Emerging Observational Needs in Atmospheric Chemistry Workshop

Meeting the Challenges of Atmospheric Chemistry Observations

June 16-18, 2025, Boulder, CO, USA

(updated June 16, 2025, subject to change)

Program Chairs: Eric Apel (NCAR), Becky Alexander (UW), and Joel Thornton (UW)

Steering Committee: Steven Brown (NOAA), Allen Goldstein (UC Berkeley), Steve Wofsy (Harvard), Kristie Boering (UC Berkeley), Ron Cohen (UC Berkeley), Armin Sorooshian (U Arizona), Patrick Veres (NCAR EOL), Kelley Barsanti (NCAR ACOM), Sam Hall (NCAR ACOM)

AGENDA

Monday 16 June

0830-0900: Coffee, tea, light refreshments

0900-0910: Opening remarks – Everette Joseph (NCAR)

0910-0920: Sylvia Edgerton (NSF) – *virtual*

0920-0930: Pieternel Levelt (NCAR)

0930-0940: Logistics and workshop format: Eric Apel

0940-1010: Nick Anderson: LAOF and CIF: NSF perspective - *virtual*

Current Lower Atmosphere Observing Facilities: Aircraft

1010-1030: King Air B200T: Shane Murphy from U. WY will discuss the new aircraft and current status

1030-1050: Break

1050-1130: NSF C130 and GV Aircraft Update: Greg Fahrenbruch + Patrick Veres will discuss the current state of the NSF NCAR aircraft (C130/GV) followed by a discussion on the outlook for the program

1130-1200: General discussion and Q & A from the mornings presented information: Joel Thornton, Becky Alexander, Eric Apel

1200-1315: Lunch

1315-1400: Community Instruments and Facilities (CIF) Overview and Status: Current Laboratories

Pi Convection-Cloud Chamber: Will Cantrell will discuss this facility
Storm Peak Laboratory: Gerardo Carrillo-Cardenas will discuss this facility
Ice Nucleation Cold Stage: Markus Petters (virtual) will discuss this facility and give a perspective from his experience

1400-1430: Current Lower Atmospheric Observing Facilities: Airborne Instrumentation from NCAR and the university community

Description of what EOL/RAF provide for each mission:
EOL instrument suite - Patrick Veres
ACOM instrument suite – Samuel Hall

1430-1530: Examples of recent uses of LAOF

Instrument innovation - LAOF platforms	Rainer Volkamer
WE-CAN/ SLC-SOS/Trans2Am	Emily Fischer
MAIRE24	Steve Wofsy

1530-1600: Break

1600-1620: Overview and perspective from recent ACOM science advisory board (experimental part) – Bart Croes, chair

1620-1700: Science talk(s) to motivate observational needs. E.g., Coupling laboratory (chamber) and field measurements (with advanced CIMS instrumentation) with the hyper explicit GECKO-A model (Generator of Explicit Chemistry and Kinetics of Organics in the Atmosphere) for a better understanding of urban and fire impacted atmospheric chemistry – Kelley Barsanti, Brett Palm, and Qing Ye. Where is this field leading us?

1700: Reception and Poster Session
Refreshments will be served

1930: End Reception and Poster Session

<u>Tuesday 17 June</u>

Topical breakout sessions will discuss instrumentation needs, tradeoffs between centralized instrumentation versus flexibility to develop new methods and train students, and barriers to getting new instruments tested and certified. There will be three nearly one-hour break-out sessions with each having three parallel sessions. Attendees can choose which breakouts they wish to attend but we would like to see reasonable participation in all the breakouts. To this end, some topics in which we expect the most participation will be featured twice in the hope to

encourage participation in breakouts that may otherwise see less participation. Topics for the breakout sessions are:

1. Radiation/Meteorology
2. Trace gases
3. Aerosol chemistry and microphysics
4. Cloud chemistry and microphysics
5. Surface fluxes
6. Infrastructure and facilities

Some guiding thoughts and questions for each session regarding instrumentation:
Instrumentation including inlets needed for measurements in the science areas listed above (+ others?).
Current status – are requestable instruments meeting the present community needs? What should be maintained that we are in danger of losing?
Future Status – what new facility provided instrumentation will be needed to 1) provide basic support for community airborne field programs; and 2) answer outstanding questions in atmospheric chemistry?
What are the barriers to getting new instrumentation on the planes and the ground (CIF)? (Funding, developmental and certification barriers, lack of a working knowledge of LAOF and CIF (e.g., early career scientists, non-R1 institutions, Certifications, etc.)

