

Satellite-aided Regional Dust Forecasting for Valley Fever Surveillance, Highway Safety and Air Quality Management

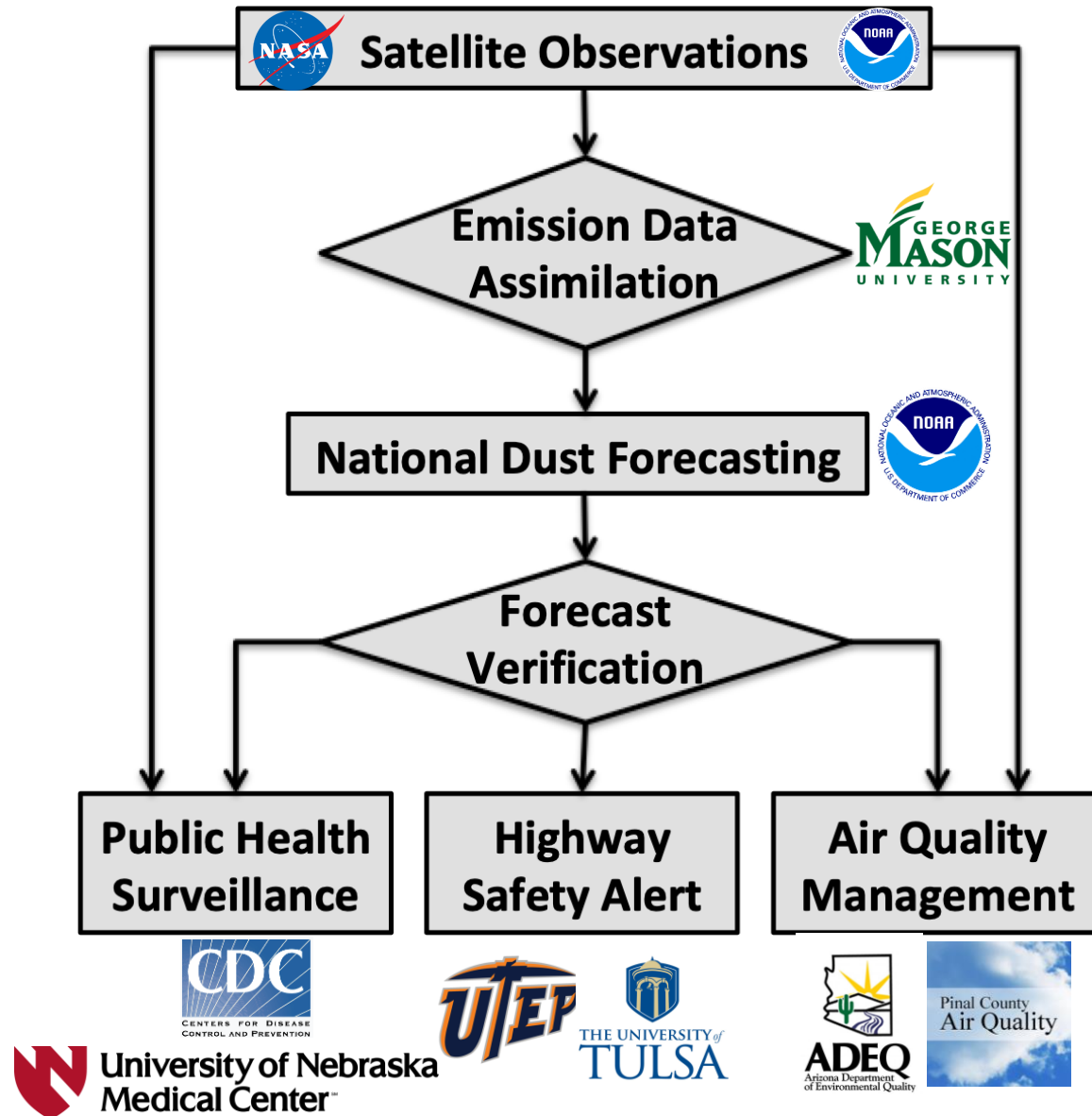
Daniel Tong

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Team: Orion McCotter (Formerly CDC), Pius Lee (NOAA), and Jesse Bell (UNMC) Thomas Gill (UTEP), William Sprigg (SPC), Junran Li (UofTulsa), Zhong Liu (NASA/GMU), Ziheng Sun (GMU), Robert Levy (NASA), Liping Di (GMU), Ralph Kahn (NASA), Nicolas Webb (USDA), Adrian Chappell (Cardiff University, UK), Julian Wang (NOAA)

Stakeholders: Jonny Malloy (ADEQ), Matthew Roach (ADHS), David Hadwiger (NM DOT), Scott Van Pelt (USDA), Scott DiBiase (Pinal County AQCD), Beth Gorman (Pima County DEQ), Andy Edman (NWS), Jeff McQueen (NWS), Dale Griffin (USGS), Mariana Singletary (Pinal County DoH), Alexander Baklanov (WMO), Andrea Sealy (WMO Pan-America), Brooke Doman (NM DoH)

Satellite-aided Dust Forecasting



Objectives:

1. Improve national dust forecasting with satellite observations;
2. Support three dust services:
 - a) Valley fever surveillance;
 - b) Highway safety alert;
 - c) Air quality management.

