Facilitating the Integration and Adoption of Satellite Products for Decision Support during Wildland Fire Smoke Episodes

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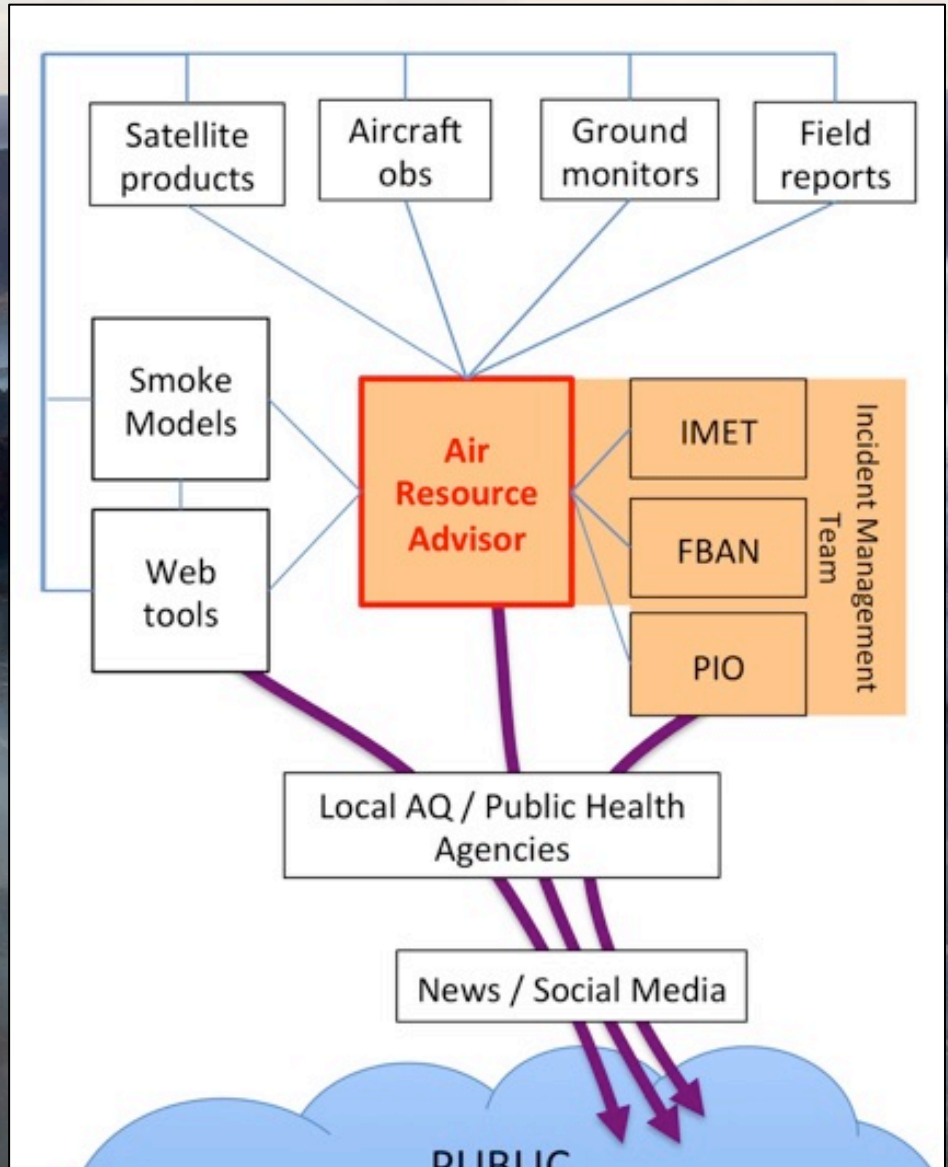
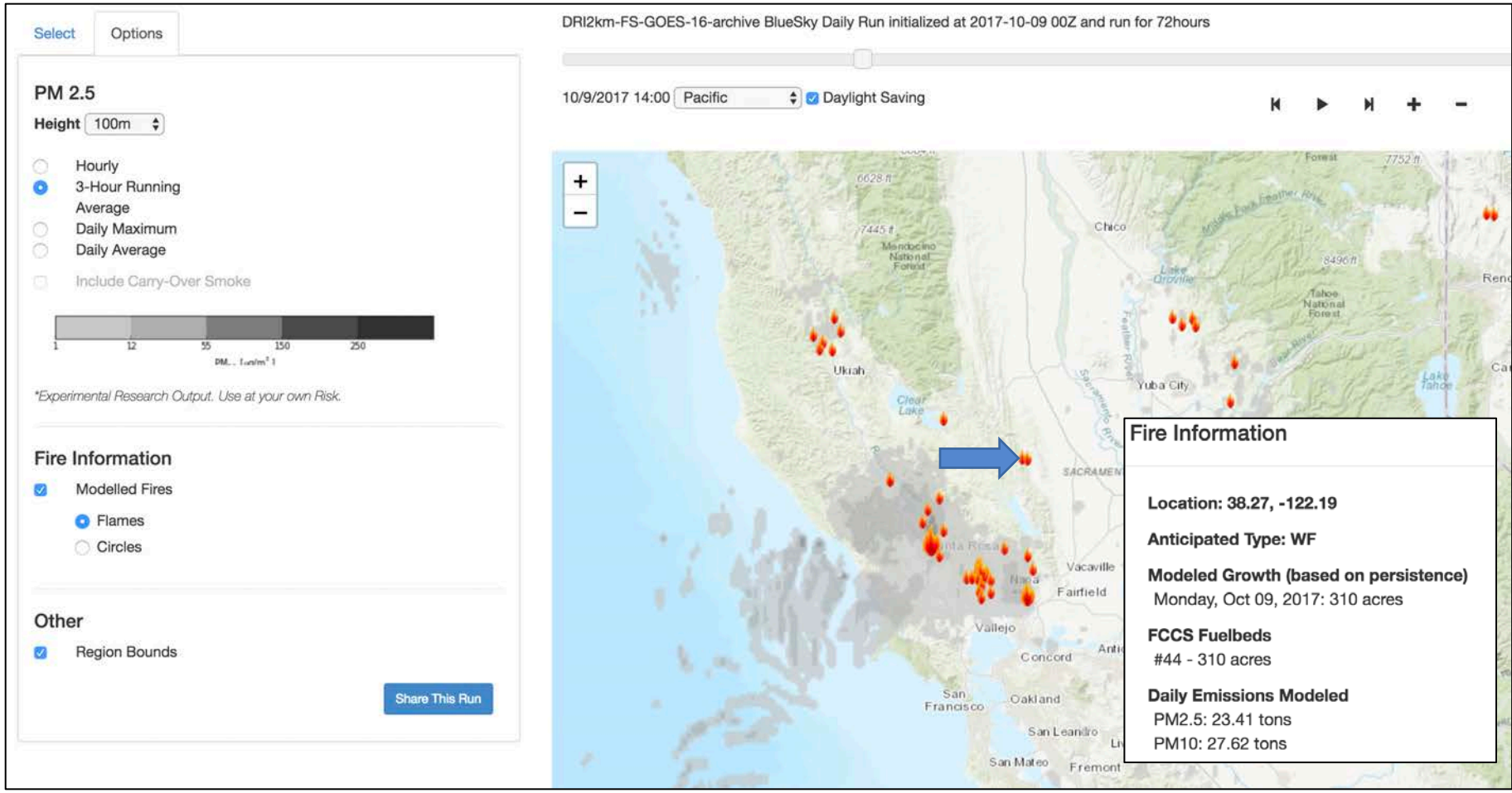


