# BASIC INSTRUCTIONS

(FOR THE DETAILED ANALYSIS DASHBOARD MATLAB APPLICATION)

BACKGROUND:

The subject MATLAB application has been developed as a framework for a 'SYSTEM' level telemetry data analysis tool. This is specifically aimed at aiding Gov't representatives in substantive data analysis of JPSS Payload instruments while a JPSS spacecraft is being tested at the spacecraft vendor or at the launch site. In certain cases, this tool set can also be used to evaluate some data sets taken from instrument level testing.

TOP LEVEL WINDOW DESCRIPTION:
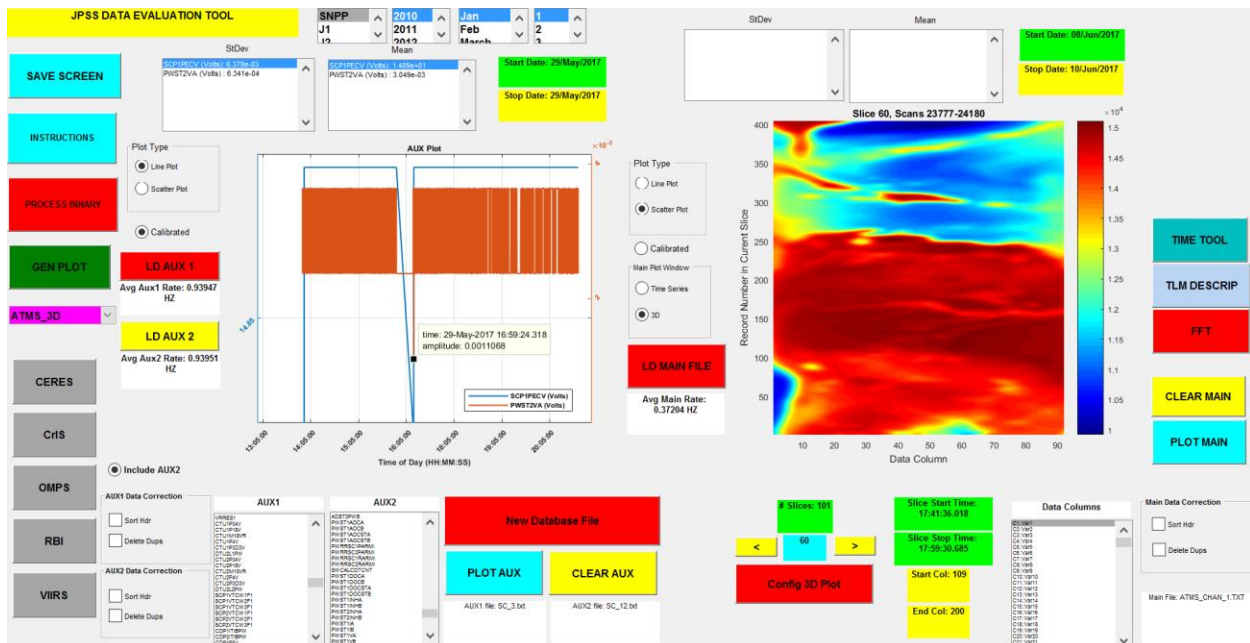
The window is divided into several areas:

1) There are two plotting windows – one on the left and one on the right. They are each independent. That means that each can display different data.
    a. The rightmost plot area is termed the 'Main' window. This window can display most any data that is anticipated at this time. This can be either some form of science or any Housekeeping data.
    b. The leftmost plot area is termed 'Aux', as it is intended to display supporting data used for comparison purposes. This plot window can display data from any Housekeeping APID (instrument or spacecraft). It is currently to enable the superposition plotting of two different APID files – FROM THE SAME TIME PERIOD. That means the files chosen for display in this plot window have to be selected from the same time based directory.
2) Each plotting window is supported by each own set of 'pushbutton' functionality such as 'File Load', 'Plot', 'line plot', 'scatter plot', 'calibration' and others.

3) On the left of the main window is a set of pulldown menus aimed at initiating specific tools for deeper analysis of individual payload instruments. Currently, only ATMS has significant processing capability apart from this top level tool.