Summary of Team Achievements

(New in Y4)

- **Publications:** 15 (4) journal papers, 4 in review; 1 WMO publication.
- **Presentations:** 23 (6) Presentations; 4 AGU/AMS sessions organized on GeoHealth and Air Quality;
- **Stakeholder meetings:** 12 small groups; **Western US Dust Workshop; Four webinars with Dust Alliance for North America.**
- **Capability transfer:** National Weather Service albedo-based dust forecasting; Pima County air quality forecast advisory;
- **Media/Outreach:** 15 (4) interviews and many republications; 1 WMO news release; 3 NASA News stories.

New Publications

- a) Kim, Dongchul, Mian Chin, Carlos A. Cruz, Daniel Tong, and Hongbin Yu. "Spring dust in western North America and its interannual variability—Understanding the role of local and transported dust." *Journal of Geophysical Research: Atmospheres* (2021): e2021JD035383.
- b) Sun, Z., Sandoval, L., Crystal-Ornelas, R., Mousavi, S.M., Wang, J., Lin, C., Cristea, N., Tong, D., Carande, W.H., Ma, X., Rao, Y., et al. 2022. "A review of Earth Artificial Intelligence". *Computers & Geosciences*, 159, 105034.
- c) Tong, D. Q., Gorris, M. E., Gill, T. E., Ardon-Dryer, K., Wang, J., & Ren, L. (2022). Dust Storms, Valley Fever, and Public Awareness. *GeoHealth*, e2022GH000642.
- d) Sprigg, William A., Thomas E. Gill, Daniel Q. Tong, Junran Li, Ling Ren, and R. Scott Van Pelt. Are Opportunities to Apply Airborne Dust Research Being Missed? *Bulletin of the American Meteorological Society*, 103(6), E1587- E1594, doi:10.1175/BAMS-D-22-0034.1

Submitted Manuscripts

- a) Ardon-Dryer, K., T. E. Gill, and D. Q. Tong. When A Dust Storm Is Not A Dust Storm: Reliability of Dust Records from the Storm Events Database and Implications for Geohealth Applications. *GeoHealth*. In Review.
- b) Eibedingil, Iyasu, Thomas E. Gill, Tarek Kandakji, Jeffrey A. Lee, Junran Li, and R. Scott Van Pelt, submitted. Relationship between Spatial and Temporal "Drought Memory" on Dust Sources in Two Ecoregions of the USA. *Catena*.
- c) Tong, D.Q., et al., Health and Safety Effects of Airborne Soil Dust in the Americas and Beyond. *Reviews of Geophysics*. In Review.
- d) Tong, Daniel Q., Irene Feng, Thomas E. Gill, Kerstin Schepanski, and Julian X.L. Wang. How many people were killed by dust storms on highways? A hazy view. *Bulletin of American Meteorological Society*, In revision.

Media/Outreach

Dust forecasting capability in NOAA operation



Air Resources Laboratory
*Investigating processes in the
Earth's Boundary Layer*

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New Dust Forecast Model Excels in Predicting Recent Dust Storms

December 21, 2021

In December 2021, some regions of the US experienced record breaking weather patterns with deadly tornados and damaging winds. An [Extreme Wind Event](#) on December 14-16 brought winds up to 100 mph to parts of southern Colorado towns such as Pueblo and Manitou Springs. Intense dust storms, sometimes called a haboob, raced across the dry plains in Colorado and Kansas to produce widespread blowing dust over much of the region.

Commendation from NOAA Assistant Secretary



“For implementing and upgrading NOAA’s Air Quality Forecasting Capability, thereby improving the lives of Americans and saving billions of dollars per year”

Nature highlighting our research

[nature](#) > [news](#) > article

NEWS | 01 August 2022

Dust-up over dust storm link to ‘Valley Fever’ disease

Researchers are divided over whether rising cases of the fungal infection in the United States can be linked to dust storms.

[Virginia Gewin](#)



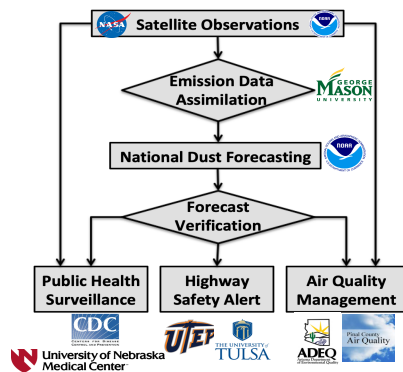
Scientists have yet to establish a clear link between dust storms — such as this one in Arizona — and the risk of Valley Fever. Credit: Getty

Dust Alliance for North America (DANA)

A new international network grown out of the project

What is DANA? Partnership of scientists and practitioners with a purpose to accelerate transition of research into service.

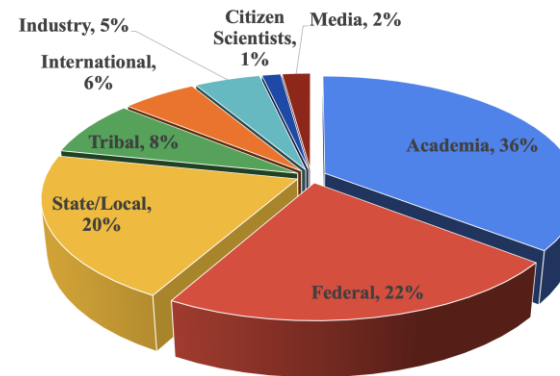
A Brief History



November 2018



Year 3 Stakeholder Workshop (October 2021)



February 2022

Status of DANA

- Steering Committee (30 members from national/local agencies/academia)
- Monthly webinars in Spring and Fall

<http://dustalliance.org/>