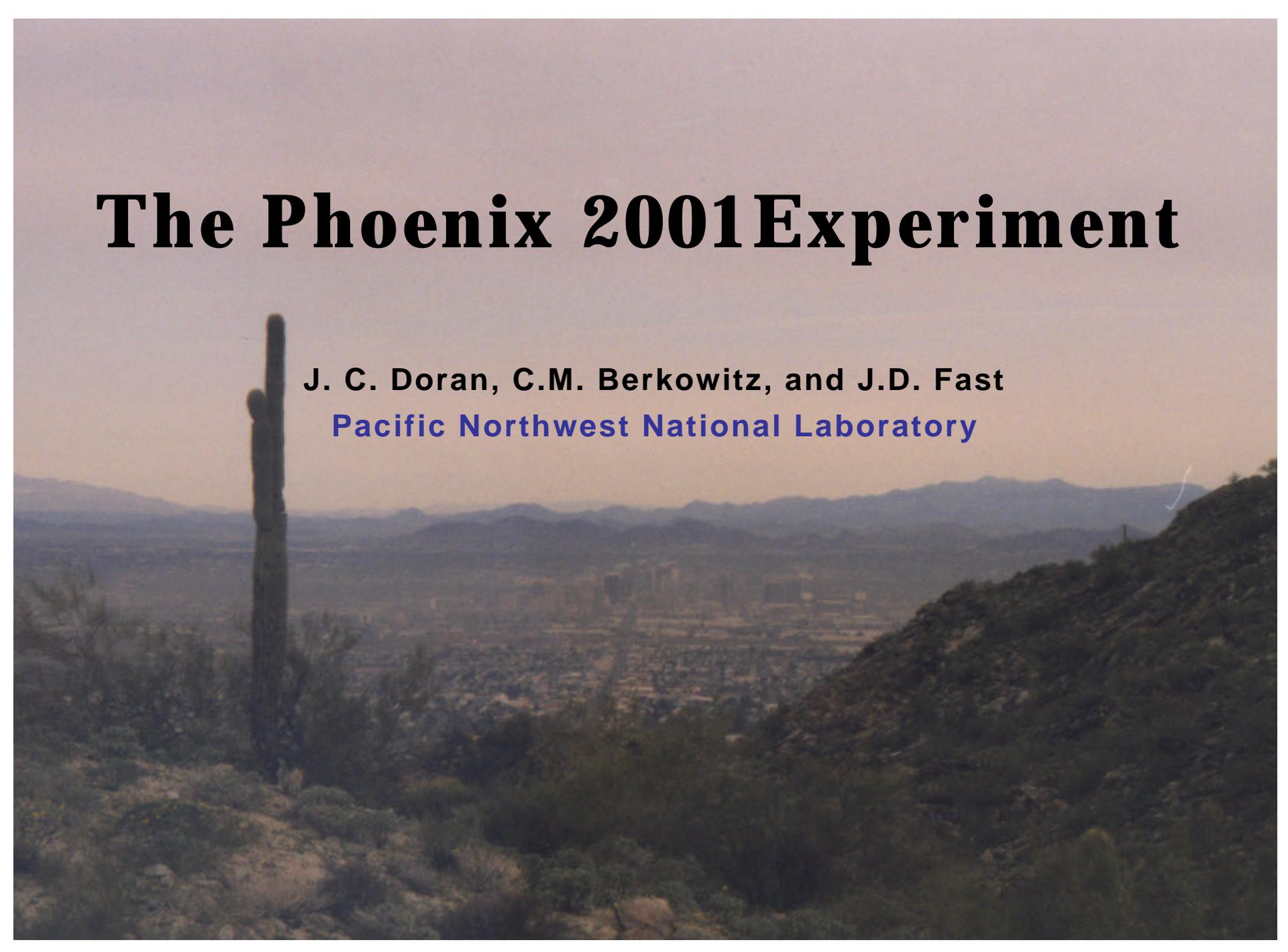


The Phoenix 2001 Experiment

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Background and Motivation

- **In 1998 Phoenix campaign, discrepancies between observed and simulated peak ozone mixing ratios in mid-afternoon were relatively small, but**
- **discrepancies were larger in the evening and morning.**

Possible sources of error:

- **chemistry: uncertainties associated with emissions, photolytic rates, chemical reactions, deposition, etc.**
- **meteorology: poor description of reservoirs of ozone and ozone precursors near the surface and aloft, vertical mixing within the boundary layer during the morning and evening transition periods, etc.**

Objective:

Characterize the local nighttime accumulation of ozone precursors and their subsequent processing the next morning as the nocturnal boundary layer breaks up.

