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Coincident airborne sunphotometer and satellite aerosol optical depth measurements during INTEX/ITCT 2004

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The NASA Ames 14-channel Airborne Tracking Sunphotometer (AATS-14) measures the direct solar beam transmission at 14 discrete wavelengths (354-2138 nm), and provides instantaneous measurements of aerosol optical depth (AOD) spectra and water vapor column content, in addition to vertical profiles of aerosol extinction and water vapor density during suitable aircraft ascents and descents. During the period 12 July – 8 August 2004, AATS-14 was operated aboard a Jetstream 31 (J31) aircraft and acquired measurements during 19 science flights ($\sim$53 flight hours) over the Gulf of Maine in support of the INTEX-NA (INtercontinental chemical Transport EXperiment-North America) and ITCT (Intercontinental Transport and Chemical Transformation of anthropogenic pollution) field studies.

Because J31 measurements during INTEX/ITCT targeted a variety of science objectives, specific J31 flight patterns were designed to achieve these goals and included a mixture of vertical profiles (spiral and ramped ascents and descents) and constant altitude horizontal transects at a variety of altitudes. One of the primary objectives of the AATS-14 measurements was to provide data for evaluation of aerosol optical depth retrievals derived from coincident measurements by the MODIS (MODerate-resolution

Imaging Spectroradiometer) and MISR (Multi-angle Imaging Spectro-Radiometer) satellite sensors. To accommodate these AATS-14 measurements, most J31 flights were designed to include a near sea surface horizontal transect in a region of minimal cloud cover during or near the time of an Aqua (MODIS) and/or a Terra (MODIS and MISR) satellite overpass.

During INTEX/ITCT, fourteen J31 flights included segments that were temporally and/or spatially near-coincident with a Terra or an Aqua satellite overpass. In this paper, we compare the AATS-14 and satellite sensor spectral AOD retrievals by examining spatial and temporal variability measured by AATS-14 along the J31 flight paths within the satellite sensor suborbital retrieval boxes. The Terra overpasses included four MISR local mode (high spatial resolution retrieval) events. Generally, retrievals of spatially coincident AOD from both MODIS and MISR during Terra overpass were generally not possible due to the effect of sun glint on the MODIS measurements. However, temporally and spatially coincident AATS-14, MODIS, and MISR AOD measurements were acquired during one overpass, and these analysis results will be highlighted.