

HIPPO merge data product descriptions provided by Britt Stephens, 20121120

The HIPPO instrumentation is described at <http://hippo.ucar.edu/instruments>. The types of data collected in the project include 1) high-rate (~ 1 Hz) in situ measurements, 2) in situ gas-chromatography (GC) measurements on samples collected over a short (~ 10 sec) period of time but spaced by several minutes, 3) in situ GC measurements on samples collected over longer (~ 2.5 min) periods of time, 4) laboratory measurements on whole air samples collected in pressurized glass flasks or metal canisters over short (~ 10-20 sec) periods of time, and 5) laboratory measurements on whole air samples collected in continuously flowing glass flasks with longer (~ 30 sec) volume mixing times. The wide range of representative sample times and the unique nature of each measurement system have necessitated several different merged data products. A flight number of -1 or 0 represent test flights before each mission, and these data should be used with caution. The merge products are (date stamp indicating data set version):

HIPPO_all_missions_merge_10s_YYYYMMDD.tbl

The 10 sec merge product contains all high-rate in situ data, plus all short period GC measurements (UCATS and Panther ECD channels), plus the NOAA Carbon Cycle Group (CCG) measurements on the NWAS flasks. Other GC measurements, measurements on AWAS and MEDUSA flasks, and additional measurements on the NWAS flasks are included in other merge products described below. The 1 Hz measurements are aggregated with a median filter to 10 sec intervals (means are used for Black Carbon to capture low-count data), while the fast-sample GC and CCG NWAS measurements are reported at the 10 sec interval most representative of the sample interval. Rigorous scientific analyses of these GC and flask measurements should use the discrete product described below which merges in 1-Hz data according to the specific sample windows. The variables CO2.X, CO.X, and APO.X represent multi-sensor synthesized 10-sec products that are recommended for analysis of these species. A full list of species in this file and their descriptions can be found in the data dictionary [[link](#)].

HIPPO_discrete_continuous_merge_YYYYMMDD.tbl

Every row of the discrete merge product represents a discrete sample from one of either the PANTHER or UCATS GC instruments or the AWAS, NWAS, or MEDUSA whole air samplers. An additional column titled 'INSTRUMENT' indicates which instrument / laboratory made a particular discrete measurement: 1 = AWAS/U.Miami, 2 = NWAS/NOAA+CU, 3 = Panther MSD/NOAA, 4 = MEDUSA/Scripps, 5 = UCATS GC/NOAA, and 6 = Panther ECD/NOAA. The only discrete data sets not included in this file are Panther ECD-channels CH₄, CO, and N₂O because the 1-Hz and/or flask measurements of these species are higher quality. These data sets do however exist in the 10 sec merge product. All columns to the right of and including the AKRD column represent merged data from the high-rate sensors, data to the left of that

column are from the discrete observations (one source for each row). Merged high-rate values exist in every row of the file, whereas the discrete measurement values only exist on the rows corresponding to that particular instrument. The corresponding 1 Hz data are aggregated by averaging over the precise sampling interval of the discrete measurements, and in the case of MEDUSA an exponential weighting function is applied. The CO₂.X, CO.X, and APO.X products only exist at 10 sec resolution and are not included in this file. Adjustments to the AWAS values have been made for differences in calibration scales between NOAA and U. Miami, one offset adjustment for each HIPPO mission (#1-5), and therefore each species measured by both labs is reported in a single column. Species names with ‘_AW’ on the end were only measured at U. Miami and have not been adjusted. Adjustments to the MEDUSA CO₂ values have been made for differences in calibration scales between NOAA CCG and Scripps, and both labs’ measurements are reported in a single column. Scripps and NOAA isotope measurements are currently in separate columns but may be merged in the future. Non-integer profile numbers exist in this file where flask samples spanned the demarcations between profiles. A full list of species in this file and their descriptions can be found in the data dictionary [\[link\]](#).

