

Current and future aircraft missions



Joshua Schwarz



CSD uses aircraft campaigns to characterize influences on the atmosphere where they occur.

- Boundary layer to stratosphere
- Regional to Global
- National and international

Recent, Current, and Upcoming Missions

NOAA Led:

- **Fire Influence on Regional and Global Environments (FIREX) –NOAA P-3 – 2018**
- Twin Otter for use in BIOLIDAR – NOAA Twin Otter 2015
- **Shale Oil and Natural Gas Nexus – NOAA P-3 2015**

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- Twin-Otter Projects Defining Oil/gas Well emissionNs (TOPDOWN) – NOAA Twin Otter 2014
- South-East Nexus (SENEX) – NOAA P-3 2012
- California Nexus of Air Quality and Climate (CALNEX) –NOAA P-3 2010
- Aerosol, Radiation, and Cloud Processes affecting Arctic Climate (ARCPAC) – NOAA P-3 2008

NOAA Participation:

- **Atmospheric Tomography Mission – NASA DC-8, 2015-2020**
- Airborne Tropical Tropopause Experiment (ATTREX) – NASA Global Hawk 2011-2015
- WINTER 2015 – NSF C130
- Studies of Emissions and Atmospheric Composition, Clouds, and Climate Coupling by Regional Surveys (SEAC4RS) – NASA DC-8 2013
- Deep Convective Clouds and Chemistry Experiment (DC3) – NASA DC8, 2012
- Global Hawk Pacific (GloPac) – NASA Global Hawk , 2010

CSD leads and participates in diverse and far-ranging aircraft campaigns to address issues of national interest

Complete list of CSD projects: <http://www.esrl.noaa.gov/csd/field.html>

Shale Oil and Natural Gas NEXus (SONGNEX)

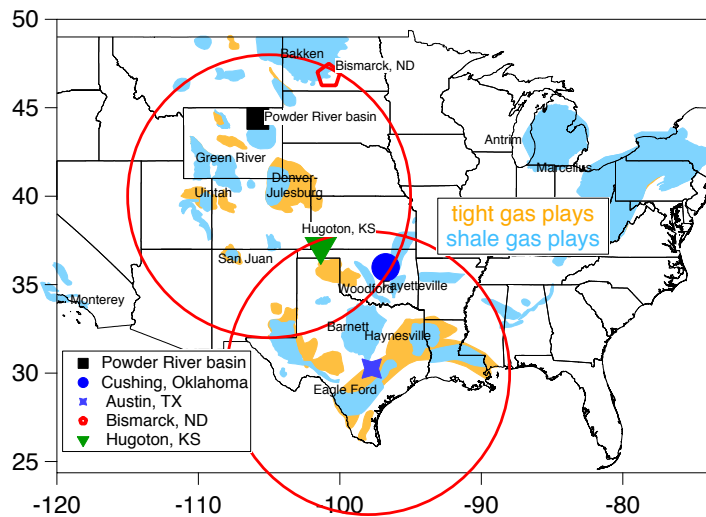
NOAA P-3 2015 J. de Gouw, principal investigator



SONGNEX will resolve critical questions about emissions resulting from oil and gas production.

SONGNEX will sample multiple production regions to address questions about:

- **Climate impacts** of methane.
- **Air Quality** impacts: of methane, non-methane hydrocarbons, and nitrogen oxides
- **Air toxics** influencing human health.



Beyond the WP-3D

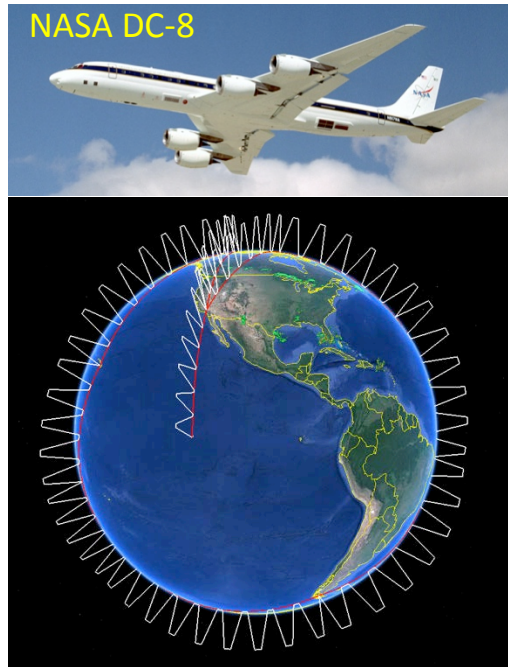


Mobile labs
Ground Networks (State/Regional/NOAA GMD)
Satellite
Modeling
Industry

CSD uses NOAA research aircraft to provide state of the art evaluations of pollutant sources and impacts

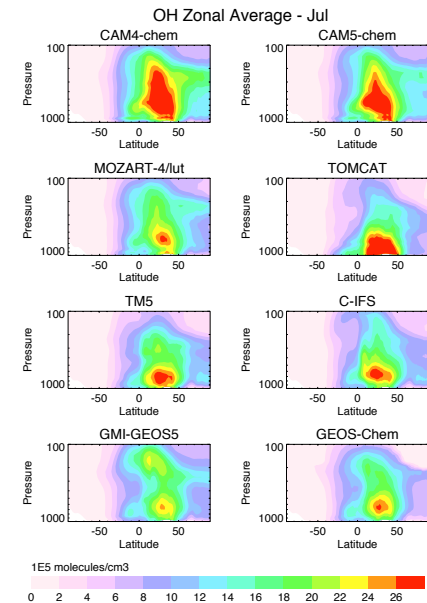
The Atmospheric Tomography Mission (ATom)

NASA DC-8 2015-2020 – S. Wofsy, principal investigator



- Quantify chemical processing and loss rates of the short-lived climate forcers **methane, ozone, and black carbon** on a global scale
- **Critically test global chemistry-climate models (CCMs)** used to define policy options for climate mitigation and adaptation
- **Provide benchmarks** for NOAA, NASA, and European Space Agency satellite retrievals

ATom provides key constraints on CCMs



ATom science leadership team:

T. Ryerson (lead)	NOAA CSD
P. Newman	NASA Goddard
D. Fahey	NOAA CSD
T. Hanisco	NASA Goddard

ATom PIs from NOAA CSD:

J. Schwarz	black carbon soot
C. Brock	particle size distributions
T. Ryerson	nitrogen oxides and ozone
E. Ray	forecasting/reanalysis

CSD leverages extra-agency airborne resources to extend its research over the entire Earth and addresses science issues of global scale

Fire Influence on Regional and Global Environments (FIREX)

NOAA P-3 2015 - 2018



FIREX Steering Committee

J. Roberts	NOAA CSD
C. Warneke	NOAA CSD
R. Yokelson	U Montana
J. Schwarz	NOAA CSD

... and more to come.

Unique Features:

- **New instrumentation and satellites**
- **Comprehensive effort** with large science community using simultaneously deployed ground, mobile, laboratory and aircraft
- **Nighttime** fires and smoke
- Years building knowledge before large field experiment,

CSD is already preparing NOAA airborne assets to answer future climate and air quality questions.

FIREX instruments the NOAA P-3 aircraft and deploys it in the US West to sample emissions from wild and prescribed fires.

- Extend optical/chemical observations of relevant species
- **Critically test global chemistry-climate models (CCMs)** used to define policy options for climate mitigation and adaptation
- Examine **nighttime evolution** of plumes.