Approach:

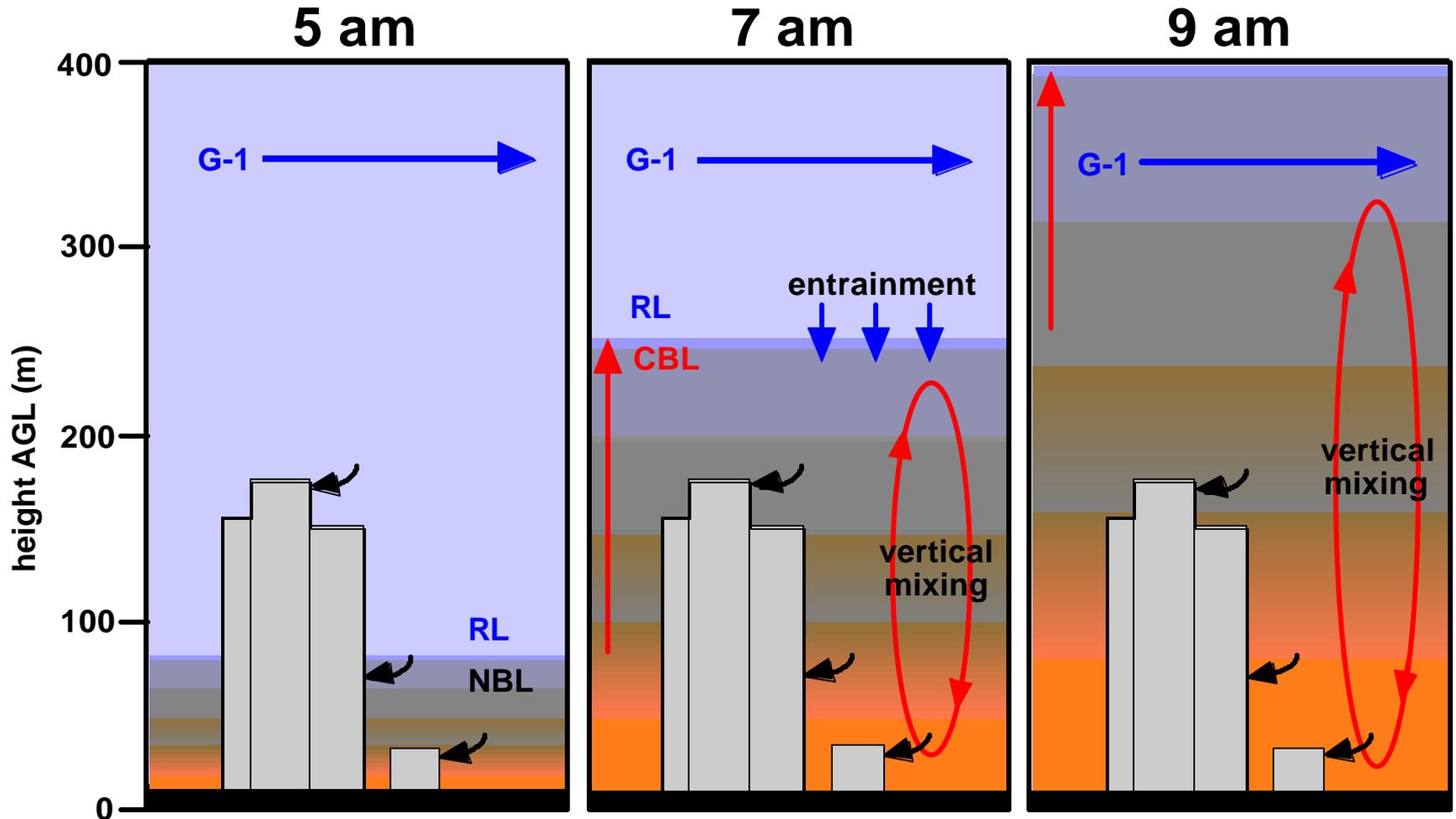
Use instruments at fixed sites at multiple elevations and on the Gulfstream-1 aircraft to compare and contrast the chemical mix within and above the nocturnal surface layer and in the developing convective boundary layer during the morning transition period.

Collect concurrent detailed meteorological data describing the evolving boundary layer structure.

