Brewer Temperature Coefficient Correction

A correction to the temperature coefficients is required when the change in the Standard Lamp (SL) R6 ratio with temperature is larger than the variation that is observed within the daily average plot of the R6 ratio.

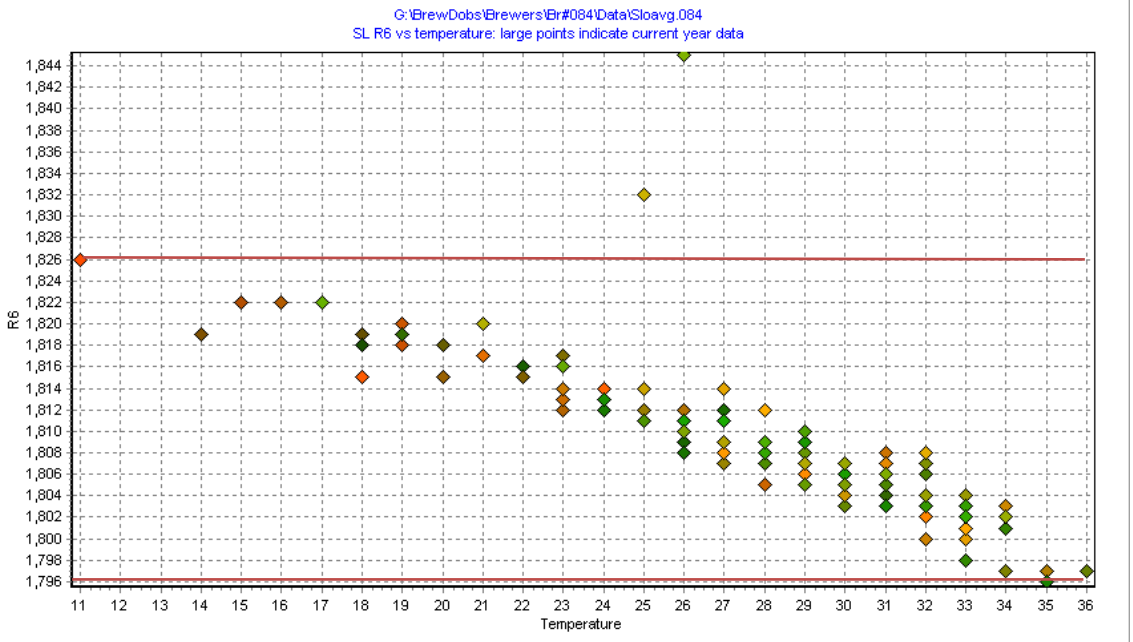


Figure 1: SL R6 ratio vs temperature plot demonstrates a 30-unit change (1796 – 1826)

