AQRP Monthly Technical Report

PROJECT TITLE	Impact of large-scale circulation patterns on surface ozone concentrations in Houston-Galveston-Brazoria (HGB)	**PROJECT #**	14-010
PROJECT PARTICIPANTS	Texas A&M University at Galveston	**DATE SUBMITTED**	3/9/2015
REPORTING PERIOD	**From:** February 1, 2015 **To:** February 28, 2015	**REPORT #**	2

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 *(Include all Task actions conducted during the reporting month.)*

Task 1: We have collected all the datasets we need for the preliminary analysis, including observational data and reanalysis data.

Using the data collected, we have started preliminary analyses of the MDA8 ozone variability over HGB (Fig 2), interannual variations of the longitude of the west edge of the Bermuda High (BH) (Fig 3) and Bermuda High index (BHI) (Fig 4). The longitude of the west edge of Bermuda High is defined as the cross point of the 1560-gpm isoline and the 850 hPa wind ridge line (Li et al., 2011); BHI is defined as the difference of regional mean SLP between the Gulf of Mexico (25.3°-29.3°N, 95°-90°W) and the southern Great Plains (35°-39°N, 105.5°-100°W) (Zhu et al., 2012).

Task 2: Not started.

Task 3: The set up of GEOS-Chem on the supercomputer of Tamu (eos) is on-going.

Preliminary Analysis

The spatial distribution of multi-year mean surface ozone concentrations during the ozone season is shown in Figure 1.

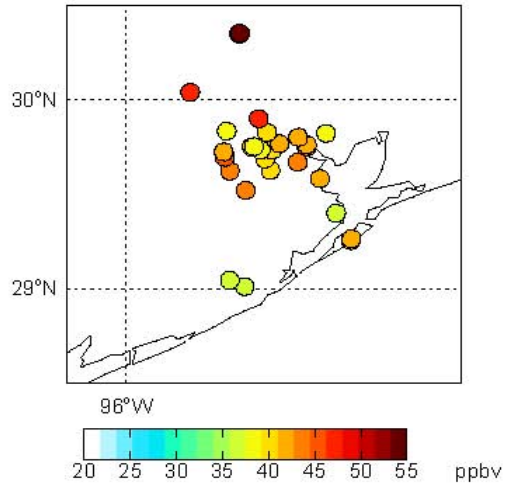

Figure 1. Spatial distribution of multi-year mean (1998 to 2013) surface ozone concentrations during the ozone season (May 1 – October 31) at selected sites over HGB.

The ozone-season (May to October) mean ozone surface concentration over HGB is shown in Figure 2. The detrended time series are obtained by subtracting the linear trend from the raw data.

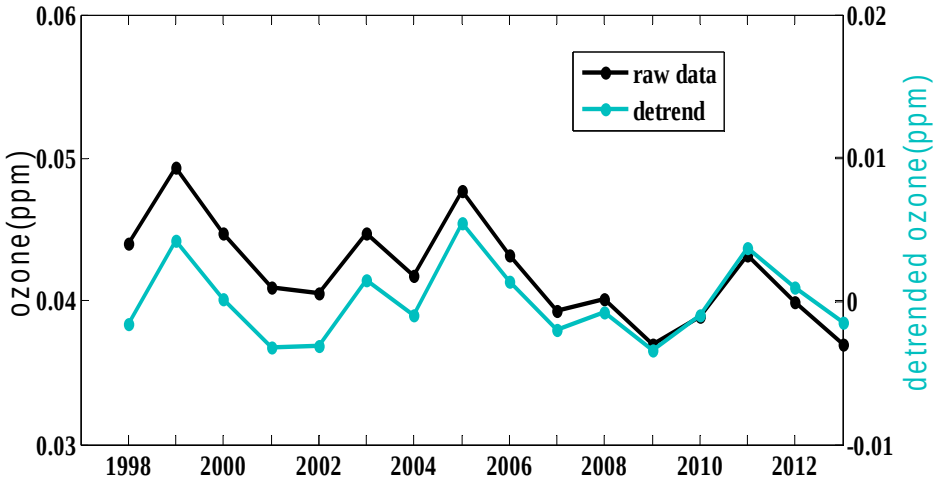

Figure 2. Time series of HGB spatial mean surface ozone concentrations (ppm) and detrended surface ozone concentration during the ozone season.

The following Figures 3-4 display the interannual variability of two different indices relating to the Bermuda High variability according to the definitions described above. The NCEP reanalysis data are used to generate these plots.