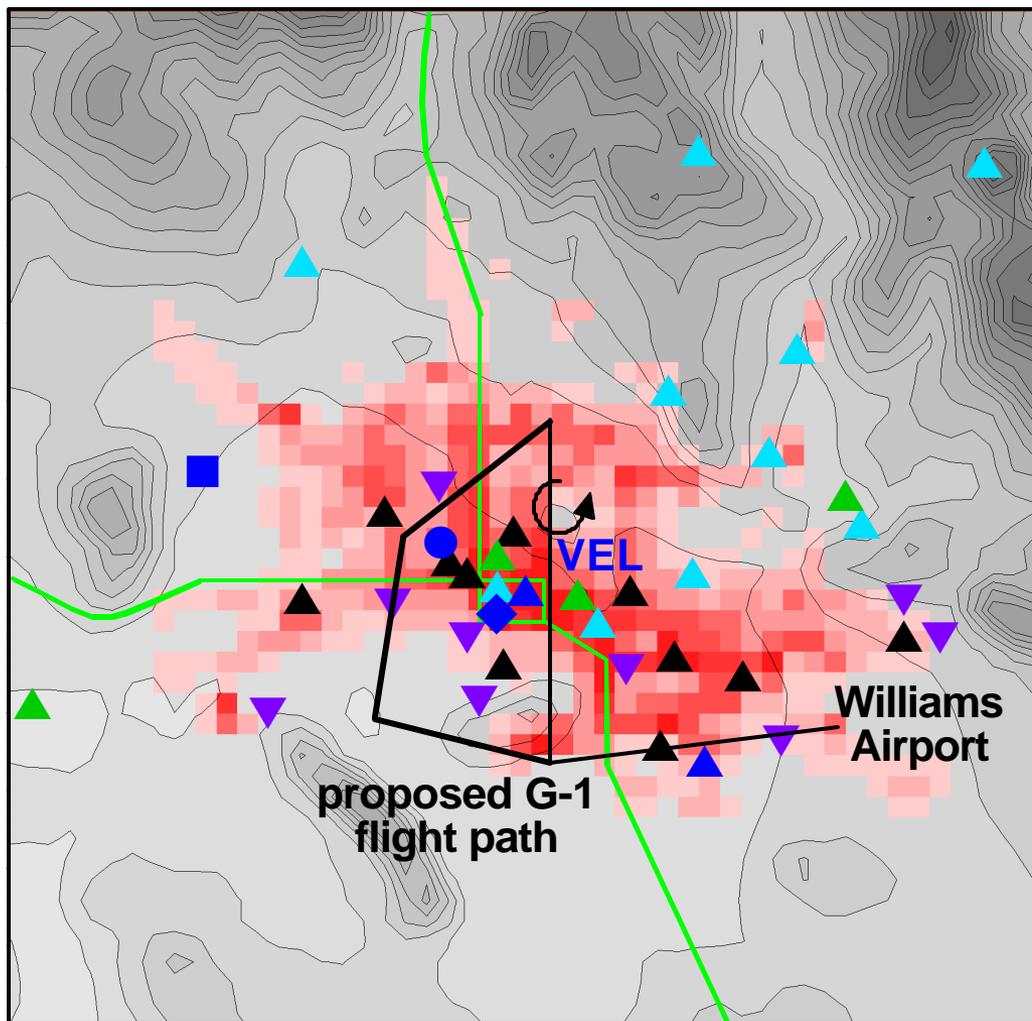
Dates: 14 June - 30 June, 2001

- **Pacific Northwest National Laboratory** - Chris Doran, Carl Berkowitz, Jerome Fast, Will Shaw
- **DOE Research Aircraft Facility** - Bob Hannigan, John Hubbe, Vic Morris
- **Battelle-Columbus** - Chet Spicer
- **Argonne National Laboratory** - Rich Coulter, Paul Doskey, Jeff Gaffney, Nancy Marley, Tim Martin
- **Arizona Department of Environmental Quality (ADEQ)** - Peter Hyde, Michael George
- **Arizona State University** - Jim Anderson, Joe Fernando
- **Brookhaven National Laboratory** - Stephen Springston
- **Lawrence Livermore National Laboratory** - Cindy Atherton
- **Loyola University** - Martina Schmeling
- **University of Alaska** - Bill Simpson
- **University of California - Los Angeles** - Jochen Stutz, Ralf Ackermann