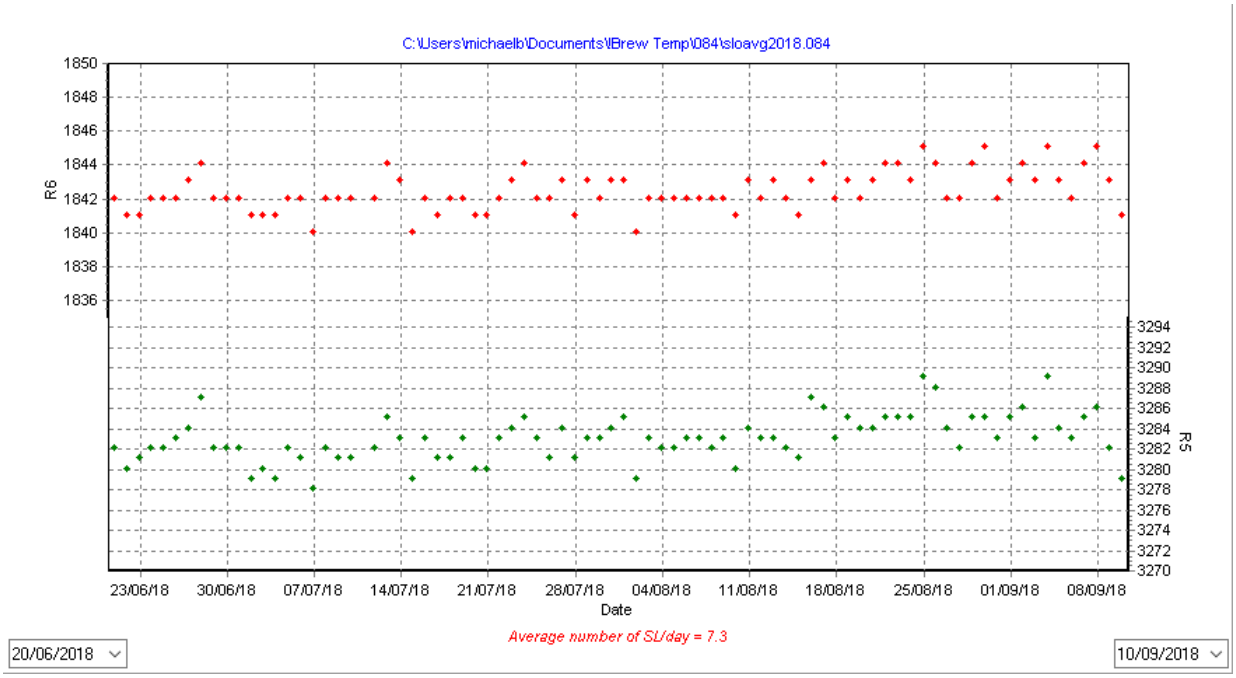
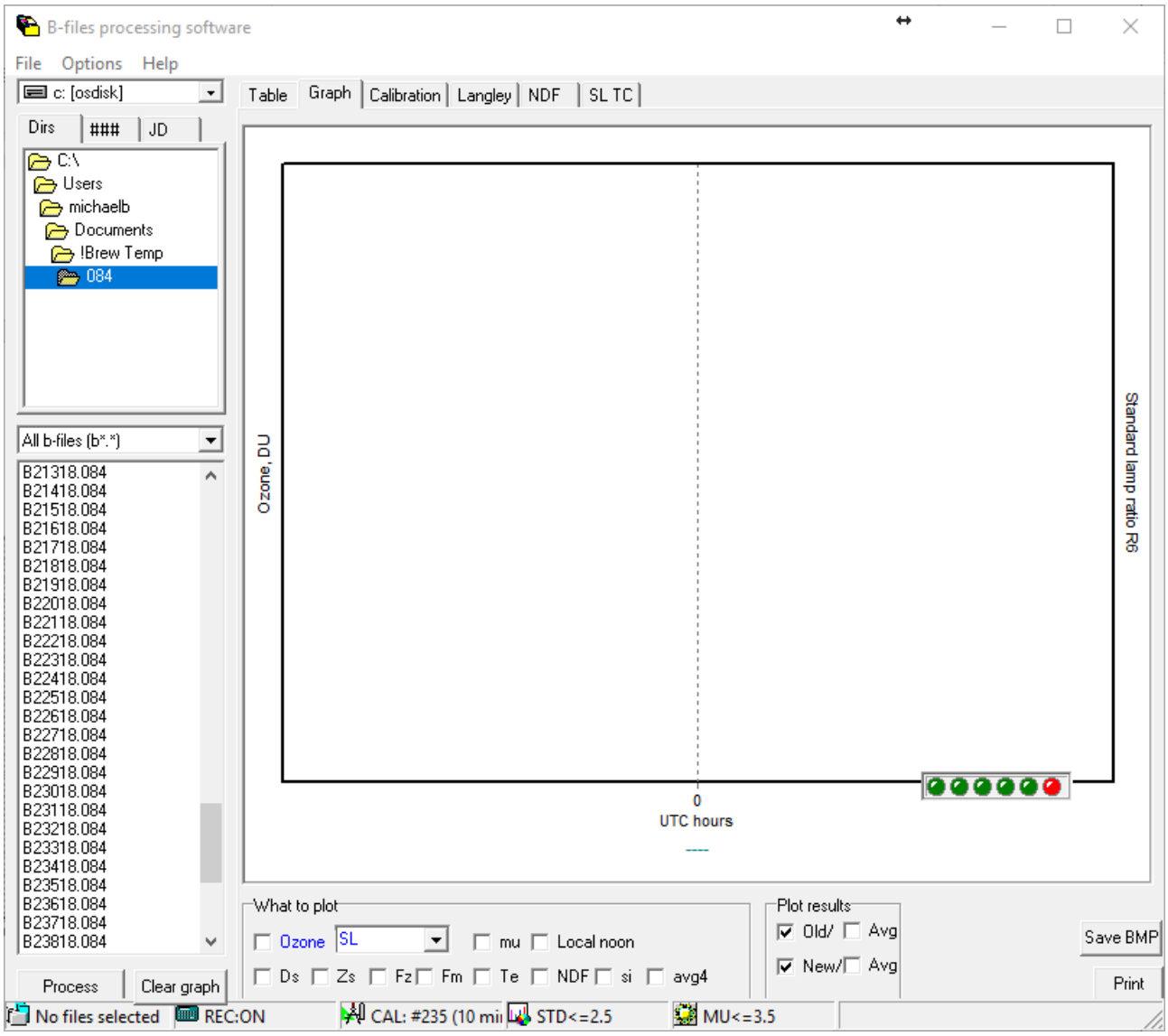


Figure 2: Average daily variation in the SL R6 ratio (seen in red) demonstrates only a 5-unit change (1840 – 1845)

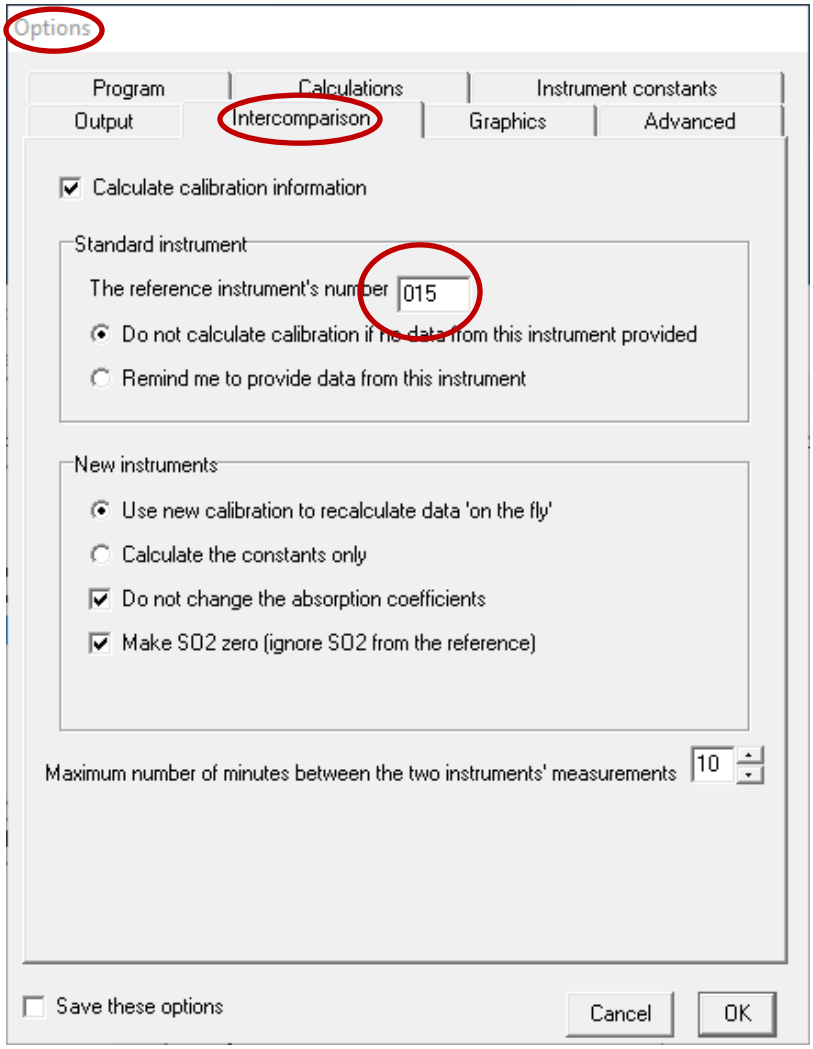
Figures 1 and 2 show a situation where a temperature coefficient correction is required for Brewer instrument #084.

