Plantower Optical Particle Counter - Post-processing Data

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June 2019

1 Introduction

This is a document about the post-processing routine for the Plantower optical particle counter (OPC). The routine consists of multiple MATLAB scripts and function. Once the routine is complete, you should have data of particle number concentration versus altitude. Note that the script assumes that you have two Plantower data files i.e. importing data from two separate OPCs. Table 1 gives a summary of the size bins for the Plantower. This will be more relevant once you get the data.

Before beginning, ensure that you have the following MATLAB files in your working directory:

1. *MURI_post_process_Plantower.m* - main post-processing script
2. *fdata_parse.m* - parses flight data
3. *import_ptData.m* - imports data from Plantower .csv
4. *A_sections.m* - averages concentration data over given altitude interval

Table 1: Size bins of Plantower OPC.

Bin 1	particles > 0.3 μm per 0.1 L of air
Bin 2	particles > 0.5 μm per 0.1 L of air
Bin 3	particles > 1.0 μm per 0.1 L of air
Bin 4	particles > 2.5 μm per 0.1 L of air
Bin 5	particles > 5.0 μm per 0.1 L of air
Bin 6	particles > 10.0 μm per 0.1 L of air

2 Post-processing

Here are the steps to take to post-process the data. At this point, you should have all the MATLAB scripts given above, flight data log and Plantower data logs in your working directory. Generally, the flight data log is named something like *FLOG.CSV* and the Plantower logs are named something like *PTLOG00.CSV*.

2.1 Parse flight data

First you will need to parse the data from the flight log. The goal of this step is to simply extract the altitude data from the flight log.

To get started, open *fdata_parse.m* in MATLAB. STOP. Do not just click run. First, you'll have to import the data from the flight log .csv file to MATLAB. Do this by selecting

"Import Data" from the "Home" tab at the top of the screen. Select only the column of data corresponding to altitude (this should be Column D, unless the format of the flight log has changed). Import only the numbers and be sure output as a column vector by switching "Output Type" to "Column vectors" at the top of the screen. Finally, select "Import Selection" at the top of the screen. You should now have a 1-dimensional array called "Altitudeft" in your workspace.

NOW, you can simply run the full script. It will prompt you for the hour, min, and sec of the last time stamp of the flight log. It does this to create a time array (in seconds) corresponding to the altitude array. Once the script is complete, the altitude data "f_h" and time data "f_t" are saved to *fdata.mat*.

2.2 Main script

The main post-processing script is called *MURI_post_process_Plantower.m*. Only run this once you have the flight data parsed and saved to *fdata.mat*. The main script uses additional user-defined functions called *import_ptData.m* and *A_sections.m*. The former will prompt you for the Plantower data .csv file. The latter will take your final particle concentration data and average it over a given altitude interval.

The current version of *MURI_post_process_Plantower.m* only considers data during the ascent. That is, it deletes the data collected after the balloon has reached apogee. This script has a fair amount of comments, so I will not go into detail here.

This script is capable of running on its own, so just click Run! The output will be a couple of number concentration vs. altitude plots, and a .mat file called *particulates.mat*. Be sure to save these! Please email the .mat file to habec021@umn.edu and be sure to indicate which flight and OPC it is from.