.6 0.8 1.0





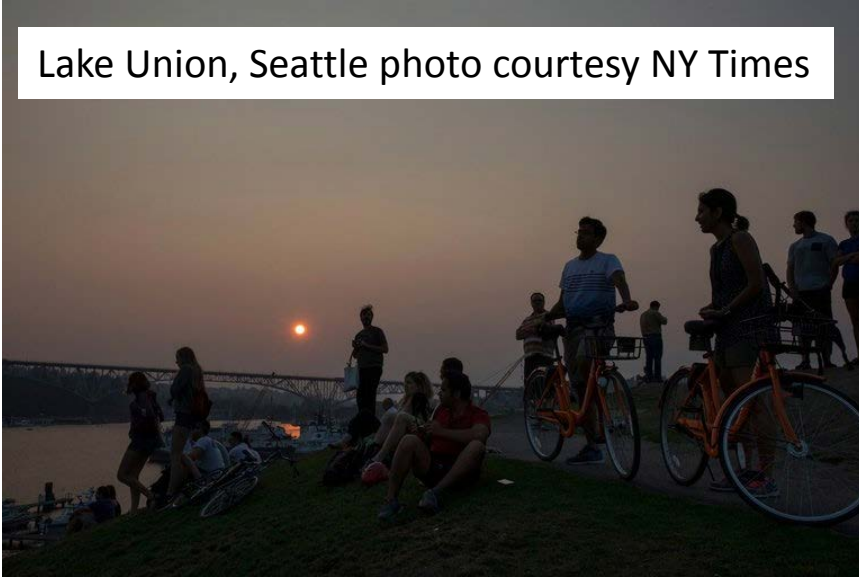
# BC/Western US Wildfires: August, 2017

- Wildfires raging this summer in western US and British Columbia
- Huge ridge of high pressure over western US; record-breaking heat wave in Pacific NW
- Seattle and Portland, OR hit hard, Code Orange and Red PM<sub>2.5</sub> air quality

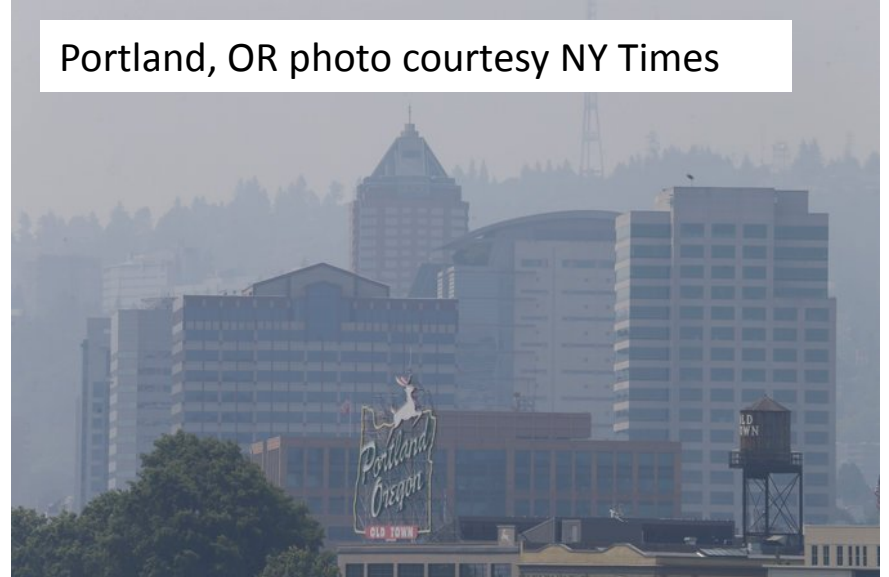


# Lots of Media Coverage

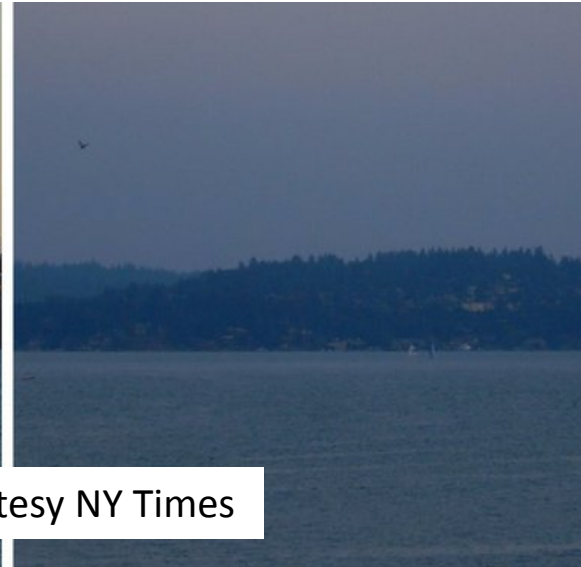
Lake Union, Seattle photo courtesy NY Times



