

## AQRP Monthly Technical Report

<b>PROJECT TITLE</b>	Characterization of Boundary-Layer Meteorology During DISCOVER-AQ Using Radar Wind Profiler and Balloon Sounding Measurements	<b>PROJECT #</b>	14-006
<b>PROJECT PARTICIPANTS</b>	Sonoma Technology, Inc., and Gary Morris (St. Edwards University)	<b>DATE SUBMITTED</b>	6/2/2015
<b>REPORTING PERIOD</b>	<b>From:</b> May 1, 2015 <b>To:</b> May 31, 2015	<b>REPORT #</b>	12

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 15<sup>th</sup> 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.
- Delivered a draft final report summarizing the analyses and conclusions.
- Began edits to the draft final 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.
- Delivered a draft final report summarizing the analyses and conclusions.
- Began edits to the draft final report.

Task 3: Derive and Deliver Continuous Mixing Heights

- No activities performed on this task.

### Preliminary Analysis

A summary of key findings from our analyses is provided below.

- Two general meteorological regimes were identified during the DISCOVER-AQ period: 1) Deep onshore flow (southeasterly winds, blowing from water to land) with lower ozone concentrations, and 2) Weak offshore flow (northerly or northeasterly winds, blowing from land to water) and complex local flows with higher ozone concentrations.
- In agreement with previous analyses, the highest ozone concentrations occurred during periods of weak offshore flow, typically following the passage of a surface cold front. In these cases, the location of highest ozone concentrations in the Houston area is related to the strength, inland progression, and interaction of the Bay breeze (easterly winds from Galveston Bay) and Gulf breeze (southeasterly winds from the Gulf of Mexico). Two

such events were identified during the time period analyzed in this report: September 25 and October 8, 2013.

- On high ozone days, mixing heights were typically low (at or below 500 m) at coastal and inland locations during the early- to mid-morning hours, before increasing rapidly to near 2000 m inland during the late-morning and early-afternoon hours while remaining steady at the coast. In contrast, mixing heights on low ozone days showed less diurnal and spatial variation. The mixing height is the height in the atmosphere from the ground to which turbulence/mixing causes atmospheric features (such as winds, moisture, and air pollutants) to be relatively uniform.
- Surface ozone concentrations were more spatially and diurnally variable on high ozone days compared to low ozone days, due to the presence of complex, local wind patterns.

#### **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 June 2015, we will make edits to the draft final report, complete and deliver the final report, and present our findings at the AQRP Workshop in Austin.

#### **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 currently working on edits to the final draft 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.

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