Morning Transition



Chemistry Measurements

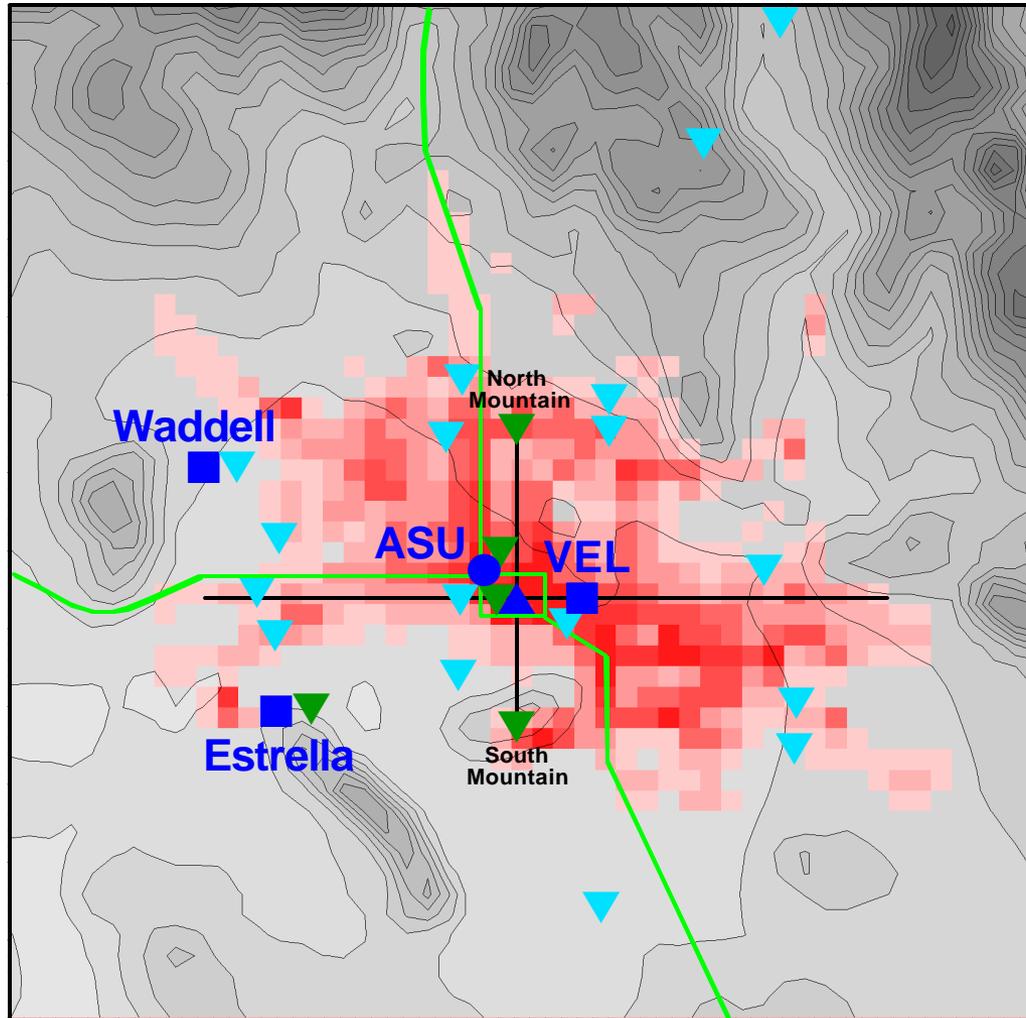


- surface: O_3 , CO, NO, NO_2 , NO_y , PAN, Neph., UVb, MFRSR, VOC canisters
- tethersonde: O_3 , PM
- ◆ 3 building levels
- ▲ JNO_2 at VEL

Routine Observations:

- ▲ O_3
- ▲ O_3 , CO, NO, NO_2 , NO_x
- ▲ O_3 , CO, PM
- ▲ O_3 , PM
- ▼ PM

Meteorological Measurements



- radar wind profilers and sodars
- radiosondes at 0, 2, 5, 6, 7, 8, 9, 10, and 17 LT at VEL and at 5, 6, 7, 8, 9, 10, and 17 LT at Waddell
- ▲ sodar
- tethered sonde
- ▼ routine surface meteorology
- ▼ additional surface meteorology
- temperature data loggers (HOBOS)

