



ASCENT: Atmospheric Science and Chemistry mEasurement NeTwork



PI: Nga Lee (Sally) Ng, Georgia Institute of Technology

Steering Committee:

Nga Lee (Sally) Ng, Georgia Institute of Technology
Ann Dillner, University of California, Davis
Roya Bahreini, University of California, Riverside
Armistead Russell, Georgia Institute of Technology

Site/Instrument Mentors: James Flynn (University of Houston), Drew Gentner (Yale University), Robert Griffin (Roger Williams University), Lelia Hawkins (Harvey Mudd), Jose Jimenez (University of Colorado, Boulder), Jingqiu Mao (University of Alaska, Fairbanks), Shane Murphy (University of Wyoming), Albert Presto (Carnegie Mellon University), Allen Robinson (Carnegie Mellon University), John Seinfeld (California Institute of Technology), Jason Surratt (University of North Carolina, Chapel Hill), Joel Thornton (University of Washington)

Website Interface/Database: Sean Raffuse and software engineering team (University of California, Davis); Eric Nienhouse (National Center for Atmospheric Research)

Collaboration Networks: NCore, PAMS, IMPROVE, SCAQMD, NEON, HNET, ACTRIS

ASCENT

- A new long-term, ground-based, high time-resolution aerosol measurement network in the US
- 12 Sites
- 3-year grant (\$12M), supported by NSF Mid-scale Research Infrastructure Program
- Transfer operation and management to (an)other organization(s) after award period

Site Map

Leverage Existing Sites/Infrastructure

NCORE: National Core Network

- $PM_{2.5}$ mass and speciation;
 O_3 , CO , SO_2 , NO , and NO_y

PAMS: Photochemical Assessment Monitoring Stations, VOCs

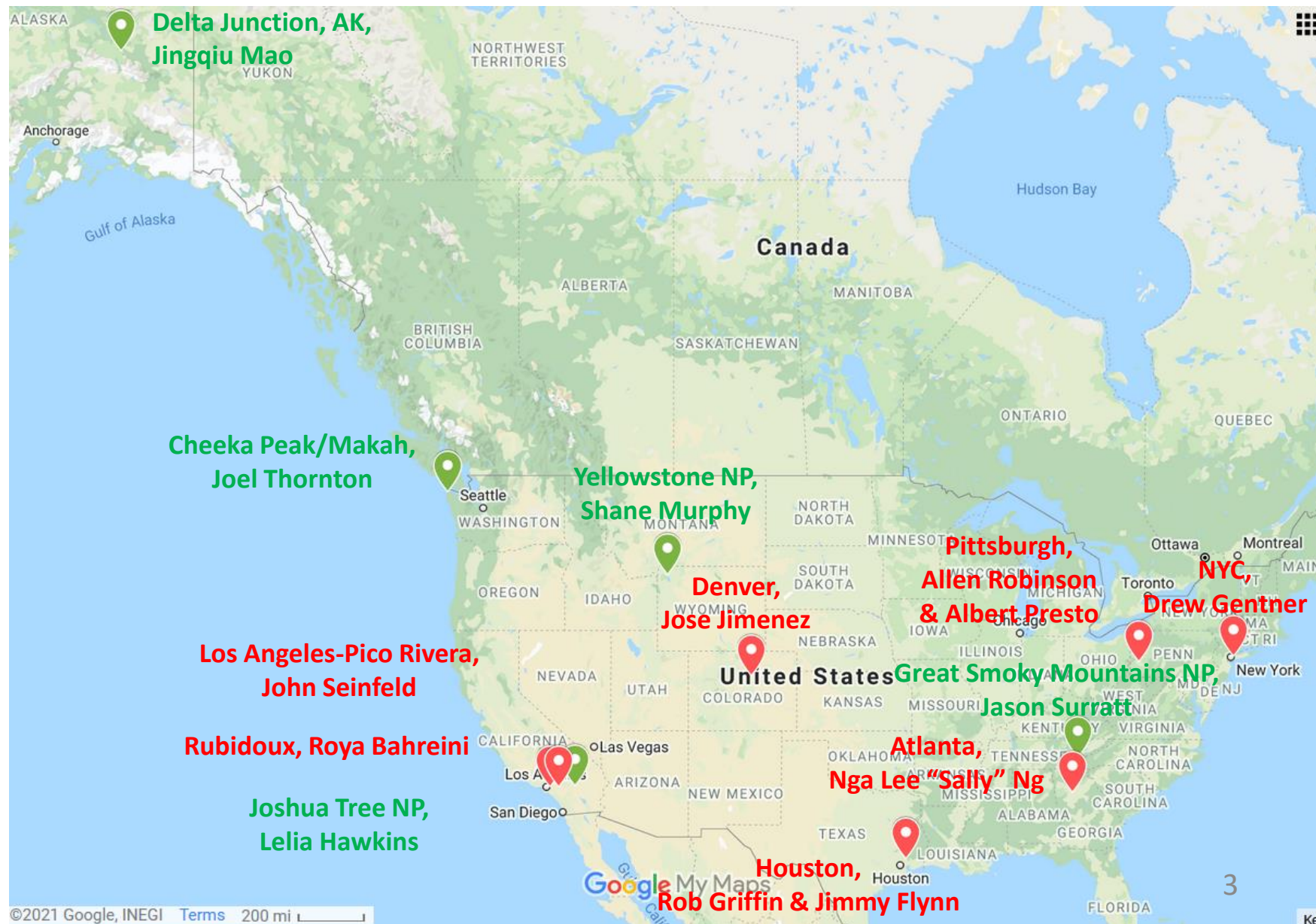
IMPROVE: Interagency Monitoring of PROtected Visual Environment network