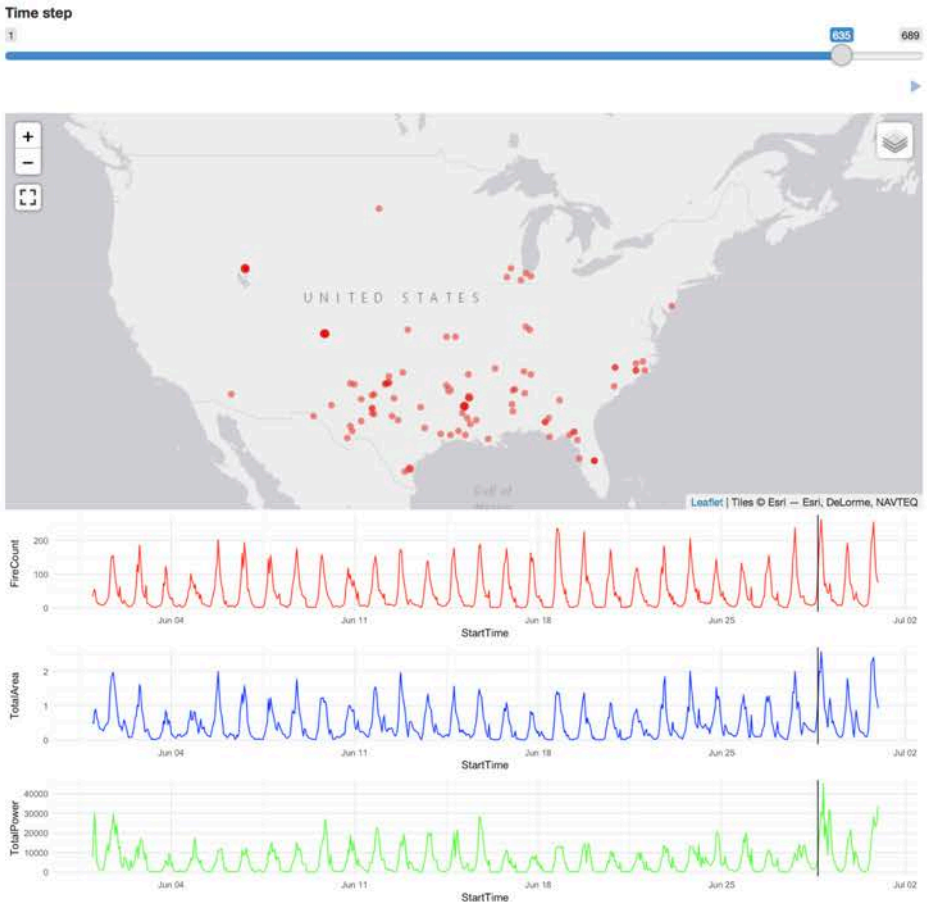
GOES-16 Fire Detection Products (beta) Smoke Model Initialization