Building Measurements

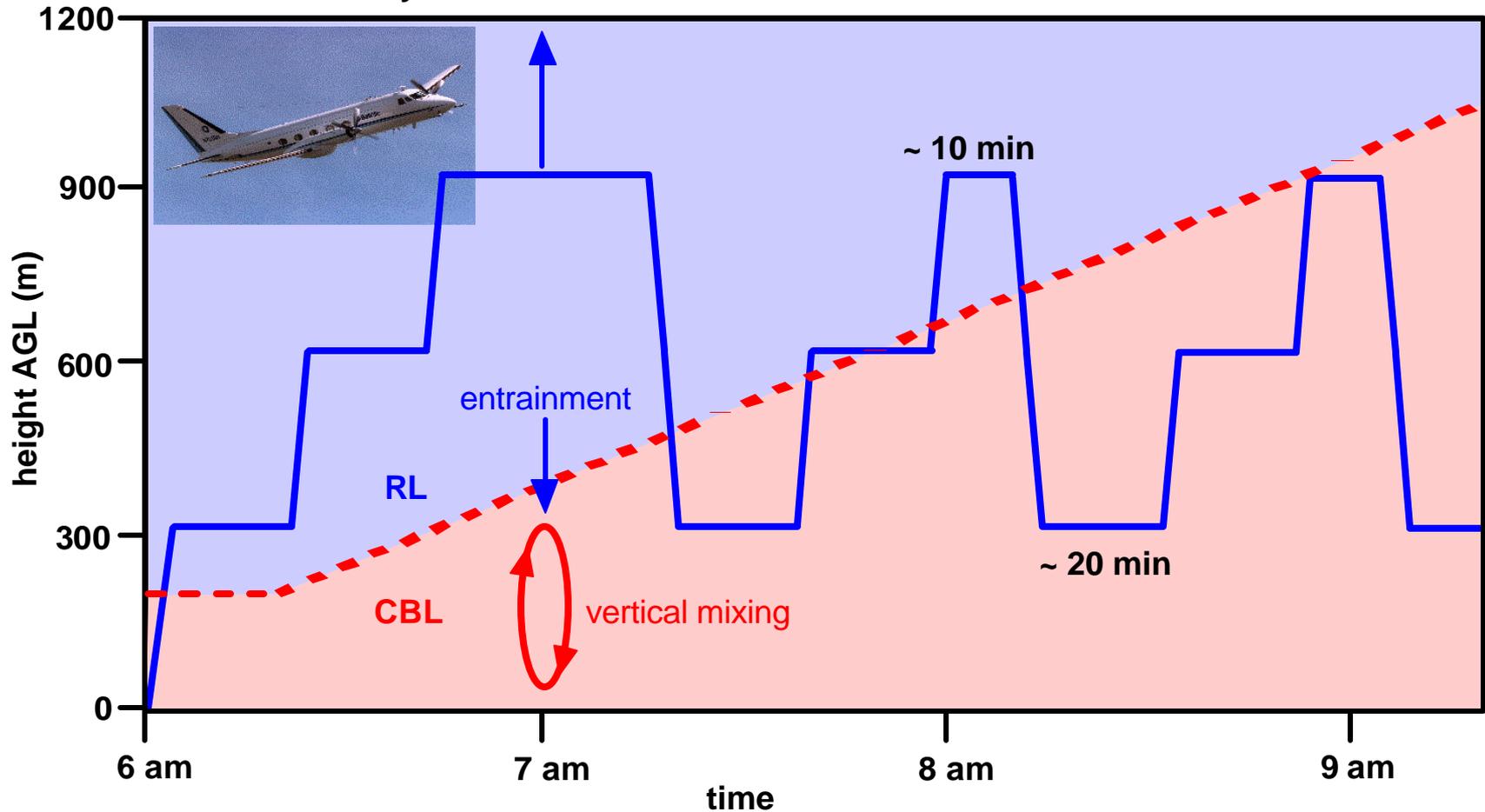


- chemistry
- Observation deck: ~ 140 m AGL
- O₃, NO, NO_y, CO, PAN, nephelometer, NO₃
- VOC canisters
- DOAS: O₃, SO₂, NO₂, HCHO, HONO, NO₃
- total reflection X-ray fluorescence spectrometer - aerosol composition

- Utility Rooms: ~ 50 m AGL
- O₃, NO, NO_y, CO, PAN, HONO, HNO₃, HCHO, nephelometer
- VOC canisters
- ion-trap mass spectrometer

Aircraft Measurements

O₃, NO, NO_y, CO, VOC canisters, + meteorology



13 flights, 1 per day, between 14 June and 30 June

