MISR Goals for INTEX-B/MIRAGE/MILAGRO 2006

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The Multi-Angle Imaging SpectroRadiometer (MISR; http://www-misr.jpl.nasa.gov) flies aboard the NASA Earth Observing System's Terra satellite, in a sun-synchronous polar orbit. MISR has nine Earth-viewing cameras, pointed at angles ranging from 70˚ forward, through nadir, to 70˚ aft, in the plane of the orbit, each with four spectral bands (446, 558, 672, and 866 nm), for a total of 36 channels. The data contain information about clouds, aerosols, and Earth's surface. For aerosols, MISR algorithms retrieve column aerosol optical depth (AOT) over land and water, some constraints on column-average particle size, shape, and single-scattering albedo (SSA), and near well-defined aerosol source plumes, the plume-top elevation.

Field campaigns play a central role in refining and validating the MISR aerosol algorithms, and of particular importance currently is a gap in our validation data for urban pollution particle types over land and water. The MISR effort for INTEX-B/MIRAGE/MILAGRO is supported by NASA's Earth Atmospheric Radiation and Composition programs, as well as by the EOS MISR Project. We have two major goals for this campaign:

1. We aim to validate MISR aerosol retrievals of urban and industrial pollution Particle Optical Depth and Microphysical Properties (size, SSA, shape) over land and water. This will be our first opportunity to perform detailed validation for this important aerosol type. To achieve this goal, we aim to obtain "Environmental Snapshots" during at least two MISR over-flights, if possible. During INTEX-A we had two Golden Days, for which our aggregate of experimenters characterized total column spectral AOT, extinction and scattering profiles, layer-by-layer aerosol microphysical properties (size, SSA, shape) from in situ measurements, and surface reflectivity or BRDF. During ACE-Asia, we had five such events. If successful at INTEX-B/MIRAGE/MILAGRO, it will lead to quantitative error bars on our aerosol products for urban and industrial pollution cases, and could lead to refinements of the MISR retrieval algorithm itself. This kind of analysis is a highly collaborative scientific activity (our papers often have 20 or more co-authors).

2. We plan to contribute, to the overall Campaign, regional maps of AOT, particle properties, and where possible, cloud and aerosol plume heights, about 400 km wide, for MISR over-flight events. These can be used to assess the relationships among sub-orbital measurements taken on different platforms, to put aerosol gradients and trends into regional context, to study, with the help of more detailed sub-orbital measurements, the evolution of particle properties from the source region downwind, and to initialize or validate aerosol transport models. The range of mission-targeted products we provide (e.g., region-specific maps, time-series from previous years), the associated analysis we can perform during the campaign (e.g., Research Aerosol Retrieval runs to provide more detailed analysis, and specialized plume height products) and the speed with which these products can be made available (ranging from 24 to 48 hours, on average, based on past experience), will depend upon available resources.

Our focus will be on the first part of the INTEX-B program, and I plan to be in Veracruz for much or all of my field deployment, but we will also contribute what we can to the Anchorage and Hawaii components of the campaign, as resources allow.