Portland, OR photo courtesy NY Times

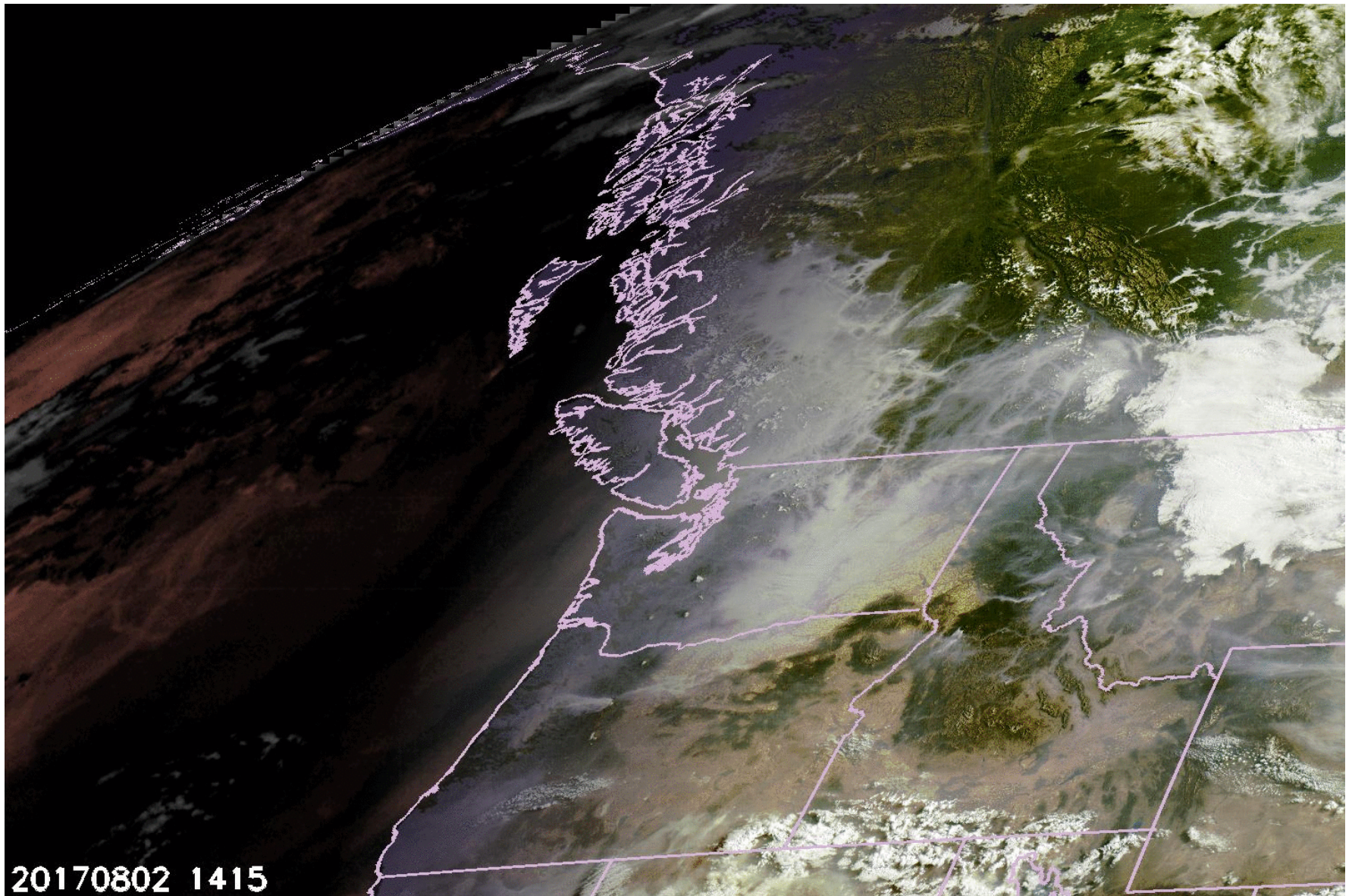


Mt Rainier photos courtesy NY Times





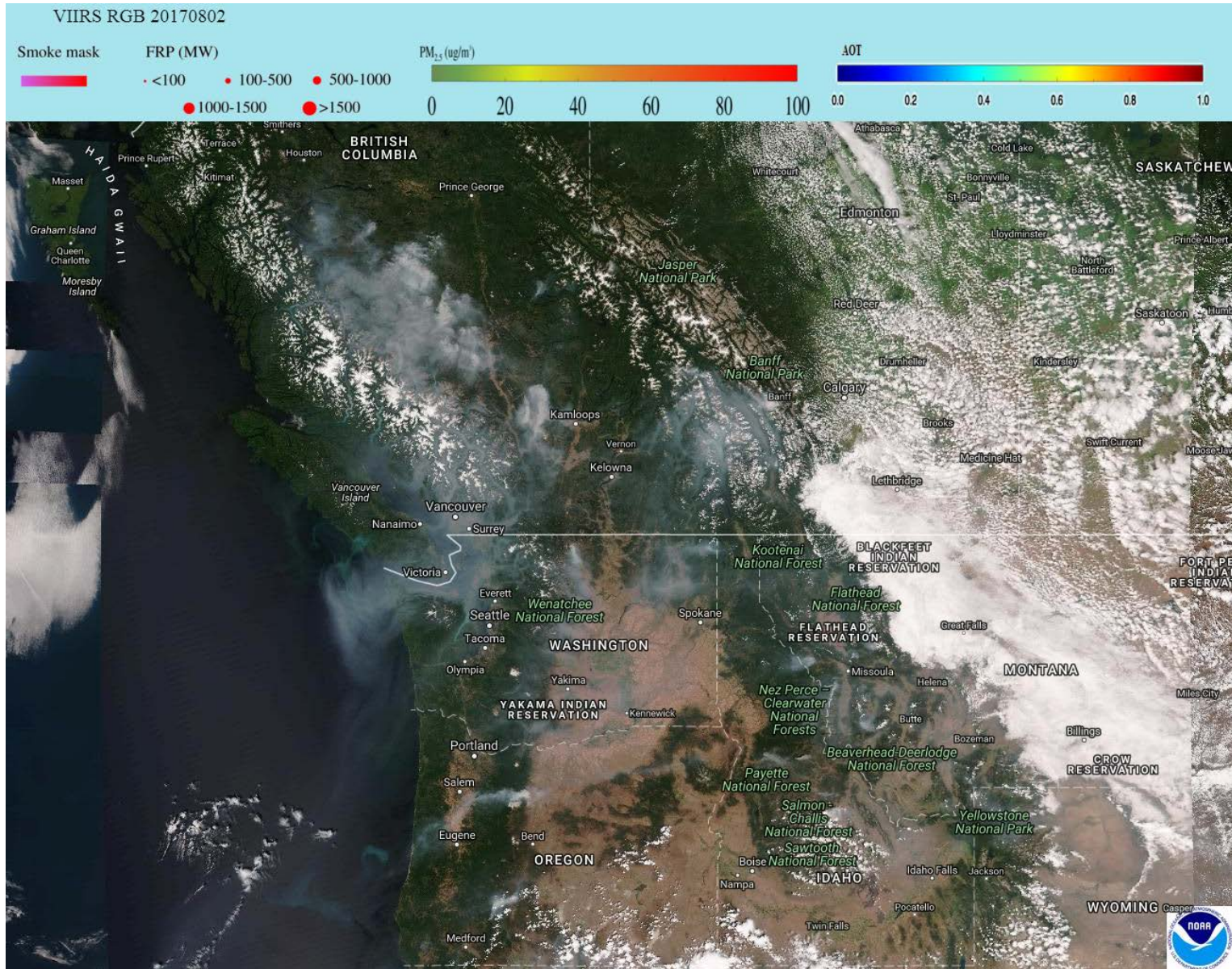
# ABI Synthetic RGB Animation



20170802 1415



# VIIRS RGB



# Summary

- ABI and VIIRS aerosol and color imagery products have their own strengths and limitations
- Take some time to become familiar and comfortable with the new ABI products
  - Understand their limitations, especially for US west coast
- Don't forget about the VIIRS products!
  - Global coverage
  - Highest available spatial resolution
  - Excellent for post-analysis
- Learn which products are most beneficial for your specific applications