- $PM_{2.5}$ mass; gas-phase
measurements

SCAQMD: South Coast Air Quality Management District

NEON: National Ecological Observatory Network

HNET: Houston Network of Environmental Towers



Site Selection

Site Number	Local Site Name	Current Network	Instrument Mentor	Comments
1	Delta Junction, AK	NEON	Jingqiu Mao	Remote, arctic, background, boreal forest, intercontinental transport, EPSCoR
2	Cheeka Peak/ Makah	IMPROVE	Joel Thornton	Marine background/inflow, smoke at times, tribal site
3	Los Angeles-Pico Rivera	AQMD	John Seinfeld	Paired site 1: urban, anthropogenic, VCP, wildfires
4	Rubidoux	NCORE, PAMS	Roya Bahreini	Paired site 2: urban, anthropogenic, aged OA, wildfires
5	Joshua Tree	IMPROVE	Lelia Hawkins & Roya Bahreini	Paired site 3: aged OA, downwind of LA and Riverside
6	Yellowstone NP 2	IMPROVE	Shane Murphy	Background site with wildfires, EPSCoR
7	La Casa	NCORE, PAMS	Jose Jimenez	Urban, wintertime pollution, oil and gas, wildfires, agriculture
8	Houston-UH West Liberty	HNET	Robert Griffin & Jimmy Flynn	Urban, petrochemical industry, maritime shipping
9	Lawrenceville	NCORE, PAMS	Allen Robinson & Albert Presto	Urban, oil and gas, fracking, heavy industry
10	Queens College 2	NCORE, PAMS	Drew Gentner	Urban, coastal, VCP
11	South DeKalb	NCORE, PAMS	Nga Lee Ng	Paired site 1: urban, biogenic
12	Great Smoky Mountains NP - Look Rock	IMPROVE	Jason Surratt	Paired site 2: background, biogenic

High Time-Resolution Aerosol Instrumentation

Instrument	Model and Manufacturer	Measurements	Typical Data Rate	Detection limit (30 min)
Aerosol Chemical Speciation Monitor (ACSM), PM _{2.5}	ToF-ACSM, Aerodyne Research	Organics, sulfate, nitrate, ammonium, chloride	10 min	< 30 ng m ⁻³
Xact, PM _{2.5}	625i, Cooper Environmental	Trace metals: Sb, As, Ba, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mn, Ni, Se, Ag, Sn, Ti, Tl, V, Zn, more available	15-240 min	< 10 ng m ⁻³ for key metals
Aethalometer, PM _{2.5}	AE33, Magee Scientific	Wavelength-dependent absorption; black and brown carbon	1 sec or 1 min	5.5 ng m ⁻³ of BC (5 lpm)
Scanning Mobility Particle Sizer (SMPS), PM ₁	3938W89, TSI	Particle number size distribution, number concentration	3 min (full scan)	< 1 cm ⁻³

Value-added products

- FT-IR / ACSM functional group analysis
- (Near) Real time source apportionment

Data Infrastructure

- Collaboration with NCAR Software Applications and Gateway Engineering (SAGE) team and UC Davis Air Quality Research Center software engineering team
- Four data levels
 - (0) raw data
 - (1) calibrated and quality assured data (minimum level of quality control)
 - (2) full quality-controlled data
 - (3) value-added data products
- Data QA/QC and export tools
- Database and web interface

Status Updates etc.

