



FRD ACTIVITIES REPORT

March 2005



Research Programs

New York City Urban Dispersion Program

Kirk Clawson participated in the first field test of the Urban Dispersion Program in New York City using perfluorocarbon tracers. While there, he met with other principal investigators of the UDP program in an impromptu planning meeting that included FRD former employee, Tom Watson. The planned August three-week field deployment is beginning to appear doubtful, as no funds have been forthcoming from DHS. However, seed money was obtained to conduct a limited background SF₆ study in NYC in the upcoming month. (Kirk Clawson, 208-526-2742)

During April, a preliminary test involving a limited number of samplers will be conducted in the proposed UDP study area to quantify the background SF₆ concentration. In preparation for this, samplers, cartridges and necessary equipment have been assembled. The cartridges have been cleaned and tested, and the samplers tested for proper operation. (Roger Carter 208-526-2745, Vance Hawley, Debbie Lacroix)

Five separate tests of the software upgrade for the Programmable Integrating Gas Samplers (PIGS) have been conducted. The downloaders, samplers and analysis software all worked correctly with no problems. The samplers all operated properly and the correct times and locations were associated with each sample during analysis. There was one problem with the software that initializes the downloaders, but we have not been able to re-create it. The tests also provided valuable insights into the operation of the PIGS in high concentrations of tracer. This information will help us design sampling procedures and quality control procedures that are more appropriate for studies in urban and indoor settings. We plan a few more follow-on tests that will be focused on providing additional information in this area. (Roger Carter 208-526-2745, Vance Hawley, Debbie Lacroix)

The Automated Tracer Gas Analysis System (ATGAS) is undergoing a major software upgrade to enable it to simultaneously analyze for multiple tracers. The ATGAS was designed primarily for high throughput and automated sample handling which are absolutely essential in large tracer field studies. In keeping with this philosophy, the software was implemented to analyze for only one tracer. This approach provided for simpler and more efficient implementation and operation. Although it was designed to be expanded, a significant upgrade is required to support multiple tracers. Several key components have been upgraded and are operational, but a number of processing programs need to be modified to recognize and appropriately handle the multiple tracers. Completion of the upgrade is anticipated in May. (Roger Carter 208-526-2745)

Three perfluorocarbon tracer (PFT) standards arrived from Scott-Marrin at the end of this month. The concentrations were 163.3 ppt, 420 ppt, and 888 ppt of perfluorodimethyl-cyclobutane

(PDCB) . Initial detection studies have been inconclusive due to some injections resulting in large peaks and some resulting in no peaks. Flow rates, oven temperatures, make-up gas introduction, and sample loop size are being varied to allow for the greatest peak separation to ensure that there is no peak overlap between injections and to create the largest peak heights. The initial studies show the separation of three PDCB isomers as seen in Fig. 1 with peaks at 1 min. 58 sec, 2 min. 1 sec, and 2 min. 6 sec. The peak at 27 seconds is most likely an oxygen peak. (Debbie Lacroix 208-526-9997)



Figure 1. PDCB at about 2 minutes retention.

ET Probe

Further investigations were made during March in comparing the ET probe with the Gill sonic anemometer during the road tests performed in 2004. There is considerable scatter from one road test to another, but there does seem to be a slight positive bias (on the order of 1-2%) of the ET probe's wind speed compared with the sonic. This suggests that a small empirical adjustment may be required to the dynamic pressure obtained from the ET probe. However, there are some complicating factors that could affect the data interpretation. For example, the ET probe was mounted on the driver's side of the pickup truck, so it may have been more affected by turbulence shed by vehicles passing in the opposite direction. It may be necessary to eventually place the ET probe in a wind tunnel to come up with unambiguous empirical adjustments.

Preparations were completed in late March for a CBLAST workshop taking place in Miami in early April. A 15-minute presentation describing the ET probe data collected during the 2004 hurricane season will be given at the workshop. This year, the CBLAST workshop will include some of the other groups that have deployed teams in landfalling hurricanes, including Dr. John Schroeder's group at Texas Tech University. (Richard Eckman, 208-526-2740)

Smart Balloon

Side by side tests were conducted to compare the performance of the smart balloon transponder and sensors against the Idaho Falls meteorological station. The Idaho Falls station, which is referred to as the reference, uses a full-sized aspirator, a Vaisala HMP45 temperature and relative humidity sensor, a Vaisala PTB101B barometric pressure transducer, and a Licor LI-200SZ pyranometer. Overall the results show good tracking on all of the sensors and accuracy seems to be very close except for the solar pyranometer (Fig. 2). Further testing will be done on the solar pyranometer to resolve this difference. (Randy Johnson 208-526-2129, Shane Beard)

