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Long term measurements and modelling of OH and HO_2 radicals at a tropical marine location

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The dominant fraction of global methane oxidation occurs in tropical marine regions. Thus understanding the processes controlling OH concentrations in these regions is important for understanding the concentrations of species such as CH_4 and O_3 and thus for our understanding of climate past, present and future.

Long-term measurements of OH, and the closely coupled HO_2 radical, were made using FAGE (Fluorescence Assay by Gas Expansion) at the Cape Verde Atmospheric Observatory (16.85 ^{o}N, 24.87 ^{o}W) on the island of Sao Vicente as part of the Seasonal Oxidant Study (SOS) in the tropical Atlantic during three distinct seasonal periods; SOS1 during February-March (generally dry with clear sky), in June during SOS2 (clear and dry), and SOS3 in September (some sustained periods of heavy rainfall). Preliminary data analysis suggests mean midday concentrations of OH were 3.6, 3.5 and 4.6 $\times$ 10^6 cm^{-3} for SOS1, 2 and 3, with corresponding mean HO_2 noontime concentrations of 1.8, 2.1 and 1.8 $\times$ 10^8 cm^{-3}.

The zero dimensional Dynamically Simple Model of Atmospheric Chemical Complexity (DSMACC), based on the Master Chemical Mechanism (MCM) and incorporating halogen chemistry and heterogeneous loss to aerosol surfaces, has been used to investigate the behaviour of OH and HO_2 during each campaign. Model calculations successfully replicate the relative diurnal trends of both OH and HO_2, but provide an overestimation in the concentration of both species, suggesting an overestimation of sources and/or an underprediction of sinks.

The role of different processes in controlling the OH and HO_2 budgets on different timescales will be discussed and compared to the GEOS-Chem global atmospheric chemistry transport model.