



Inorganic aerosol composition in a tropical environment (Rondônia, Brazil): Intercomparison of integrating samplers with a real-time technique

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We have measured the concentrations of the water-soluble inorganic aerosol species ammonium (NH_4^+), nitrate (NO_3^-), chloride (Cl^-) and sulfate (SO_4^{2-}) at a pasture site in the Amazon Basin (Rondônia, Brazil) from Sept. to Nov. 2002 (LBA-SMOCC). Measurements covered the late dry season (biomass burning), a transition period, and the onset of the wet season (clean conditions). Real-time measurements of aerosol species (time resolution 20 to 60 min) were performed using a Steam-Jet Aerosol Collector (SJAC). Interfering gaseous compounds, such as ammonia (NH_3), nitric acid (HNO_3), hydrochloric acid (HCl) and sulfur dioxide (SO_2) were removed prior to aerosol collection by a wet-annular denuder. Analyses were performed on-line using ion chromatography (IC) for anions and flow injection analysis for ammonium. Additionally, inorganic aerosol composition (including the mineral cations Na^+ , K^+ , Ca^{2+} , Mg^{2+}) was determined by traditional techniques, such as the denuder-filter

pack (DFP) and stacked filter units (SFU's). Aerosols collected on 12-, 24- and 48-hours integrated samples were analyzed using standard IC techniques and PIXE (for Cl and S). High daytime temperatures prevailing at the site (30 – 36 °C) and low vapor pressure products of $\text{NH}_3 \times \text{HNO}_3$ and $\text{NH}_3 \times \text{HCl}$ did not allow formation of fine mode (PM 2.5) aerosol NH_4NO_3 and NH_4Cl at $\text{RH} < 90\%$. According to real-time results, $(\text{NH}_4)_2\text{SO}_4$ appeared to be only a minor component of the Amazonian inorganic aerosol fraction. Mineral cations (especially pyrogenic K^+) present in Amazonian fine mode aerosols significantly balanced daytime aerosol NO_3^- and SO_4^{2-} . However, large discrepancies between results from the real-time and integrating techniques were found particularly for the dry (biomass burning) season (PM 2.5 mostly $> 100 \mu\text{g m}^{-3}$). Aerosol NO_3^- and Cl^- determined by the real-time technique exceeded results from integrating samplers by a factor of three to four. By contrast, aerosol NH_4^+ from integrating samplers was about 50 %, and aerosol SO_4^{2-} a factor of two to three higher than measured with the real-time technique. These results will be discussed from the viewpoint of meteorology and aerosol chemical properties.