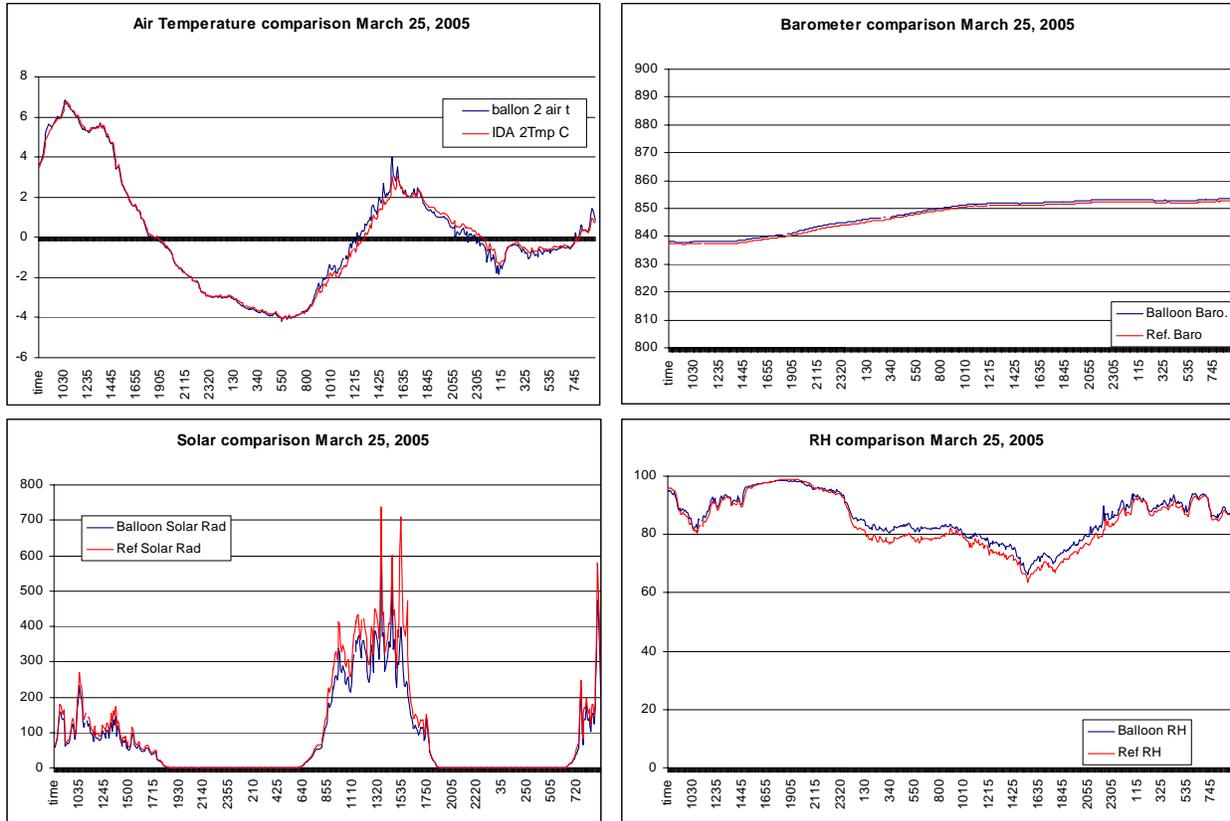


Figure 2. Comparisons of the sensors on the smart balloon transponder with the sensors from Idaho Falls meteorological station.

Pentagon Shield

News was received this month that there is a possibility of a second Pentagon Shield study to be conducted in November of this year. Details are still sketchy, but this is much more planning time than was provided for the first field deployment in May of last year. (Kirk Clawson, 208-526-2742)

Cooperative Research with DOE NE-ID (Idaho National Laboratory)

INL Drills, Exercises, and Emergencies

An assessment specialist meeting was held at the EOC on 24 March. Together the team held a table-top drill to foster cooperation among the various subject matter experts in the EOC, including the subject matter of meteorology as provided by FRD. The table-top scenario was centered around the breach of an Argonne cell at the Fuel Conditioning Facility (FCF) on the INL. (Jason Rich 208-526-9513)

Team D attended their EOC requalification drill for 2005 on 30 March. The drill dealt with the collision of a passenger van with a truck containing hydrogen peroxide. The location of the spill

was between TAN and NRF. The drill went smoothly with FRD employees using the MDIFF transport and dispersion model and current meteorological conditions to provide simulated evacuation support to the Emergency Director. (Debbie Lacroix 208-526-9997, Jason Rich)

Transport and Dispersion Modeling

To estimate radiological doses, the MDIFF puff model relies on a set of conversion coefficients supplied by the INL contractor. These are derived from another model called RSAC. In the past, these RSAC conversion coefficients were updated infrequently, but INL plans to start updating them on a quarterly basis. This will likely require some modifications to INLViz, since INLViz currently requires manual recoding each time the conversion coefficients are modified. With quarterly updates, it will be desirable to modify the INLViz code to better automate the updates of the RSAC coefficients. To ensure that the new RSAC coefficients are compatible with MDIFF, INL recently sent a test sample of the new coefficients to FRD. These were successfully tested with the existing MDIFF model. (Richard Eckman, 208-526-2740, and Brad Reese)

Other Activities

Safety

The video “Back Safety” from the National Safety Council was shown at the monthly staff meeting. (Debbie Lacroix 208-526-9997)

Travel

Kirk Clawson, March 7-11, to Washington, DC, to meet with ARL management to discuss the Core Competencies Review Team Report, and to New York City, to participate in the first field test of the Urban Dispersion Program and attend a UDP planning meeting.