CIRAS-2 Export function – simplified data format with numerical and graphical data views

Perhaps some of the most exciting moments for CIRAS-2 Portable Photosynthesis System users come when the time arrives to view meaningful data sets. What many new users will not realize is that they have the option of viewing these data in two formats: raw CIRAS-2 format (.dat) and a much streamlined Export format (.tab). Both formats easily and automatically import and parse into spreadsheet programs, e.g. Excel. Raw data give a complete record of CIRAS-2 system specifications - attached cuvettes/chambers, constants, and operational parameters including all user-defined control settings. Besides the measured and calculated data of primary interest, the information in .dat format is coded for practical reasons (for descriptions see Windows RCS menu bar Help – Recording – Data Files). Exported .tab data provides many options, such as allowing you to retain or skip coded extraneous information, and importantly, to retrieve data items that are not automatically written to the raw (ASCII) file.

From the RCS menu bar choose File – Export Data..., creating a customized file is accomplished in three steps: **1)** the **Open Data File** dialog appears, select the .dat file you wish to export. **2)** The **Export Data** dialog now appears (below, Fig. 1), allowing you to customize the output format. In the 'Options' section choose the desired field delimiter and decimal separation type from the 'Data Format' dropdown list. Select the 'Do not include [Data only]' checkbox found under the 'Include File Information' section. If you recorded data using the 'Treatments' option or have a CFM unit select the 'Body Info' checkbox to customize treatment and/or CFM trace data output. The selected .dat file and its total number of included records appear in the field to the lower left.

In the 'Export Field(s)/Defined Options' section, deselect the 'All Fields' checkbox. Several predefined combinations of variables exist in the dropdown list to the right, such as 'Pn/Ci only' and 'Calculated', but first try 'User Defined' to enable the parameters checkboxes. *Currently, CIRAS-2 output does not automatically preserve VPD and RH data seen during live recording, so be sure to select the* 'Calculate VPD and Cuvette %RH' *checkbox in the* 'Other' *field*. Individual variables may now be selected, or all listed variables can be included by reselecting the 'All Fields' checkbox. Note that two new variables are available: Ca (analysis CO_2) and Ha (analysis water vapor). Also in the 'Other' field, it is advisable to retain the parameter 'SC' (Status Code), which has useful information for quality control of individual records as they were captured. **3)** Call up the **Export Data to...** dialog by clicking the Export button once you have made your selections. Save the new .tab file to the folder of your choice. The lower left field where the file name appears will then read, e.g. "49 of 49 records completed". This file may now be opened in any spreadsheet program.
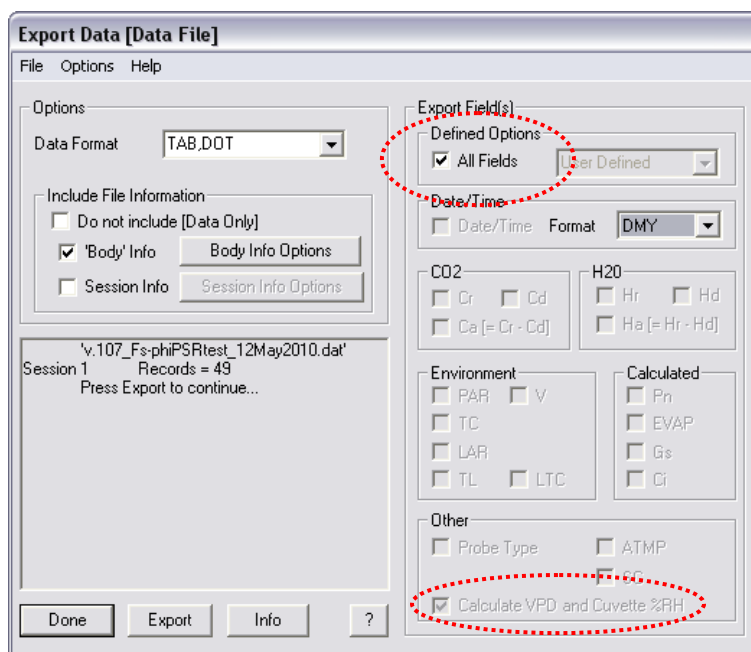

Figure 1.

