R. J. Yokelson - Field Measurements in Alaska and North Carolina (1997)

1997 Field Measurements in Alaska and North Carolina

* *Description* - Most of the fires in the US are due to prescribed burning in the southeast and most of the fires in the extratropical northern hemisphere occur in the boreal forest. The latter fires strongly influence the summertime atmospheric chemistry of the northern hemisphere. During 1997, we deployed our airborne FTIR (AFTIR) in North Carolina and Alaska as part of comprehensive, airborne, 3-D, chemical profiling of smoke plumes from single, large fires in tandem with detailed meteorological measurements. We used our AFTIR spectra to obtain concentrations for 15 of the most common species in smoke: water, carbon dioxide, carbon monoxide, methane, ozone, formaldehyde, acetic acid, formic acid, methanol, ethene, ethyne, nitric oxide, nitrogen dioxide, hydrogen cyanide, and ammonia. The Fire Chemistry Project of the US Forest Service provided GPS and wind speed measurements so we could precisely determine the age and chemical composition of the smoke to support development of smoke photochemistry models. A key result of these and our earlier lab-fire studies was the observation of many oxygenated organic compounds at emission ratios to CO that were up to 100 times greater than previously reported. These compounds are an important, previously overlooked source of HO2 and OH radicals in the plumes from all fires. These radicals have many important effects, which were explored in smoke photochemistry models (Mason et al., 2000).