- Goal: Demonstration of utility/ feasibility for smoke forecast modeling
- Example: October 2017 Northern California
- Fire emission calculation stream #1:
  - Aggregate to hourly
  - Area-based
  - BlueSky standard processing.
- Fire emission calculation stream #2:
  - FRP-based to calculate total Particulate Matter (Ichoku and Ellison, 2014)
- NOAA CLASS
- Discovering: False detections, Cloud interactions
- Need: VIIRS, MODIS

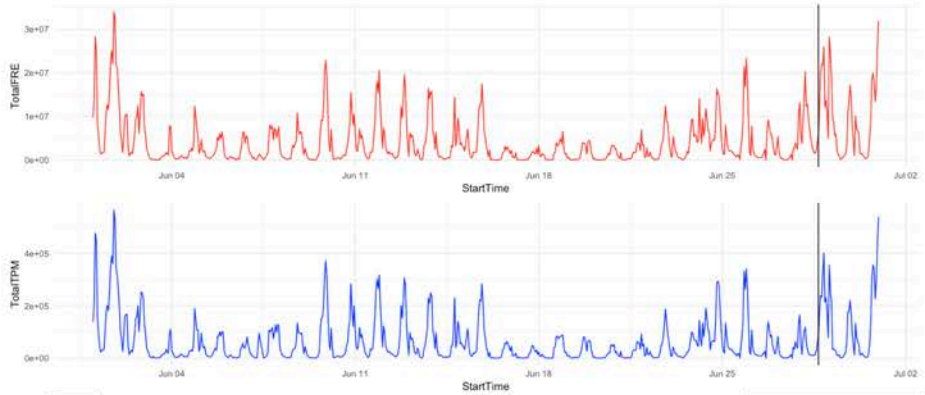


GOES-16 Fire Detection Products (beta) Web-based Dissemination of Data

- Web-based viewer for analysis and dissemination to users
- TPM, Area, FRP, Number of Detections
- Diurnal Patterns
- Zoomable
- 3 Variations of Tool



2018-06-28 16:00 UTC
Total FRE: 3,079,650,972 MJ
Total PM: 46,073,441 kg (50,787 tons)