Another useful function is embedded in the **Export Data** dialog, allowing you to view your data even before opening the newly created .tab file. By clicking the Info button, the **Information** dialog appears, displaying the Graphs tab by default (below, Fig. 2). In the resulting Data display it is possible to view all variables listed in the top row of buttons and their individual data points, or any subset of the listed variables – click on a button to display the desired variable. The active Y-axis is indicated in two ways: by a small icon with the active variable's assigned color at the top right of the Graph field, and bulleted with a black dot in the Numeric field. The corresponding Y-axis is scaled for the active variable, in the example below, Pn. Ci is also selected in this example. Clicking the active variable button toggles through all selected variables.
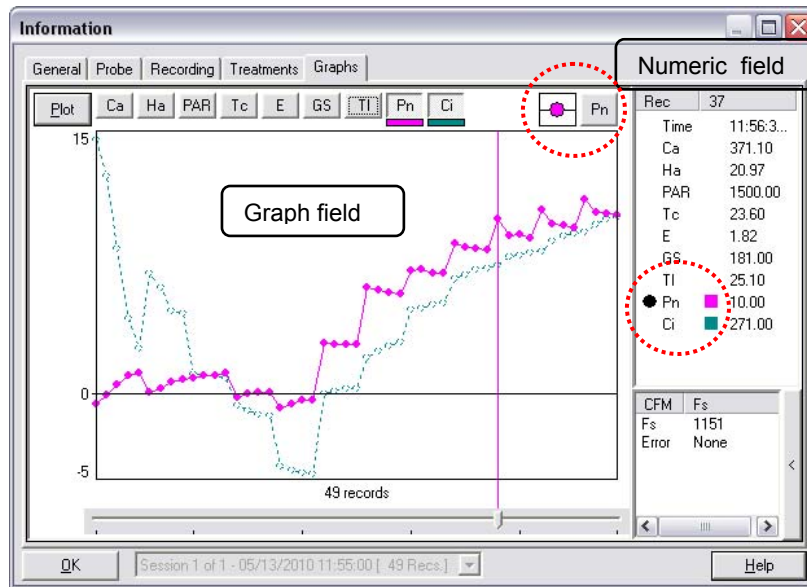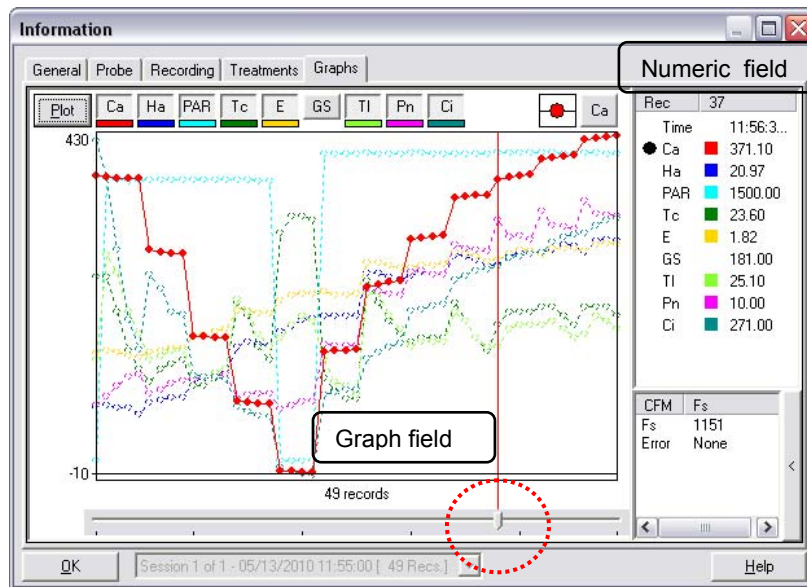

Figure 2.

Figure 3.

In the second example (Fig. 3) all variables except 'GS' (stomatal conductance) have been selected, but only Ca is actively scaled on the Y-axis. The X-axis represents records, sliding the X-axis cursor (circled) allows you to view numeric data associated with an individual data point, in this case record number 37. Of course, it is typically better to view only two, or perhaps three variables simultaneously, to infer meaningful relationships.

We see this in the first example (Pn, Ci), but two variables can also be viewed as a scatter plot by clicking the Plot button at the top left. The Graph field now switches to a scatter plot (below, Fig. 4).
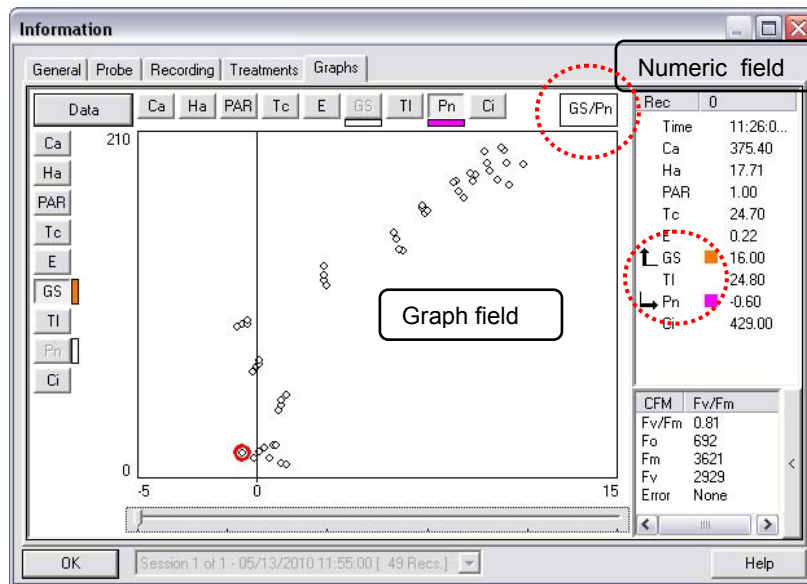
Figure 4.

