AMS Readme File

GoAmazon Campaign (IOP 2) 9/6 – 10/04/2014

John Shilling, PNNL, 3/23/2015

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Please contact the instrument PI for any questions regarding this data. Please adhere to the ARM data policy when using this data. Note that suspected "bad" data and data when the instrument is zeroed may be retained in the file and flagged instead of deleted.

AMS data was collected on an Aerodyne high-resolution time of flight mass spectrometer during the GoAmazon field campaign in the Manaus, Brazil region. The instrument was flown on the G1 research aircraft from September 6th to October 4th, 2014. The AMS sampled behind a nafion diffusion dyer, which reduced the RH of the airstream to 30-40%. A pressure controlled inlet was used to maintain a constant pressure upstream of the AMS aerodynamic lens. The pressure controlled inlet closely followed the design in Bahreini et al., Aerosol Sci. Technol., 42, 465-471, 10.1080/02786820802178514, 2008. The inlet pressure was set to approximately 620 mbar during the campaign. Due to the inlet pressure setting, the AMS was not able to maintain a constant sample flow above altitudes of ~10,000 ft. Data at altitudes > 10,000ft are still included in the files, but flagged. In general, the data at these altitudes will be less accurate than data at lower altitudes, though I have attempted to correct the data for the reduced flow.

Files are in tab delimited files. The single-line header information gives the date and time, species name, approximate error for the unit mass resolution (UMR) species, and a flag wave. Date and time are local time (Manaus, Brazil). The flag column indicates the instrument status, data quality, and sampling inlet. A value of 0 indicates good data, 1 indicates zero periods, 2 indicates known bad data that should not be used in analysis, 3 indicates data when the sample flow was somewhat unstable and that should be OK, but will have somewhat higher uncertainty than typical, and 4 indicates data taken when the AMS sample flow began to decrease (above 10k ft) and should be used with caution. The data interval is 12s. Time stamps represent the end of the averaging period.

The instrument was run only in V-MS mode. Therefore, there is no size distribution data. Data files contain the time trace of the unit mass resolution organics (labeled "org"), sulfate ("SO4"), nitrate ("NO3"), ammonium ("NH4"), and chloride ("Chl") in units of micrograms per cubic meter. The approximate error of each measurement is also given in a wave labeled with the species name and "\_err". For example, the error on the organic concentration is labeled org\_err. Measurements are normalized to laboratory conditions of 23 C and 1 atmosphere pressure.

The standard AMS fragment table has been adjusted to account for gas-phase species by diverting the sample flow periodically through a HEPA filter, which removes particles from the airstream. Signal intensity is converted to ug/m^3 according to procedures found in the literature. See for example Jimenez et al, J. Geophys. Res., 108, 8425, 2003 and Allan et al., J Geophys, Res, 108,4090, 2003. Instrument IE and ammonium RIE were calibrated several times throughout the campaign in the field using standard procedures and monodisperse ammonium nitrate particles (CPC method).

The UMR ammonium data are noisy because concentrations are low. I strongly recommend using the HR ammonium concentrations which are labeled as HR\_NH4.

G-1 AMS data analysis assumes that CE=0.5. This assumption is consistent with analysis of the T3 (Manacaparu) AMS data during the dry season. Attempts to evaluate the CE of the G-1 AMS have not yet been made. In previous field campaigns, the CE of this instrument has been evaluated as CE=0.5. For further questions, please contact John Shilling (john.shilling@pnnl.gov).