Once it is determined that the temperature coefficients require correction (using PReport), b-files (raw Brewer data) need to be prepared for processing by BFile Pro.

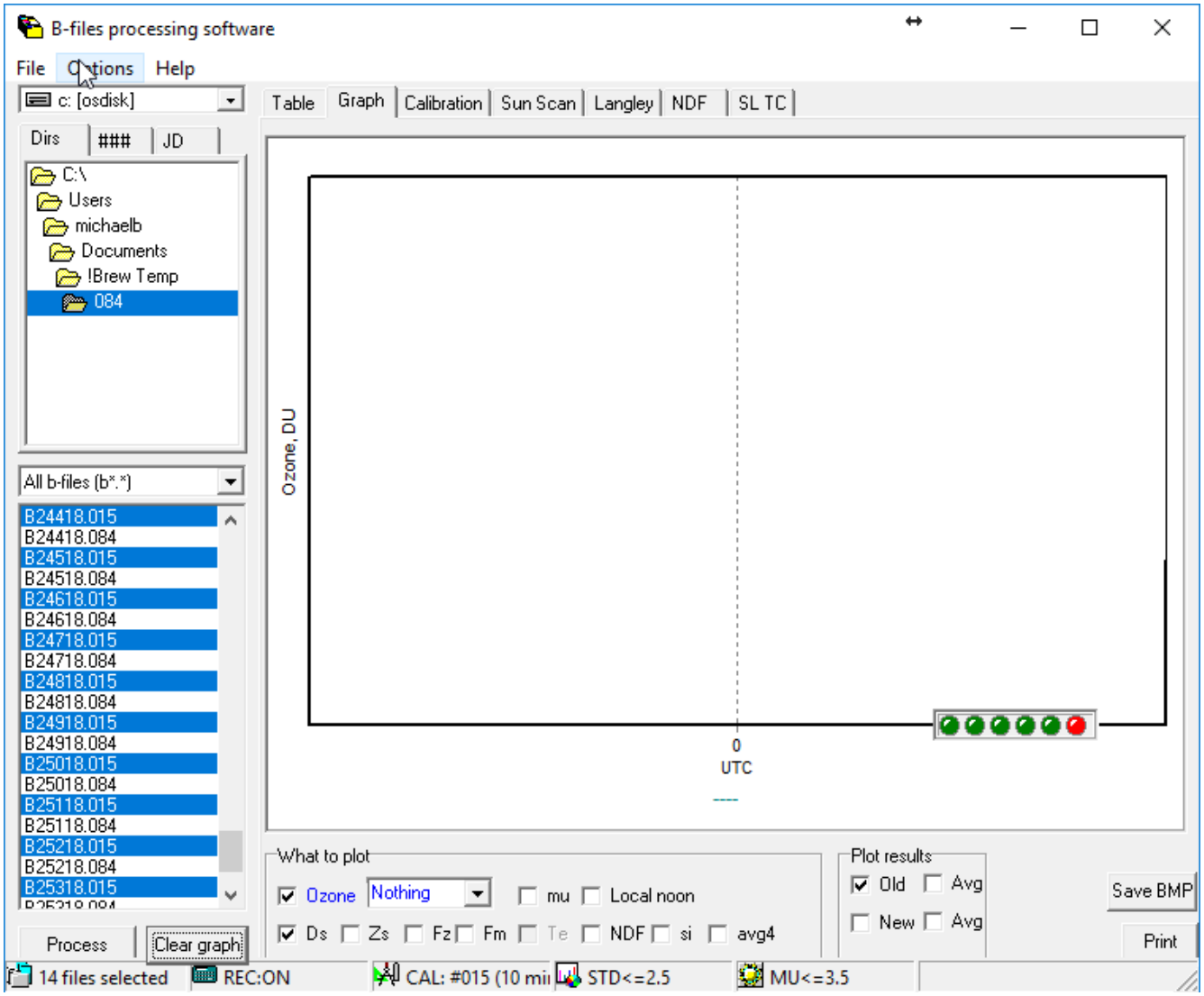
1. Copy enough data to cover the temperature extents seen by the instrument (eg.Brewer #084) into a directory that you will use for processing (eg. C:\Brew Temp\ 084). Typically, a year worth of b- files from the instrument are used to meet these requirements.



