**GACP THIRD YEAR PROGRESS REPORT**

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*Goal of Proposed Work*

The goal for submitting this work was to supplement work with inflight, vicarious calibration for the Landsat-7, ASTER, and MODIS Science Teams. The work with ETM+ and ASTER also included research on atmospheric correction. As part of the above research, the Remote Sensing Group (RSG) has been involved with ground-based retrievals of aerosol parameters for over 10 years through ground-based, radiometers looking at directly-transmitted solar energy and downwelling skylight. The RSG has a history of developing instrumentation as well as the processing software to determine aerosol size distribution, scattering phase function, and columnar amounts of ozone and water vapor. In addition, the group has one of the AERONET solar radiometers. The goal was to use membership on the science team as a means for keeping abreast of recent work in aerosol remote sensing and developing new techniques for improving the accuracy of radiance validation and vicarious calibration methods.

*Tasks Completed*

During the period of funding of this work, several activities were undertaken solely as part of work with the Global Aerosol Climatology Project (GACP) through funding of this letter proposal. In addition, funding through a joint project with John Reagan of the Electrical and Computer Engineering Department at the University of Arizona and funding from other relevant work as parts of other NASA projects allowed for additional work. Much of this additional work is described in the final GACP report by J. Reagan. Activities of note directly funded under this project include:

— Purchase of several diode-based solar radiometer kits based on the design of Mims. This work gave several students in the RSG experience in instrument fabrication, testing, and evaluation. This work also led to the inclusion of these radiometers in the curriculum of the atmospheric remote sensing course taught by Reagan and Thome. The course will include software developed by a visiting student from Mexico whose visit was funded separately, but whose work in the RSG has been related to this GACP project.

— A Cimel solar radiometer that was installed in February 1999 on the University of Arizona campus for inclusion in the AERONET was cross-compared to a 10-channel solar radiometer developed at the University of Arizona. The data from the 10-channel instrument, while not collected throughout the entire day, were collected at much higher temporal resolution than the Cimel system with the goal of eventually studying short term variability of aerosols in the Tucson Valley. Results of the data collections show good agreement between the two systems in retrieving optical depth, though the agreement varies from day to day with differences as large as 0.02 for an optical thickness of 0.10. Considering that the results are using two independently

calibrated systems, no common calibration data sets, and different processing schemes, the agreement is quite good.

— Proximity of the joint Cimel and 10-channel data collections to the radiosonde site at the Tucson International Airport (approximately 10 km from the radiometers) allowed for evaluation of column water vapor retrievals. Again, the agreement between the radiometers is quite good with differences for the most part being less than 10%. Comparison with the radiosonde results also show relatively good agreement.

— Regular sampling of atmospheric aerosols at the RSG laboratory was begun in March 1999 with collections being made on every day it was possible to track the sun with the automated radiometer and personnel were available to set up the equipment. This resulted in more than 100 data sets ending December 1999.

— GACP funds allowed the placement of the RSG's Aeronet Cimel at Railroad Valley Playa which is one of the core validation sites for NASA's EOS program. The instrument is currently operating at this site alongside a meteorological station deployed as part of other projects. The sensor has been operating since late June 2001 and has been used to provide additional aerosol information for three vicarious calibration campaigns of the RSG. Work is currently underway to use the data for cross-calibration studies between MODIS, ASTER, and ETM+.

— Attendance at Science Team meetings in November 1998, October 1999, and October 2000. The second Science Team meeting included presentation of a joint poster with J. Reagan as part of his funded activities under the GACP Science Team. A student was funded to present a poster at the Fall 1999 AGU meeting in San Francisco where she also attended the GACP Science Team breakout session.

*Project Results Highlights*

1) Deployment of Cimel solar radiometer to the Railroad Valley Playa EOS Core Validation site.

2) Demonstration of agreement between optical depths and columnar water vapor derived from Cimel solar radiometer and an independently calibrated 10-channel solar radiometer.

3) Development of a partial curriculum for an atmospheric remote sensing course including diode-based solar radiometers.

*GACP Bibliography*

Publications under this work have also been funded through joint work with J. Reagan and have been included under the bibliography of that project.