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Final Report
Real-Time Trajectory Analysis Operation and Tool Development

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EXECUTIVE SUMMARY

Trajectory models are often used to establish source-receptor relationships of air pollutants. Such a model allows the Texas Commission for Environmental Quality (TCEQ) to target ozone control strategies more efficiently by locating sources of emissions that most likely cause high ozone problems in the Houston-Galveston area (HGA). This trajectory tool can be used to identify the sources along the trajectory paths to study if there are upset or other emissions events that might have contributed to the rapid development of high ozone concentrations.

The real-time trajectory analysis tool can make use of the real-time continuous air monitoring site (CAMS) data to produce quick and more accurate trajectories when combined with meteorological model output. To facilitate TCEQ's air pollution source apportionment study, the UH Institute for Multidimensional Air Quality Studies (IMAQS) has developed a new trajectory system, called the Real-time Trajectory Analysis System (RTAS). The major function of this system is to generate 12-hour backward trajectories for Southern Texas four times a day in a near real time mode. For calculating trajectories, the system downloads NCEP ETA reanalysis grid data (EDAS) and other available observations including CAMS data produced by the TCEQ. The trajectory results are automatically provided to the public through its web page. In addition, a web-based user interface has been built to allow users to construct backward trajectories in (near) real time made. This web-based user interface utilities wind fields archived during the operation of the RTAS. The interactive web-interface of UH RTAS is called the Real-time Interactive Trajectory System (RITS) and through it user's inputs are collected to construct the trajectories.

To understand the source-receptor relationships, not only the graphical representations of the trajectories are useful. Statistical estimates characterizing the behavior and quality of the trajectories may be also useful. To quantify behavior of trajectory clusters, we have devised two parameters. They include stagnation potential (SP) and trajectory travel time (T_{travel}). They are analogous to Schichtel's accumulation potential (AP) and trajectory residence time (T_{res})**.** The spatial plots of these fields reveal frequency and arrival time of air parcels that originated in different source regions.

This final report serves also as the User's Guide and Installation Document for the RTAS and RITS trajectory modeling system and user interface.