

Dominant presence of oxygenated organic species in the remote southern Pacific troposphere

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Abstract

Oxygenated organic species are intimately involved with the fate of nitrogen oxides (NO_x) and hydrogen oxides (HO_x) which are necessary for tropospheric ozone formation. A recent airborne experiment (March-April 1999) focused over the southern hemisphere (SH) Pacific Ocean (PEM-Tropics B) provided a first opportunity for a detailed characterization of the oxygenated organic composition of the remote southern hemisphere troposphere. Three co-located multi-channel airborne instruments measured a dozen key oxygenated species (carbonyls, alcohols, organic nitrates, organic pernitrates, peroxides) along with a comprehensive suite of C_2 - C_8 nonmethane hydrocarbons (NMHC). These measurements reveal that in the tropical SH (0-30°S), oxygenated chemical abundances are extremely large and collectively are nearly five times those of NMHC. Even in the NH remote atmosphere their burden is equal to or greater than that of NHMC. The relatively uniform global distribution of oxygenates is indicative of the presence of large natural and distributed sources. A global 3-D model reflecting the present state of knowledge is unable to correctly simulate the atmospheric distribution and variability of several of these species.