Show 10 entries Search:

	lon	lat	StartTime	Area	DQF	Mask	Power	Temp	FRE	TPM	countyState
11	-105.28	37.53	2018-06-28T16:00:00Z	0.0482	0	10	559.1	429.3	1,053,255	16,747	colorado,costilla
50	-94.20	33.44	2018-06-28T16:00:00Z	0.0480	0	10	275.7	442.2	519,504	5,818	texas,bowie
9	-105.31	37.53	2018-06-28T16:00:00Z	0.0445	0	10	268.5	423.6	463,705	7,373	colorado,costilla
2	-112.34	41.96	2018-06-28T16:00:00Z	0.0440	0	10	140.6	429.0	242,778	2,792	utah,box elder
43	-97.71	27.46	2018-06-28T16:00:00Z	0.0440	0	10	33.3	425.5	57,521	481	texas,kleberg
55	-92.92	32.25	2018-06-28T16:00:00Z	0.0440	0	10	158.3	441.7	273,366	3,444	louisiana,bienville
57	-92.90	32.25	2018-06-28T16:00:00Z	0.0440	0	10	177.7	447.7	306,885	3,867	louisiana,bienville
10	-105.29	37.50	2018-06-28T16:00:00Z	0.0400	0	10	198.3	439.8	311,393	4,951	colorado,costilla
14	-105.25	37.53	2018-06-28T16:00:00Z	0.0400	0	10	374.3	434.2	587,654	9,344	colorado,costilla
63	-92.49	32.90	2018-06-28T16:00:00Z	0.0400	0	10	40.7	425.8	63,847	804	louisiana,union

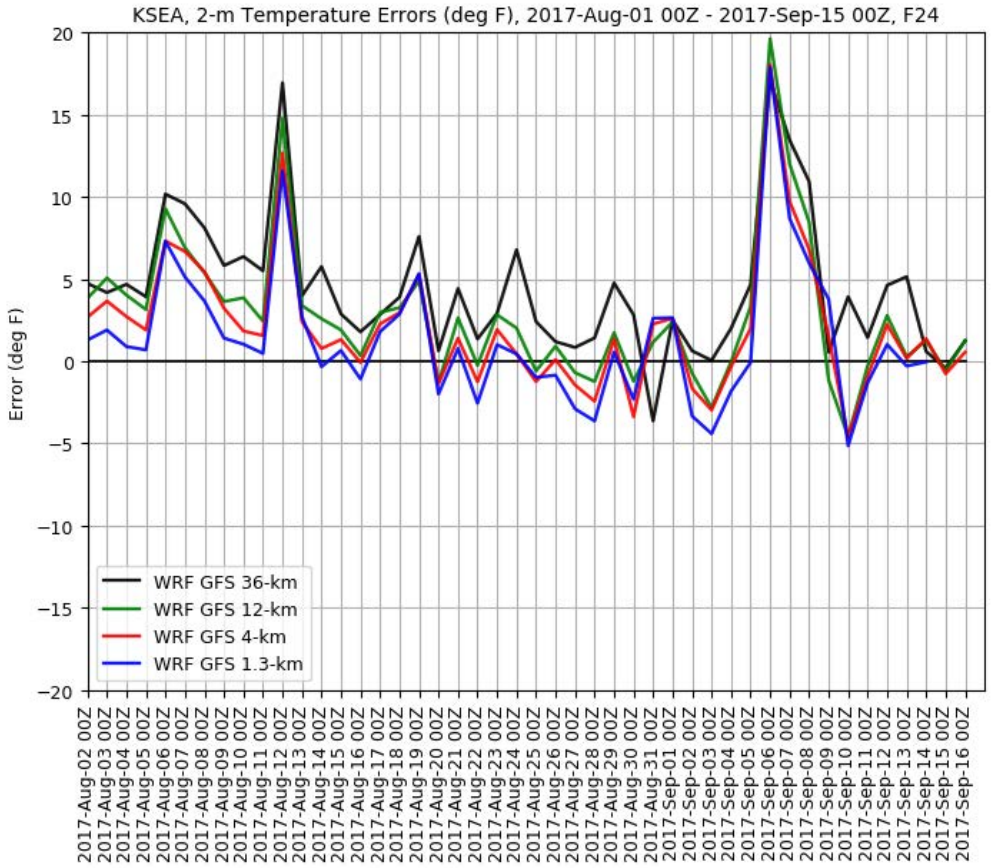
Showing 1 to 10 of 104 entries Previous 1 2 3 4 5 … 11 Next

Sean Raffuse, UC Davis, HAQAST Contributor

NASA GEOS AOD
NW WRF Forecasts

Collaborators: Cliff Mass, David Ovens, University of Washington

- Problem: Dense smoke cooling the atmosphere (not captured in the WRF forecasts).
- Potential Solution: Use NASA GEOS AOD

