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SO2 MEASUREMENTS IN AMAZONIA AND ITS RELATIONSHIP WITH AEROSOL PROPERTIES

Atmospheric chemistry and the coupling between biogenic and anthropogenic emissions

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Sulfur dioxide (SO_2) is the predominantanthropogenic sulfur-containing air pollutant, resulting in acid precipitationand impacting soil, water and vegetation. It is also a precursor of sulfateaerosols and, together with amines and volatile organic compounds (VOCs), actsin the process of atmospheric new particle formation. In its turn, aerosolsinteract with solar radiation, with impacts over climate and cloudmicrophysics. In pristine Amazonian areas, SO_2 is produced throughthe oxidation of biogenic H_2S and DMS, emitted from soil and vegetation.The last SO_2 observations reported for pristine Amazonian areas arefrom the 1980's, indicating mixing ratios in the order of 20 ppt. Suchmeasurements are scarce, in part because of its challenging low mixing ratios. InAmazonian areas affected by biomass burning, reports from the 2000's have showedSO_2 in the order of 100 ppt. Since then, sprouting urbanization inthe Amazon region has brought changes to the atmospheric composition, justifyingthe need to further characterize SO_2 levels and its relationshipwith aerosol composition. Here we report SO_2 measurements from two distinctAmazonian sites: the first site is right in the outflow of Manaus city urbanplume (TIWA site); the second one is in a forest reservation in EasternAmazonia (tower site km67 in Pará State). Observations at the first siteindicated average SO_2 mixing ratios of 500 ppt, with peaks reaching upto 2 ppb. Simultaneous aerosol size distribution measurements showed a profusionof ultrafine particles (diameters below 30 nm), which is uncommon in Amazonianpristine areas. The combination of relatively high SO_2 levels with widespreadbiogenic VOCs like isoprene and monoterpenes, emitted from forest areas, may increasesignificantly secondary aerosol production. We discuss if SO_2 couldbe a limiting factor for the occurrence of new particle formation in pristineareas of Amazonia. Moreover, the relationship between SO_2 levels,aerosol composition and particle optical properties will be investigated.