Now let's get to a simple 'step by step' process of getting this tool to do some functionality:

If the user has no prior experience in running this tool, instructions are provided by clicking the 'Instructions' pushbutton. This action will open the file you are reading.

1) The first decision upon entering this tool is to determine if this 'top level' tool itself will be used to do some analysis or will it only be used to start a more detailed tool. – CURRENTLY THE TOOL DOES NOT HAVE LINKS TO LOWER LEVEL PROCESSING, BUT WILL SOON.
    a. If the top level tool is to be used for analysis or plotting, press the 'GEN PLOT' button on the top left. This will enable features in the window to Load file(s) for both the left and right plot windows.
2) If there is no processed data available, the tool has the capability to process raw binary data in the *.h5 file format. This can be done by pressing the 'Process Binary' button. This will open up options for instrument-specific science data, or housekeeping data. NOTE – ONLY ATMS SCIECNE AND GENERAL SPACECRAFT DATA ARE CURRENTLY AVAILABLE. This tool will create the *.txt files that the Matlab tool uses to plot the data. The files will be placed in the 'data' directory, and the user will be pointed to this directory upon selecting a data file with any 'LD …' button.
    a. In order to process the data, the user will be prompted to select a database file from the DBD_XLS folder. The database must be relevant to the data being processed for the best results. This database will be used for telemetry descriptions and calibrations until the user chooses a different one. If a database is updated, it should be placed in the DBD_XLS folder to be used by this tool.
    b. The data will be placed in a subsequent subtree as JPSS/Matlab_tools/data/<SCID>/<DATE> for easy access of a specific spacecraft or date by the user
3) Once the 'GEN PLOT' button is pushed, the file load functionality is enabled. Next to the right plot window, the 'LD MAIN FILE' button appears. Pushing this button will start a file explorer window to allow for the selection of the desired file. This file can be from any time period – NPP or J1 and can be either science or APID data. The data is anticipated to be time ordered column format, based on APID packet header contents. The first column shall be the packet 'day'. This is a day referenced to the JPSS epoch time. The second column is the milliseconds of the day, followed by the third column which is the microseconds of milliseconds. These three columns represent the 'secondary header' time information of the APIDs from which this data is obtained from. This data is used for plotting the time series data in this plot window as well as in the right plot window. NOTE – THIS DATA FORMAT IS IMPLEMENTED BY THE LOWER LEVEL TOOLS IN THE PROCESS BINARY BUTTON
4) Once the file is loaded, the column text headers (first row of data columns) are placed in the 'list boxes' at the bottom of the plot window. If the first record of the file doesn't include the column 'text' labels, these will be assigned general 'headers' of the form of the text string 'COL' being appended to the column number(ie. Var1, Var2, etc). The column headers will be used to select the desired data for plotting.

5) Each file opened will result in the population of file data/time information, such as start and end time/data of the contents of the file. The time information embedded within the file will be decoded and displayed in small text window above the respective plotting windows, along with the x axis of the plots.

6) The AUX plotting window is only a 'time based' window. It will plot the selected parameters from either of the AUX1 or AUX2 files and label the plots. There is a 'Zoom' feature within the Matlab window to be able to zoom into a point of the plot that is of interest. Additionally, one can use the data cursor Matlab tool to see the exact time and amplitude of a data point, and the pan tool to move the plots.

7) Standard Deviation and Means are calculated for each plot and presented in separate windows. Separate windows are provided for the AUX and Main plot windows.

8) Some data can be calibrated using the 'Calibrated' option. A database file is necessary for this, which is the Excel file or xml folder containing all relevant information about the APIDs. Currently only polynomial calibrations are available, excluding piece-wise polynomials.

9) For the 'Main' plotting window, a 3D plotting capability is incorporated to allow the rendering of instrument science data. The use of this function requires some knowledge on the part of the user, especially knowledge of the format and content of the data that is displayed. For example, ATMS science data is written to the files with each row being one lateral scan. Columns 1-109 are scan angle information, and after that are the scan data. The user must know this to choose which columns to plot in the 3D plotting window.

10) The names of open files are provided in text windows at the bottom of the page.