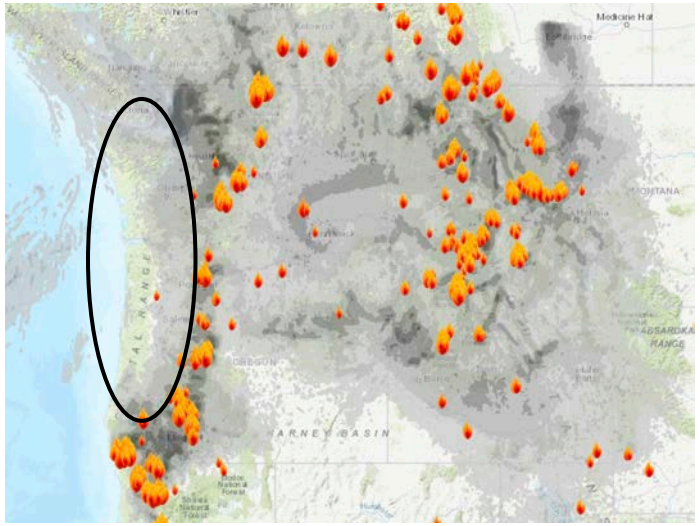


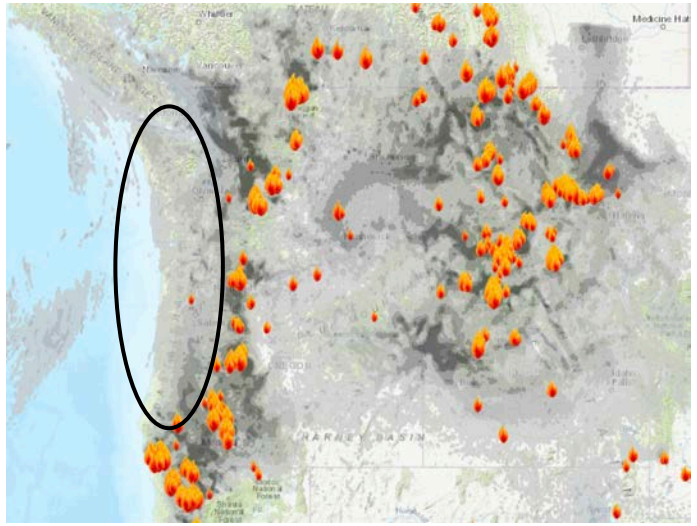
- Goal: Add smoke to the forecast with little overhead
- 4-km WRF Forecast
- 3-hr GEOS AOD and Angstrom exponent