In this example we see stomatal conductance (GS) plotted against net photosynthesis (Pn). The icon GS/Pn indicates which variables are currently selected. Click on a variable button in the vertical array at left to choose a new Y-axis variable – click on a variable button in the horizontal array at top to choose a new X-axis variable. The right arrow symbols in the numeric field indicate whether a variable is assigned to the vertical or horizontal axis. Slide the X-axis cursor to scroll through numeric data for each record. The **red halo** marks the plot location of the currently selected record. Click the Data button in the upper left to toggle between plot and data views.
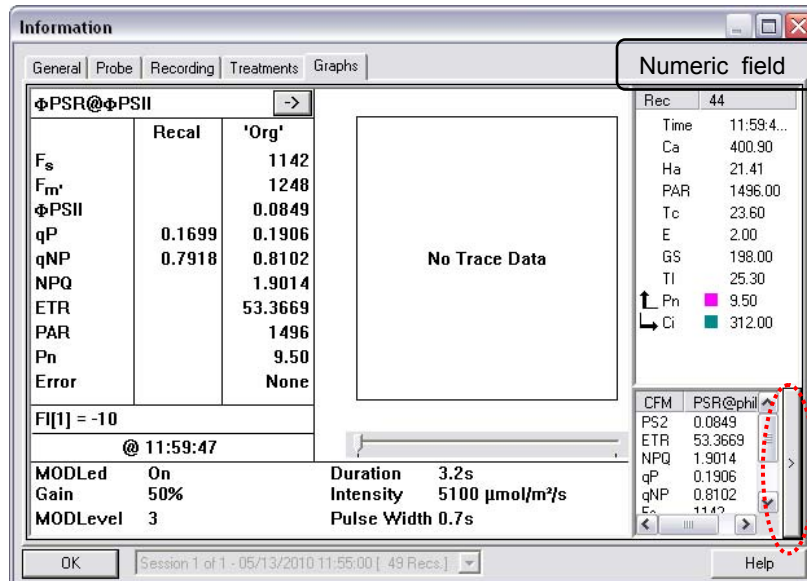

Figure 5.

If chlorophyll fluorescence (CFM) data were included with gas exchange measurements, these data are viewable by clicking the small > button on the bottom right of the Numeric field. CFM data are displayed numerically, one record at a time – to view different records click the > button to return to the previous screen, slide the X-axis cursor to a new record, then repeat.

Finally, any of these dialogs can easily be inserted as a graphic into a working document. Simply select Ctrl - Alt – Prt Sc (print screen) from your computer keyboard and paste the screen as an image into an open document. Crop the image, then label the axes of Plot or Data screens as seen below (Fig.6).
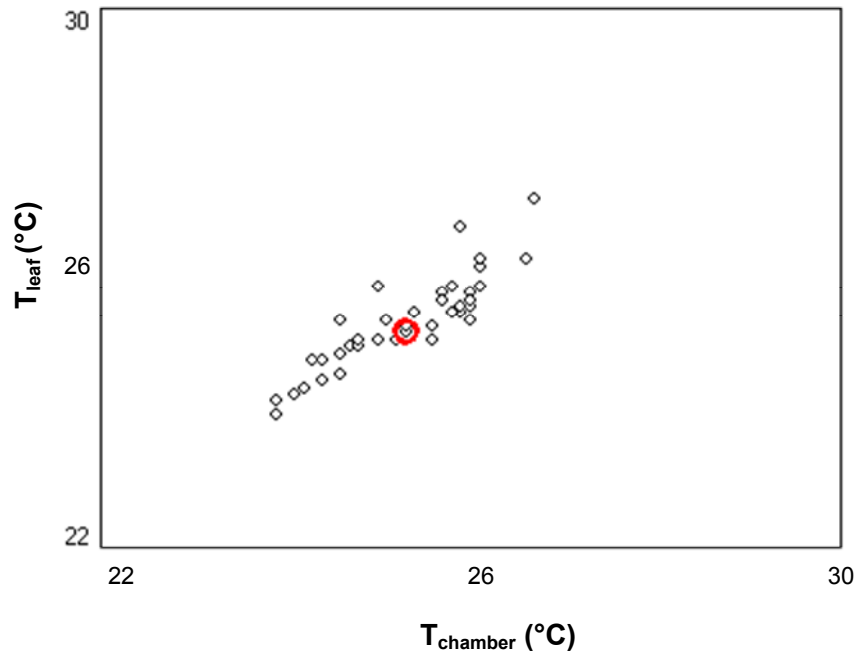
Figure 6.

References:

PP Systems Inc. 2010. CIRAS-2 Portable Photosynthesis System Operator's Manual. Version 2.04.
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