Discuss center or university led instrumentation purchases and developments

Custom developments and partnerships with private industry
Emerging new certification requirements and paths forward to meet these
Holistic considerations of community wide assets

Additional thoughts to consider:

1) Can we identify instruments that exist with demonstrated capabilities that could advance science problems we are currently studying but which LAOF doesn't have or doesn't have enough of - what are those?

2) Are there science problems we are currently studying where prototype instruments - if made more robust or cheaper or capable of lower detection limits, etc. - could advance the science? What are those?

3) Are there science problems we should be studying but are not due to a lack of observational capabilities - what are those?

4) New instruments often don't just help advance existing science questions, they often help us ask new questions or start new fields, etc.

0830-0900: Coffee, tea, light refreshments

0900-0905: Remarks on previous day and overview of today:

0905-0935: Discussion of current instrumentation that needs to be maintained/supported (to provide continuing core instrument capability and continuity to the community for future airborne science missions) – *Eric Apel to lead w/ Kristie Boering following to discuss whole air sampling as an example of one instrument platform with an uncertain future, followed by an open discussion where attendees are encouraged to freely share their thoughts.*

0935-0945: Guidance from co-chairs on breakout sessions:

0945-1035: Topical breakout session 1
(Names in parentheses are people who will lead this discussion and take notes.)

Parallel sessions:

1) Radiation and Meteorology (Sam Hall, Sebastian Schmidt, Natalie Kille)
Location: Center Green – Rm 3150: https://meet.google.com/vud-akir-mdf Or dial: (US) +1 224-901-2178 PIN: 771 635 620#

2) Trace Gases (Steve Brown, Dylan Millet)
Location: Center Green - Center: https://ucar-edu.zoom.us/j/98847137804?pwd=T78DVkht1Loon8nahdE4zEsgtbU4CD.1 Passcode: EONA 2025

3) Aerosol phase chemistry and microphysics (Armin Sorooshian, Kelley Barsanti)
Location: Center Green – Rm 2126: https://meet.google.com/nyw-bxzg-zuk Or dial: (US) +1 570-634-5997 PIN: 233 722 992#

1035-1100: Break

1100-1200: Topical breakout sessions 2

Parallel sessions:

4) Aerosol phase chemistry and microphysics (Allen Goldstein, Cassie Gaston)
Location: Center Green - Center: https://ucar-edu.zoom.us/j/98847137804?pwd=T78DVkht1Loon8nahdE4zEsgtbU4CD.1
Passcode: EONA2025

5) Surface Fluxes (Ron Cohen, Roisin Commane, Glenn Wolfe)
Location: Center Green – Rm 2126: https://meet.google.com/nyw-bxzg-zuk Or dial: (US) +1 570-634-5997 PIN: 233 722 992#

6) Cloud chemistry and microphysics (Sarah Woods, Liz Moyer)
Location: Center Green – Rm 3150: https://meet.google.com/vud-akir-mdf Or dial: (US) +1 224-901-2178 PIN: 771 635 620#

1200-1315: Lunch, included with registration

1315-1400: Topical breakout session 3

Parallel sessions:

7) Cloud chemistry and microphysics (Armin Sorooshian, Sara Lance)
Location: Center Green – Rm 2126: https://meet.google.com/nyw-bxzg-zuk Or dial: (US) +1 570-634-5997 PIN: 233 722 992#

8) Infrastructure and Facilities (Patrick Veres, Shane Murphy)
Location: Center Green – Rm 3150: https://meet.google.com/vud-akir-mdf Or dial: (US) +1 224-901-2178 PIN: 771 635 620#

9) Trace gases (Steve Wofsy, Ron Cohen)
Location: Center Green - Center: https://ucar-edu.zoom.us/j/98847137804?pwd=T78DVkht1Loon8nahdE4zEsgtbU4CD.1
Passcode: EONA2025

1410-1440: First summaries of topical breakout sessions (15 min each from first parallel session, allow for some feedback from the larger group)

1440-1515: Break

1515-1615: Summaries continue of topical breakout sessions (15 min each from second and third parallel sessions, allow for some feedback from the larger group) continue

1615-1700: Open discussion and concluding remarks: Joel Thornton, Becky Alexander, Eric Apel

1700: Adjourn

1800: Steering committee meets for dinner

Wednesday 18 June

0900-1130: Synthesis steering committee meeting:

- Integrate findings and recommendations derived from the breakout sessions
- Provide overarching findings and recommendations derived from considerations such as scientific and technological readiness, urgency, breadth of applications, other considerations
- Draft a report
- Distill a high-level summary for website postings

1030: RAF tour for those interested and who have signed up

Note: Please register for this event on the registration site, space limited. More information here on the facility.