HIPPO_medusa_flasks_merge_insitu_YYYYMMDD.tbl

The MEDUSA flask sampler collects air into glass flasks that are continuously purged at a controlled flow and pressure with a mixing time of around 30 sec and a representative sampling kernel that drops off exponentially with a several-minute tail. This product accounts for this by aggregating the 1 Hz data by weighted averages according to the sample kernel for each flask. Values in this file are identical to those in the discrete file, but presented here for MEDUSA flasks alone, with additional MEDUSA diagnostic information, and *without the correction for the Scripps-NOAA CO₂ scale offsets*. A full list of species in this file and their descriptions can be found in the data dictionary [\[link\]](#).

HIPPO_noaa_flask_allparams_merge_insitu_YYYYMMDD.tbl

The NWAS sampler flushes glass flasks for a period of time, then closes the downstream valve and increases the flask pressure to several atmospheres. Thus, the air sampled is a combination of an exponential mixing and plug flow. This product aggregates the 1-Hz data by averaging over the interval between downstream and upstream valve closure. Values in this file are identical to those in the discrete file for the NWAS flasks only (INSTRUMENT 2), but the species names in this file have different suffixes from those in the discrete file to identify the source of the data. A full list of species in this file and their descriptions can be found in the data dictionary [\[link\]](#).

HIPPO_profile_pw_tot_col_mean_YYYYMMDD.tbl

Total column means. All measurements from the 10 sec merge product, except the CCG flask measurements, aggregated by pressure-weighted means for each vertical profile (N in entire project). In

this file, measured species are organized by row rather than column and the first row indicates the mission and profile number (e.g X1.001 is the first profile from the HIPPO1 campaign). This file includes data to the top of every profile, which is typically 8-9 km with the exception of 2 profiles at the start and end of each flight that went to 12-14 km.

HIPPO_profile_pw_tot_col_wt_YYYYMMDD.tbl

Total column weights. This file has a similar structure to the total column mean file but after the first 4 rows gives the fraction of the pressure-weighted column sampled for each species. This fraction is calculated relative to the total column between the minimum (z.min) and maximum heights (z.max) sampled on each profile. Converting these values to portion of the total column, or filtering data for incomplete profiles, requires careful attention to z.min and z.max. For the GC measurements the fractions are considerably smaller than for the 1 Hz measurements. [The weight is calculated as the fraction of 100-m intervals between the profile minimum and maximum altitudes (z.min and z.max) with non-missing data (i.e., non-missing intervals / total possible intervals). Added by LAH, 20121121]

HIPPO_profile_pw_10km_col_mean_YYYYMMDD.tbl

Partial column weights. This file has a similar structure to the partial column mean file but after the first 4 rows gives the fraction of the pressure-weighted column sampled for each species. This fraction is calculated relative to the total column between the minimum (z.min) and maximum heights (z.max) sampled on each profile up to 10 km. It is not possible to convert these values to the portion of the column below 10 km. Filtering data for incomplete profiles requires careful attention to z.min and z.max. Most profiles reach only 8 or 9 km and thus their 10 km values will be the same as their total column values. A small subset of profiles went as high as 14 km and have different values in the two files.

HIPPO_profile_pw_10km_col_wt_YYYYMMDD.tbl

Partial column means. Similar to the total column mean file but limiting each profile to below 10 km. Most profiles reach only 8 or 9 km and thus their 10 km values will be the same as their total column values. A small subset of profiles went as high as 14 km and have different values in the two files.

HIPPO_profiles_100m_intervals_YYYYMMDD.tbl

All measurements from the 10 sec merge product, except the CCG flask measurements, aggregated by means over 100 m intervals for each vertical profile. In this file, measured species are organized by row rather than column. The first row indicates the center of the pressure interval used and all other rows

give a single profile for a specific parameter, campaign, and profile number. Profile data may be readily extracted from this file using the tool (Linux or Mac) `profile_tool.sh` (**give link!**).

HIPPO_*_merge_1s_YYYYMMDD.tbl

For each campaign, these products list the 1 Hz measurements.