Preliminary analysis of Figure 1 to Figure 3 reveals that a higher surface ozone concentration is often companied with a more eastern location of the west edge of Bermuda High (e.g., 1999, 2005 and 2011). The BHI has a smaller value in 1999 and 2005, indicating a weaker Bermuda High of these two years, but the BHI in 2011 has a large value. In-depth analysis will be conducted in the succeeding report.

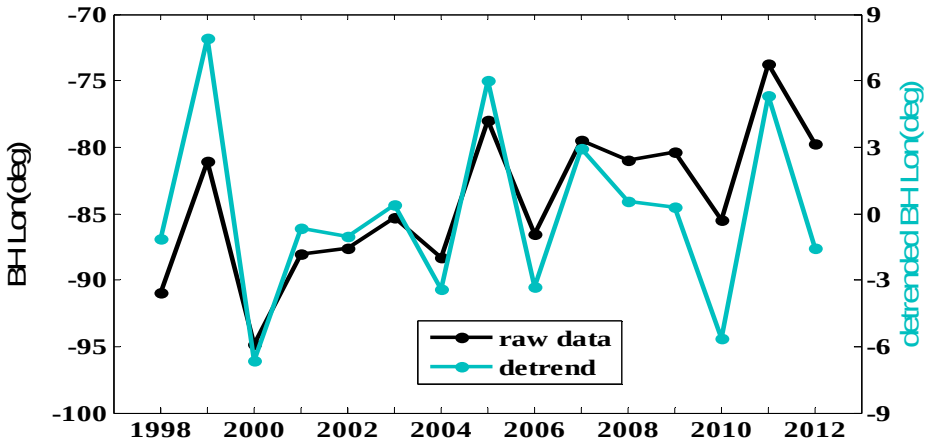

Figure 3. Time series of the longitude of the west edge of Bermuda High (raw data and detrended data, deg).

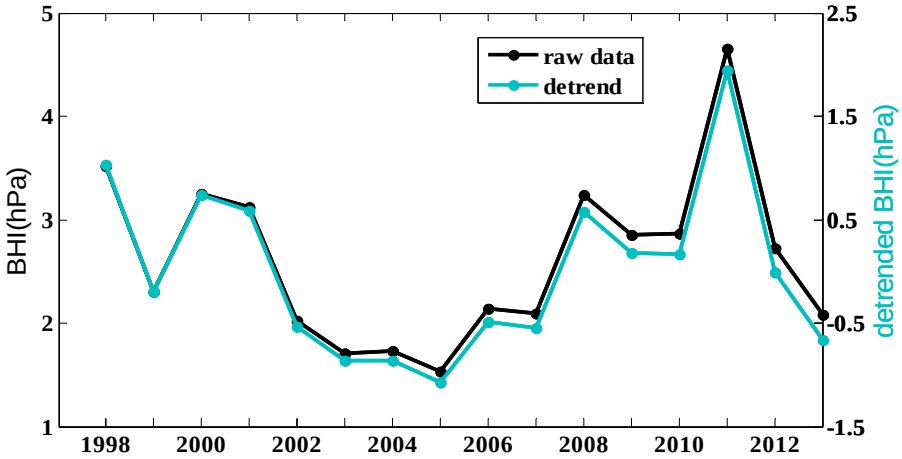

Figure 4. Time series of BHI (raw data and detrended data, hPa).

Data Collected
On-going collection of data used to run GEOS-Chem.

Identify Problems or Issues Encountered and Proposed Solutions or Adjustments
None this period.

Goals and Anticipated Issues for the Succeeding Reporting Period
We will continue to focus on characterizing the effects of BH on surface O_3 variations in HGB on different time scales from interannual to monthly. In addition, work will continue on setting up GEOS-Chem on eos.

Detailed Analysis of the Progress of the Task Order to Date*(Discuss the Task Order schedule, progress being made toward goals of the Work Plan, explanation for any delays in completing tasks and/or project goals. Provide justification for any milestones completed more than one (1) month later than projected.)*
Progress on the project is ongoing.

Submitted to AQRP by:

Principal Investigator: Yuxuan Wang

References

Li, W., L. Li, R. Fu, Y. Deng, and H. Wang, 2011: Changes to the North Atlantic subtropical high and its role in the intensification of summer rainfall variability in the southeastern United States. J. Climate, 24, 1499–1506

Zhu, J., and X.-Z. Liang, 2013: Impacts of the Bermuda High on Regional Climate and Ozone over the United States, Journal of Climate, 26, 1018-1032, doi: 10.1175/JCLI-D-12-00168.1