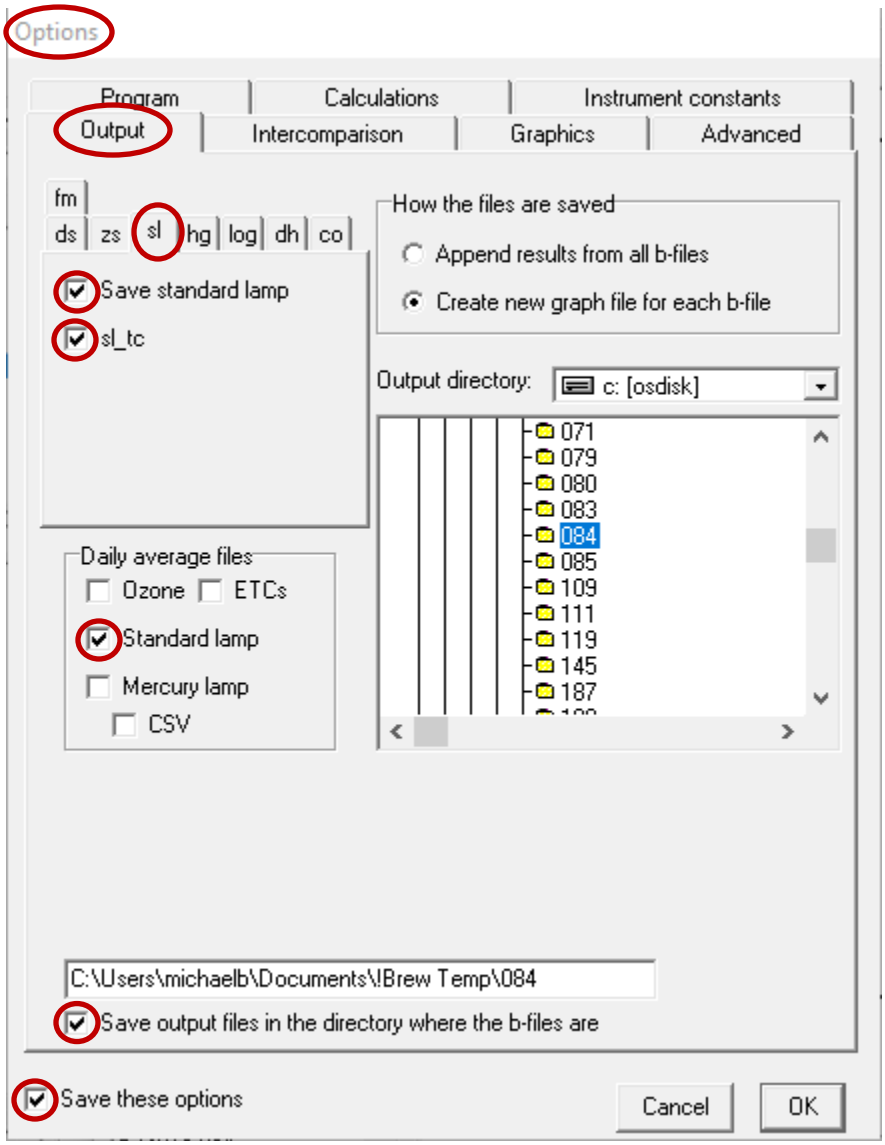
2. At least one b-file from the reference instrument needs to be included in the same processing directory for the program to be able to generate the temperature coefficients file. In this example, we used Brewer #015 for intercomparison.
    a. In BFile Pro, select the **Options** tab
    b. Under options, select the **Intercomparison** tab and input the reference instrument number. In this example, 015.
    c. Press the "OK" button.



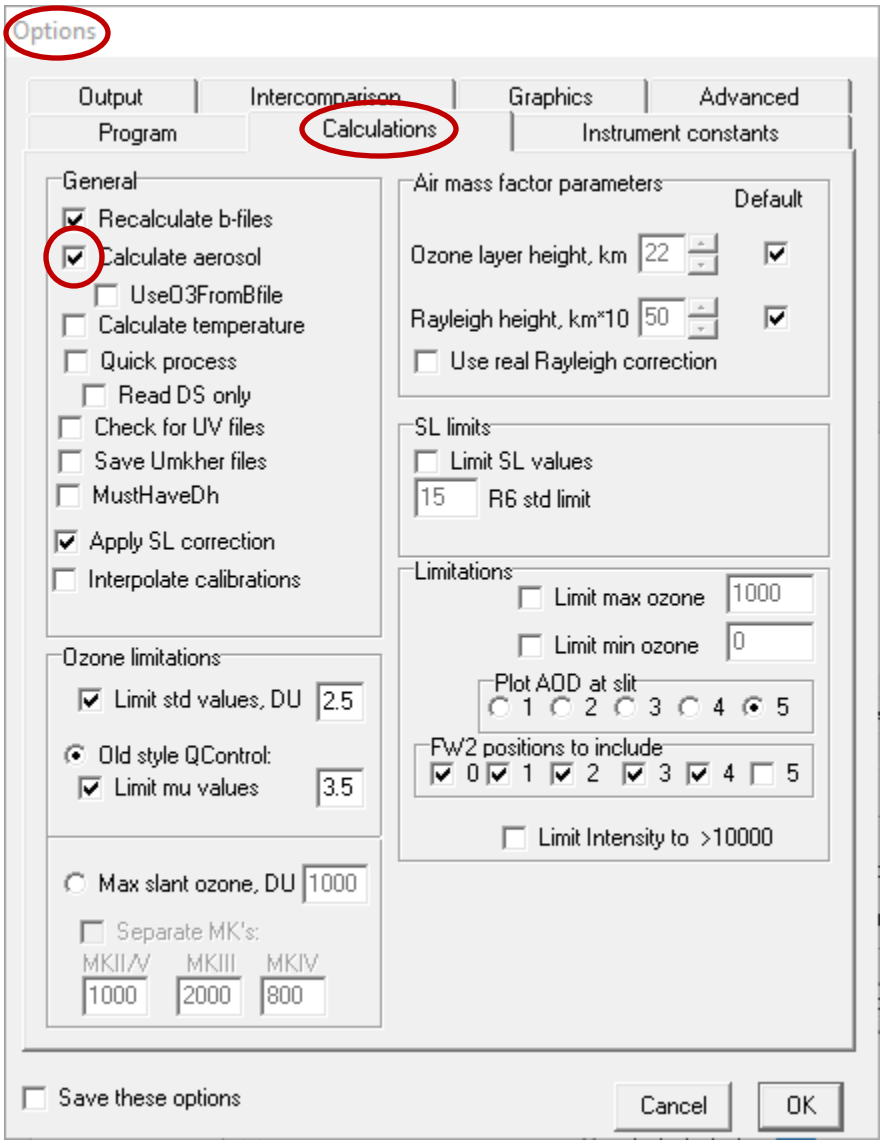
3. Copy at least one b-file from the reference instrument (in this case #015) into the same directory that you will use for processing. Just as you have copied Brewer #084 data into the temporary processing directory (eg. C:\Brew Temp\ 084) in step 1, now you need to also copy some #015 reference Brewer b-files into the same directory.



