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The interaction and relationship between atmospheric aerosols and ambient VOC concentrations is a current area of activity in atmospheric research both in urban and remote environments. Current atmospheric models seriously under predict the amount of secondary organic aerosol (SOA), highlighting the importance of simultaneous particle and VOC measurements and their importance to climate change models. The Cumulus Humilis Aerosol Processing Study (CHAPS) campaign was conducted in June of 2007 near Oklahoma City to investigate the mutual interaction of anthropogenic aerosols and clouds on each other. An important part of this study was characterizing the temporally and spatially resolved VOC environment in which urban aerosols and cumuliform clouds in the Oklahoma City environment exist. We report results from the proton transfer reaction mass spectrometer (PTR-MS) aboard the DOE Gulfstream 1 (G1) research aircraft to perform time-resolved measurements of the ambient VOC species and concentrations in conjunction with the suite of aerosol, trace gas and meteorological instruments aboard the G1. Several classes of VOC's were observed. Benzene, toluene, C2-benzenes and other species indicative of primary urban emissions were found in the Oklahoma City plume, strongly correlated with CO and other inorganic urban trace gases. Oxygenated species such as methanol, acetone and acetaldehyde were observed with no well defined spatial or temporal variation. Finally, species typical of biogenic emissions, isoprene and its oxidation products were seen in broad but definite spatial distributions, not correlated with the urban gas phase products as measured with the PTR-MS and other instrumentation. The concentration levels of these species and possible ground-based sources will be investigated and reported in this presentation. Correlation with aerosol instrumentation such as the Aerodyne aerosol mass spectrometer (AMS), nephelometer and other optical measurements will also be reported, both within and out of cloud environments. These correlations will be examined for possible influences of the local VOC species on the cloud-aerosol systems under study.