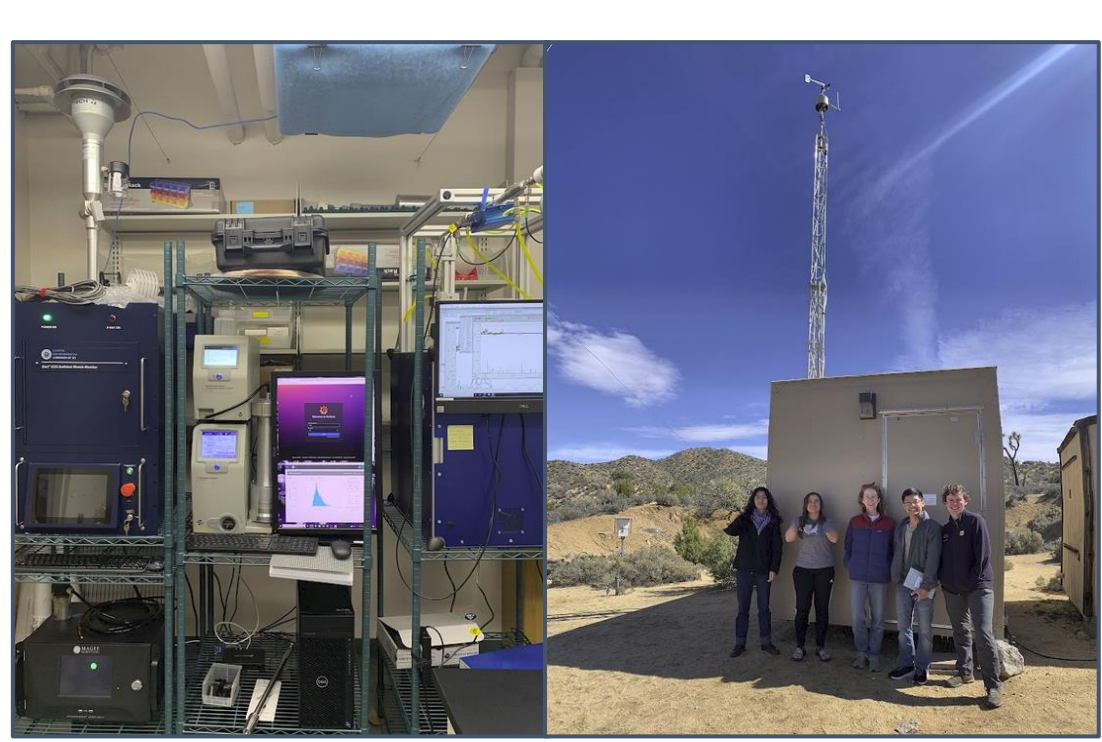
- NYC site up and running since Dec 2022; other sites being set up, start sampling this month / next month
- Developed installation, calibration, and general maintenance SOP for each instrument
- Developing data tools, data from each instrument imported into a local site database and the import process features automated QC checks for basic level data
- ASCENT internal meeting (May 23-24) and ASCENT public workshop (May 25-26) at Georgia Tech
- Opportunities: ASCENT/SPARTAN
 - SPARTAN samplers at ASCENT sites
 - Offline-AMS measurements; comparison of organic composition between ACSM and offline-AMS
 - Compare functional group measurements at ASCENT and SPARTAN
 - Calibration / development of low-cost monitoring approaches



Above: South DeKalb Atlanta; Below: Roubidoux



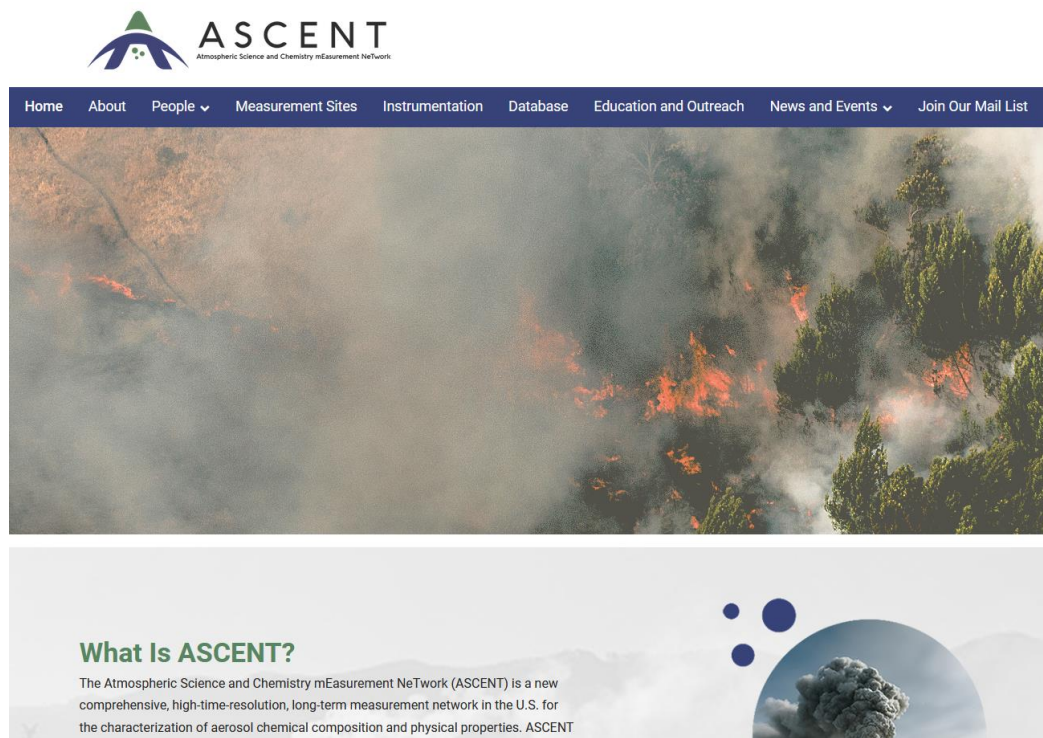
Above: Pittsburgh Lawrenceville; Below: Queens College



Above: Joshua Tree NP; Below: Great Smoky Mountains NP



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