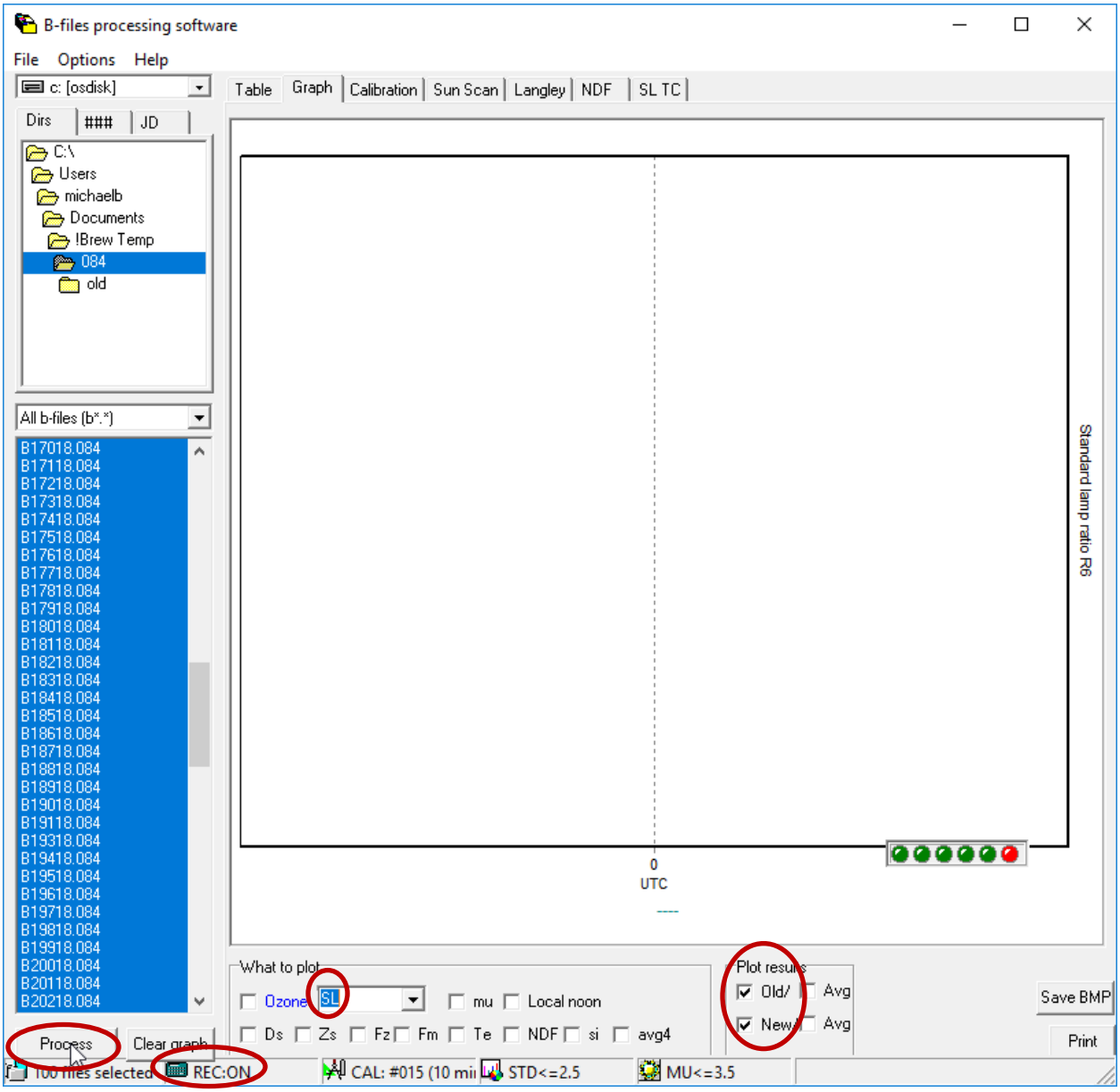
4. To configure BFile Pro to process the newly added files:
    a. Select the **Options** tab
    b. Select the **Output** tab
    c. Select the **SL** tab
        i. Check the “Save standard lamp” box.
        ii. Check the “sl_tc” box.
        iii. Under Daily average files, check “Standard Lamp” box.
        iv. Check “Save output files in the directory where the b-files are” box.
        v. Check “Save these options” box.
        vi. Press the “OK” button



