

AQRP Monthly Technical Report

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| PROJECT TITLE | Characterization of Boundary-Layer Meteorology During DISCOVER-AQ Using Radar Wind Profiler and Balloon Sounding Measurements | PROJECT # | 14-006 |
| PROJECT PARTICIPANTS | Sonoma Technology, Inc., and Gary Morris (St. Edwards University) | DATE SUBMITTED | 5/8/2015 |
| REPORTING PERIOD | From: April 1, 2015 To: April 30, 2015 | REPORT # | 11 |

A Financial Status Report (FSR) and Invoice will be submitted separately from each of the Project Participants reflecting charges for this Reporting Period. I understand that the FSR and Invoice are due to the AQRP by the 15th of the month following the reporting period shown above.

Detailed Accomplishments by Task

Task 1: Characterize the Atmospheric Boundary Layer

- Completed documenting analyses from characterization of atmospheric boundary layer during DISCOVER-AQ in draft report.

Task 2: Determine Representativeness of Meteorological Conditions

- Completed documenting comparisons of meteorological conditions on high ozone days during DISCOVER-AQ to high ozone days during the Tex-AQS II study period.

Task 3: Derive and Deliver Continuous Mixing Heights

- No activities performed on this task.

Preliminary Analysis

The meteorological conditions observed during the DISCOVER-AQ period can be grouped into one of two general weather regimes:

1. Deep onshore flow, driven synoptically and/or driven locally by a sea breeze from Galveston Bay (Bay breeze) or the Gulf of Mexico (Gulf breeze). Ozone levels in Houston were typically lower on the days with sea breezes due to increased pollutant dispersion, transport of cleaner maritime air into the region, and cloud cover.
2. Light synoptic offshore or shore-parallel flow during the morning hours and a shallow light-to-moderate afternoon Gulf and/or Bay breeze. Ozone levels in Houston were typically higher on these days due to reduced horizontal and vertical pollutant dispersion, transport of polluted continental air into the region, and reduced cloud cover. Ozone levels were typically highest on days when the Gulf and/or Bay breeze was weak and did not develop until late in the afternoon. Ozone levels were also typically higher on the north side of Houston when onshore flow was stronger, and higher in central Houston and on the south side of Houston when onshore flow was comparatively weaker.

Comparison of DISCOVER-AQ and TexAQS-II study days:

In general, meteorological conditions during the 10 TexAQS-II study days featured weaker onshore winds and higher ozone levels compared to conditions on most of the DISCOVER-AQ study days. An important distinction between the two studies in this analysis is the fact that the DISCOVER-AQ study days were later in the year (late August-early October) compared to the TexAQS-II study days (late June-early September). Thus, in general, upper-level heights were lower, surface pressure gradients were stronger, and mixing heights were lower during the DISCOVER-AQ study days, as would generally be expected across the southern and southeastern U.S. during late summer and early fall.

Similar to findings from the TexAQS-II study period, ozone levels were highest in the Houston area on days with generally light winds through the depth of the boundary layer and a gradual shift in winds from light offshore (land breeze) during the overnight and morning, to light easterly/onshore (Bay breeze) during the late-morning and early-afternoon, and then light to moderate southeasterly/onshore (Gulf breeze) during the late-afternoon and evening.

Data Collected this Period

Not applicable.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments

Not applicable.

Goals and Anticipated Issues for the Succeeding Reporting Period

During the month of May 2015, we will deliver the draft final report on our analyses.

Detailed Analysis of the Progress of the Task Order to Date

We have completed analysis work and documentation for Tasks 1 and 2 and are performing internal review of the draft final report. No major technical or data quality issues have arisen regarding the air quality and meteorological data that have been collected thus far, aside from five ozonesonde launches that experienced data loss and some data processing issues with profiler data from the Univ. of Houston Coastal Center. The budget for this Task Order remains on track.

Submitted to AQRP by: Daniel M. Alrick

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