



J-31 INTEX-B/MILAGRO Mission

In February and March 2006, as part of the INTEX-B/MILAGRO (Intercontinental Chemical Transport Experiment/Megacity Initiative; Local and Global Research Observations) mission, the Sky Research Jetstream 31, loaded with a suite of atmospheric science equipment, deployed to Veracruz, Mexico to measure the properties and radiative effects of aerosols, water vapor, clouds and surfaces.

The specific goals of the mission were to:

- Characterize the distributions, properties, and effects of aerosols and water vapor advecting from Mexico City and biomass fires toward and over the Gulf of Mexico, including, aerosol optical depth and extinction spectra.
- Test the ability of Aura, other A-Train and Terra sensors, and airborne lidar to retrieve aerosol, cloud and water vapor properties.
- Characterize surface spectral albedo and bidirectional reflectance distribution function (BRDF) to help improve satellite retrievals.
- Quantify the relationships between the above and aerosol amounts and types.

To meet the above science goals, the J-31 carried a payload comprised of the following six instruments:

- Ames Airborne Tracking Sunphotometer (AATS-14), PI: Dr. Jens Redemann
- Solar Spectral Flux Radiometer (SSFR), PIs: Dr. Peter Pilewskie and Dr. Sebastian Schmidt
- Research Scanning Polarimeter (RSP), PI: Dr. Brian Cairns
- Cloud Absorption Radiometer (CAR), PIs Dr. Charles Gatebe and Dr. Michael King
- Position and Orientation System (POS), PI: Rose Dominguez
- Meteorological Sensors and Nav/Met Data System (Nav/Met), PI: Warren Gore



Sky Research J-31 aircraft on the ramp at the General Heriberto Jara International airport, Veracruz, Mexico.



Science flight planning meeting at the MILAGRO Operations Center in Veracruz.

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The Earth Science Division played a major role in this deployment. The J-31 Lead Principal Investigator, Dr. Phil Russell, led the instrument PIs in developing a consensus set of science goals. He coordinated flight planning, including appointment of Flight Scientists. Ames provided three of the six instruments on-board the J-31, and monitored instrument integration by Sky Research, including the new installation of the CAR instrument on the nose of the aircraft. The Earth Science Project Office in SG managed the deployment to Veracruz, and worked with Mexican officials for all aspects of the deployment, including permits, shipping, visas, accommodations, security, ground support, etc.

Planning of this mission was a complex endeavor, requiring close coordination with the many MILAGRO science and operations groups. The J-31 team had to not only balance science flight objectives among the on-board instruments, but also had to coordinate flight plans with the other five U.S. aircraft participating in the campaign (along with additional ground elements), Mexican airspace air traffic restrictions, and coordinate with defined satellite overpass times. Continuously changing conditions over both Mexico City and the Gulf of Mexico required frequent changes to flight paths to maximize science data return. In all, measurements were made on thirteen successful flights out of Veracruz over a three-week deployment period.

Review of the science data is now underway, including comparisons of aerosol optical depth (AOD) values from the J-31 sunphotometer (AATS) to those from the OMI and MODIS satellite instruments. Data are being archived in the INTEX-B archive at NASA Langley. Preliminary science results were presented at the first MILAGRO science meeting in Boulder, CO in October 2006, and further science results will be presented at the Fall 2006 AGU meeting in San Francisco in December and the INTEX-B science meeting in March 2006. Special sessions on INTEX-B/MILAGRO are planned for the Fall 2007 AGU meeting in San Francisco.

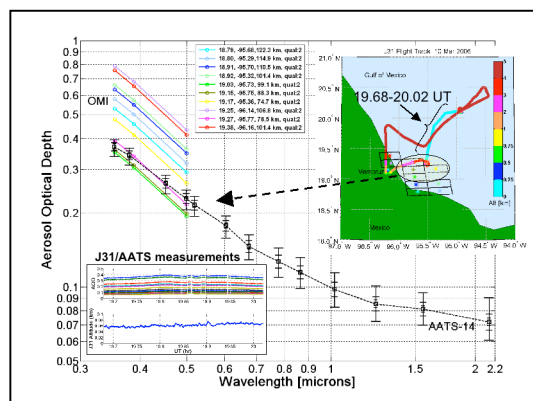
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J-31 flight over Mexico City metropolitan area showing local haze and pollution. March 6, 2006.



Comparison of OMI and AATS Aerosol Optical Depth. Corresponding J-31 flight track is shown.