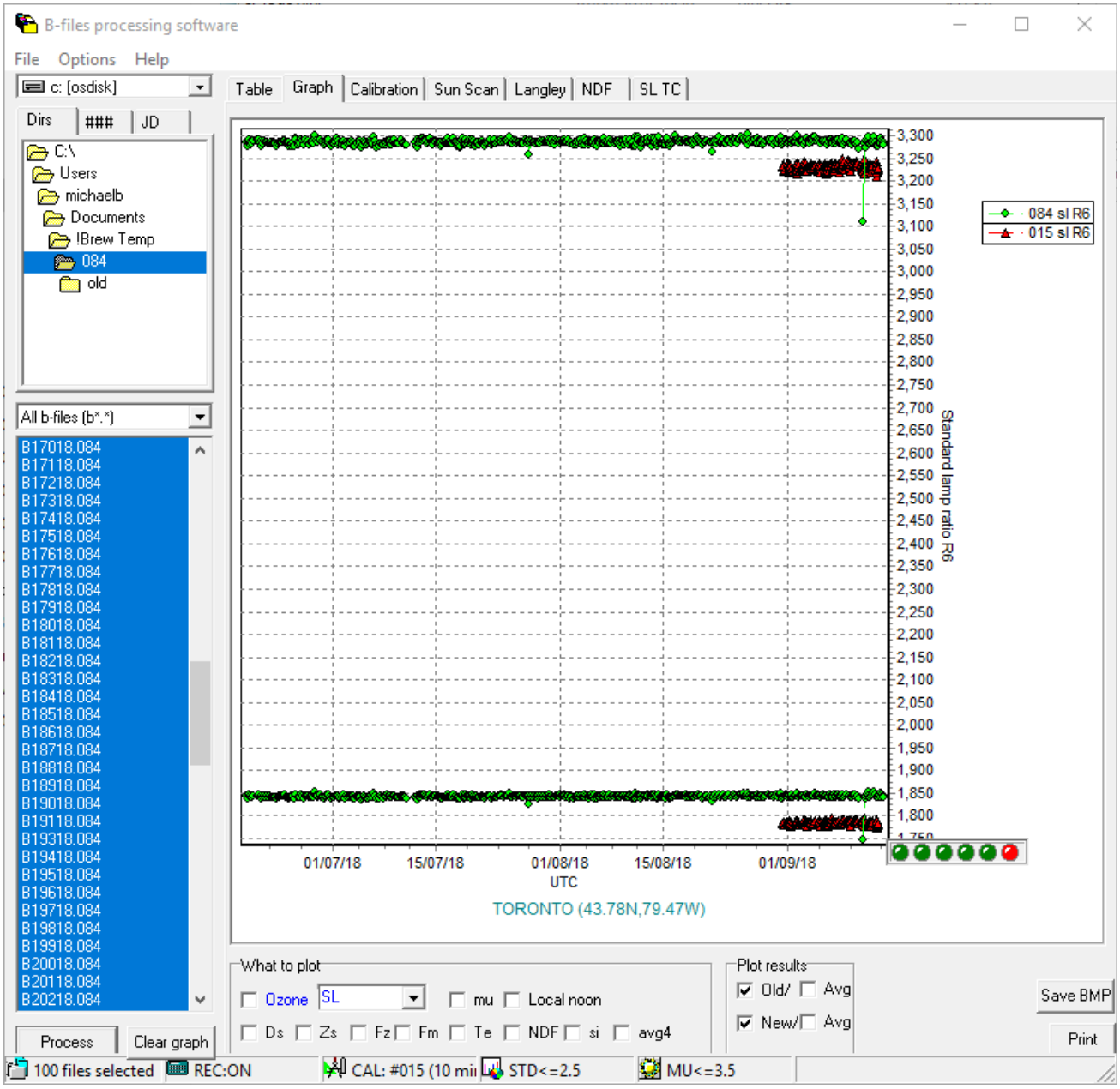
5. BFile Pro needs further configuration
    a. Select the **Calculations** tab
        i. Check the “Calculate aerosol” box.
        ii. Press the “OK” button



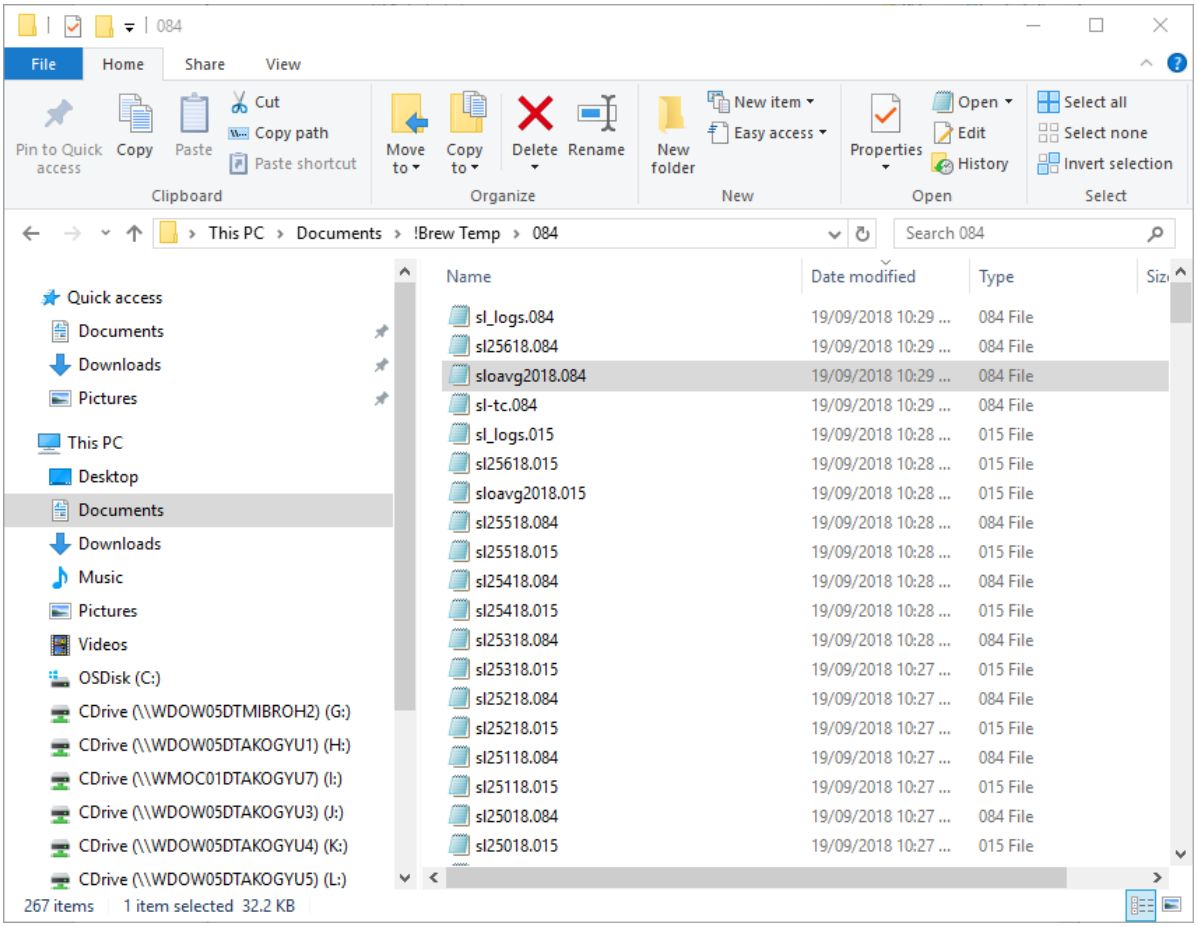
6. Now that the configuration is set, options for the calculations must be set.
    d. Ensure the Recalculation is set to "**REC:ON**" if it is set to "REC:OFF", double click on "REC" at the bottom of the window and it will change to "ON"
    e. Select all the files to be processed from the created temporary directory including those from the reference Brewer
    f. Under "What to Plot" uncheck all boxes and pick **SL** from the drop down menu
    g. Under "Plot results" check "**Old**" and "**New**" to have the R5 ratios (reference data associated with the SO2 correction) and the R6 ratios (reference data associated with the O3 correction) plotted on the graph.
    h. Press the "Process" button.