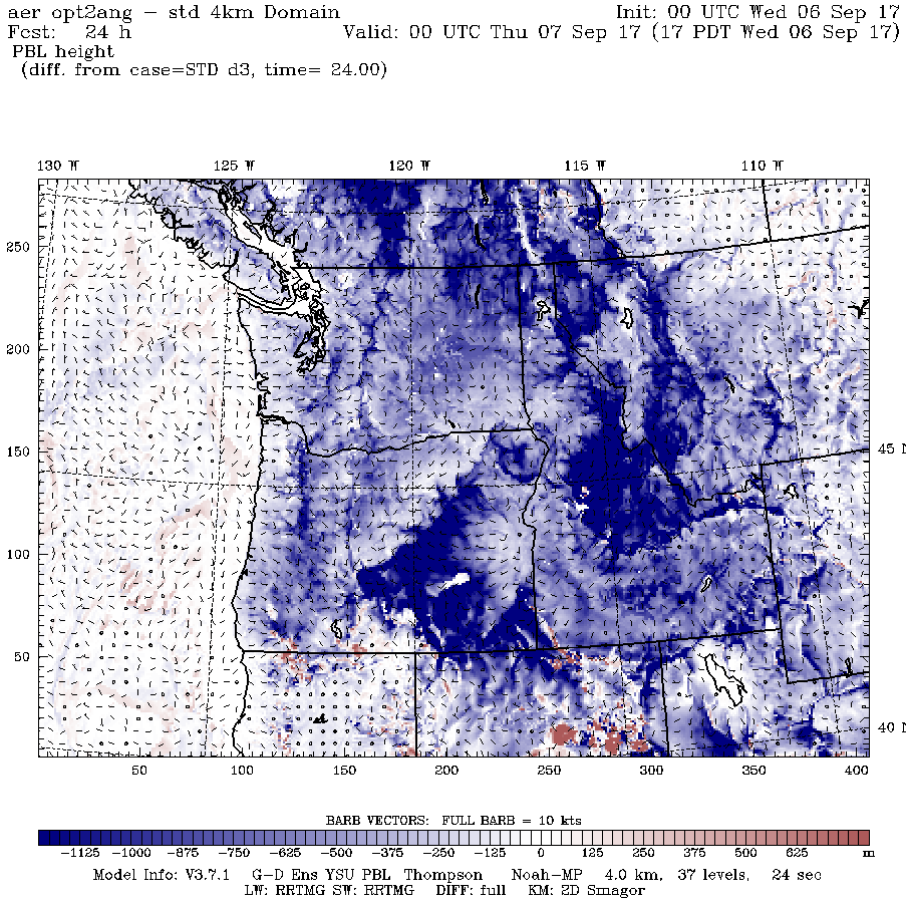
NASA GEOS AOD
NW WRF Forecasts

Collaborators: Cliff Mass, David Ovens, University of Washington

- WRF & Smoke Modeling (BlueSky)
- September 6-7, 2017
- 4-km Domain







Initial Results:

- Lower Temperatures
- Reduced PBL Heights
- Greater Smoke Concentrations
- Some Reduction in Smoke Transport

Year 2 Progress Update, PI O'Neill

Integration and Adoption of Satellite Products for Decision Support during Wildland Fire Smoke Episodes

- Post-doctoral researcher joined team 12/2017.
  - Upgrading operational smoke forecasting system (HYSPLIT->CMAQ)
  - Remote sensing products for smoke model evaluation
  - See Dr. Yufei Zou's poster
- Remote-Sensing Data for Smoke Forecast Initialization and Emissions Calculation
  - GOES-16 FDC Data
    - Web-based Tools
    - Contributor: Sean Raffuse, UC Davis
  - VIIRS, MODIS, GOES – Fire detection aggregation
- Western Wildfire Experiments for Cloud Chemistry, Aerosol Absorption, and Nitrogen (WE-CAN) – Custom Smoke Forecasts
- Continued support for users deployed to wildfire incident management teams. Collaborator: Pete Lahm, Stakeholders: WFAQRP
- NASA GEOS AOD
  - Modify WRF forecast radiation scheme
  - Initial test with 9/6-7/2017, 8/2017
  - Collaborator: Cliff Mass, David Ovens, University of Washington
- *4 End-User Trainings, 1 Stakeholder Webinar, 1 Stakeholder Presentation, 2 Publications, ARSET Training (Pullman, WA 2018)*

Tiger Team Participation

- OMI NOX Tiger Team (Pierce, Tong)
  - VIIRS, MODIS, GOES – Fire Detection Aggregation
  - Product: Fire emissions data for Lake Michigan Ozone Study (LMOS) time period (May-June, 2017).
  - Canadian fire emission estimation from Canadian Wildfire Fire Information System/SmartFire2 (CWFIS/SF2) system. CWFIS is MODIS-based.
- Hi-Res/MAIAC Tiger Team (Kinney, Freedman)
  - Northern California Oct 2017, Chetco Bar wildfire Oregon 2017, Sand Wildfire 2016
  - Analysis: MAIAC AOT, observational data (permanent and temporary networks), 2-km resolution smoke modeling (near-surface, total column)
  - Product: Threshold relationship of AOT to AQI
  - Product: Develop R code/infrastructure to extend analyses to other time periods & domains
  - Contributor: Mazama Science

Tiger Team Round 2: Air Quality and Health Burden of 2017 California Wildfires

- **HAQAST MEMBERS:**
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  - Minghui Diao (San Jose State University)
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  - Pat Kinney (Boston University)
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  - Jessica Neu (NASA JPL)
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  - Yufei Zou (University of Washington)
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  - Note: BAAQMD is also a contributor.
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  - Jeff McQueen (NOAA)
  - Pete Lahm, Trent Proctor (USDA Forest Service)
  - Susan Stone, Ana Rappold, Tesh Rao (EPA)
  - Scott Bohning, Kathleen Stewart, Lauren Maghran (EPA Region 9 Wildfire Smoke Team)
  - ShihMing Huang (Sonoma Technology Inc.)
  - Mark Fitch (DOI, National Park Service)
- **Proposed Work**
  - Fire Emission Inventory (MODIS, VIIRS, GOES-16)
  - Air Quality Modeling (WRF/CMAQ)
  - Improve Model Prediction with Satellite Observations (MAIAC AOD, CrIS CO)
  - Health Impact Analysis