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**Ambient Hydrocarbons in the Houston Metropolitan Area During TexAQS 2000:
An Identification of Unusual Features**

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Abstract

Houston's ozone problem has been linked to the occurrence of very high light olefin concentrations. We have analyzed the DOE G-1 aircraft hydrocarbon data set to provide additional information on the geographic distribution and prevalence of air samples with high olefin concentration as well as an identification of other compounds which contribute to the high hydrocarbon reactivity in Houston. In order to identify high concentrations we need a definition of normal. For that purpose we use aircraft samples collected during a 1999 aircraft based field campaign in Philadelphia relying on the circumstance that the frequency distributions of NO_x and C_2H_2 in Philadelphia are nearly the same as in Houston. Comparison is made also with hydrocarbons collected in Phoenix which exhibit nearly the same NO_x and C_2H_2 frequency distribution as the other 2 cities, but in spite of that similarity have a much lower hydrocarbon reactivity. As in other studies we find that there is a subset of Houston hydrocarbon samples with very high OH-reactivity due to elevated concentrations of ethylene, propylene and less often butenes, including 1,3 butadiene. Although these samples stand out as being qualitatively different we present evidence that ethylene and propylene are significantly elevated in at least half of the Houston samples, covering a wide geographic area apart from the Ship Channel region. Frequency distributions for these compounds are log normal suggesting that Houston's atmosphere is a single entity rather than separate industrial and urban areas. The comparison between Houston and Philadelphia also identifies C_2 - C_5 alkanes, n-hexane, and benzene as having elevated concentrations. Emission reductions of these less reactive compounds sufficient to yield the concentrations observed in Philadelphia would have a minor effect on the most reactive samples, but about a 20% effect on samples with more typical (median) reactivity.