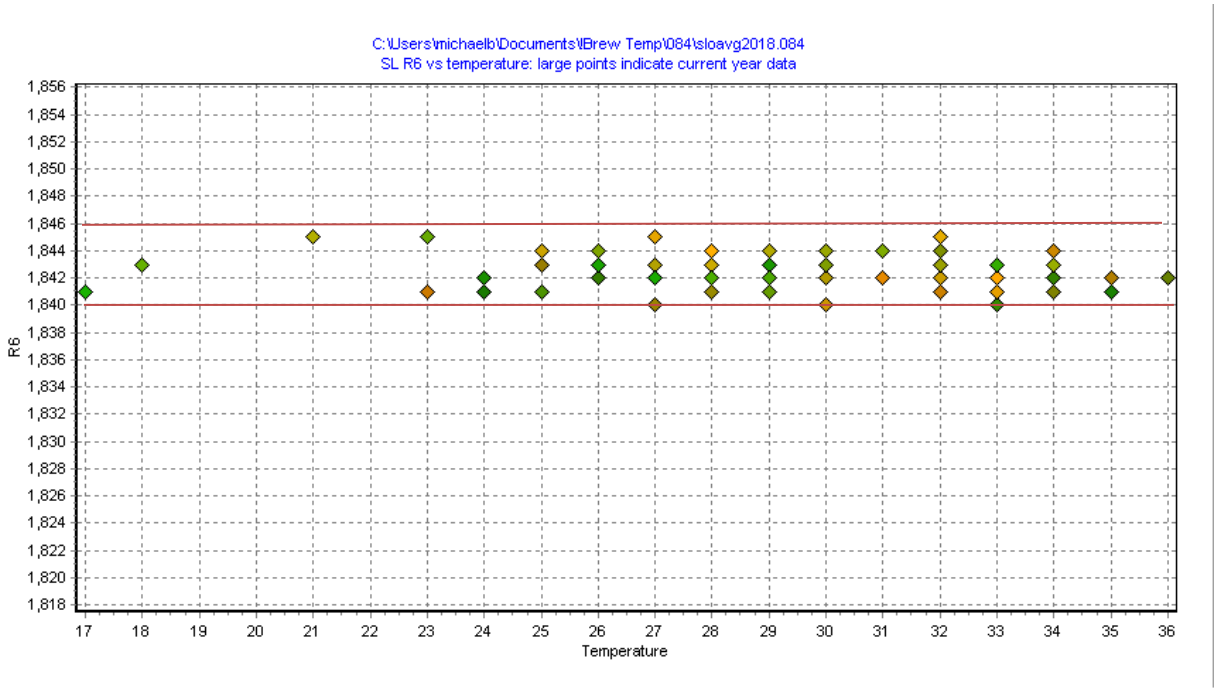
7. BFile Pro will process and plot the data. Standard Lamp temperature coefficients and sloavg files will be generated within the created temporary directory.



