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Hydroperoxide measurements in the outflow of the Indian summer monsoon

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The general goal of the OMO (Oxidation Mechanism Observation) campaign was to investigate the influence of the Indian summer monsoon on the large-scale distribution of atmospheric pollution and the oxidation power of the atmosphere. For this purpose the hydroperoxides are of major interest. Here we investigate the composition of measured organic hydroperoxides in the outflow of the Indian summer monsoon and in background air masses. A threshold for CH_4 is used to differentiate between air masses influenced by the monsoon and background air. Simulations with the global circulation model EMAC indicate good agreement with the observations for H_2O_2 and MHP (methyl hydroperoxide) in background air masses. For monsoon-influenced air masses significant discrepancies between model simulations and observations are found for both compounds. Steady-state calculations of H_2O_2 based on measured HO_x show good correlation with the measured H_2O_2.

Estimates of MHP mixing ratios show that the composition of ROOH depends on the air mass origin. In air masses influenced by the Indian summer monsoon most of the measured ROOH cannot be accounted for MHP. The median of the unidentified hydroperoxide ($ROOH_{unknown}$) mixing ratio increases from 103 ppt in background air to 211 ppt in the outflow of the monsoon anticyclone, while neither H_2O_2 nor MHP show significant variations in both air masses (159 ppt for H_2O_2 in the background, 163 ppt in the monsoon-outflow, and 77 ppt and 68 ppt for MHP respectively).

The correlation with acetone indicates that PAA (peracetic acid) is most likely a component of $ROOH_{unknown}$ that increases in monsoon influenced air masses.