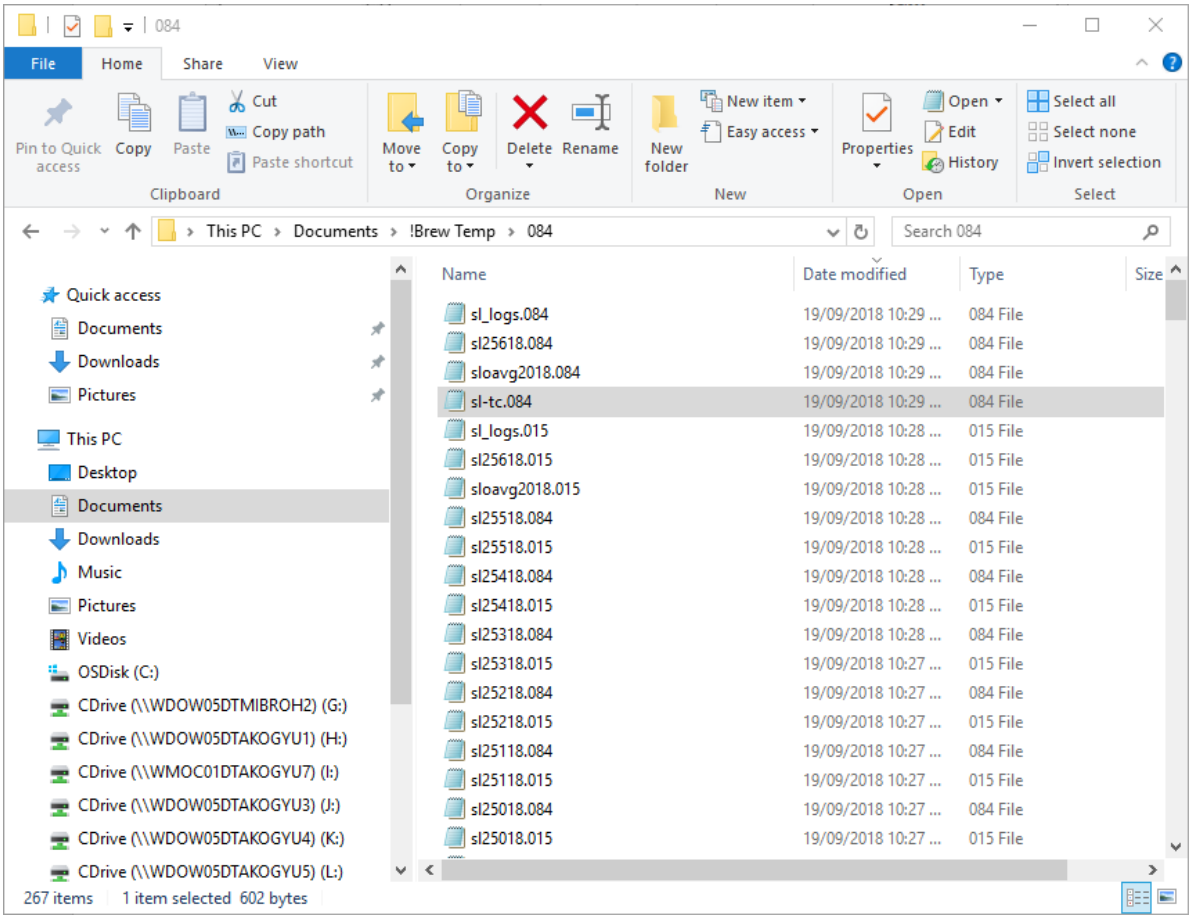
8. Use PReport to verify the effect of the newly created temperature coefficients by plotting the created sloavg file. In this example, sloavg2018.084.



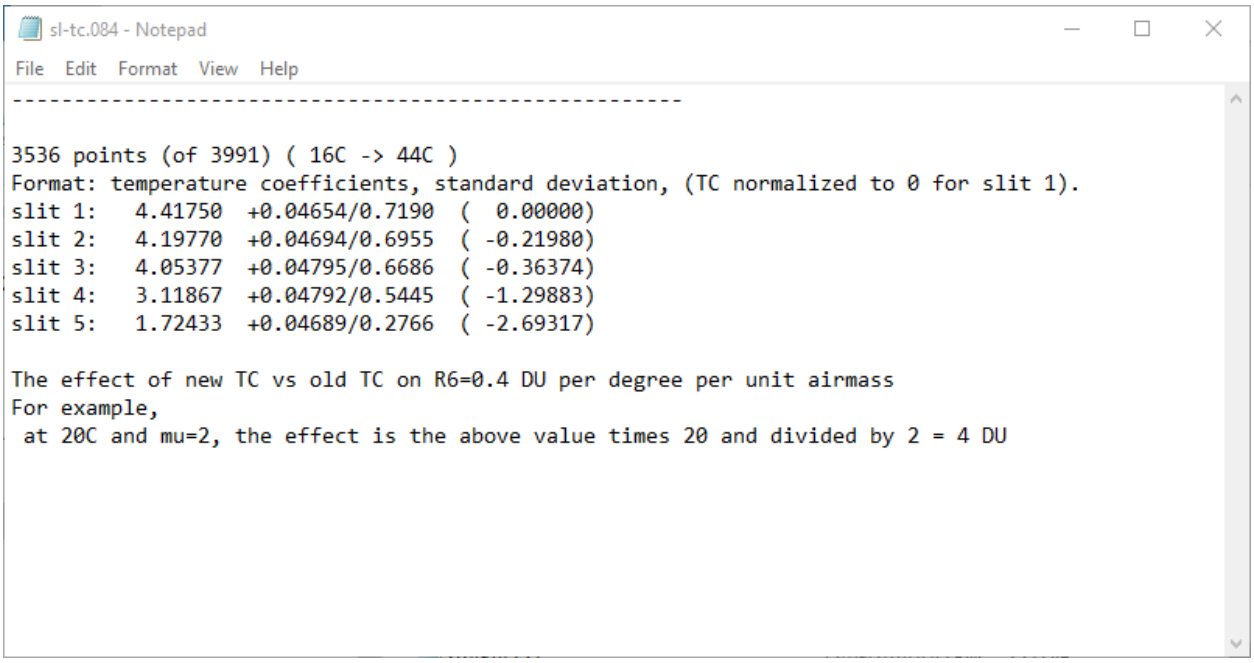
9. The R6 ratio vs Temperature will be displayed. Note the improvement from 30-units in the example down to only 6-units spread (1840 to 1846).



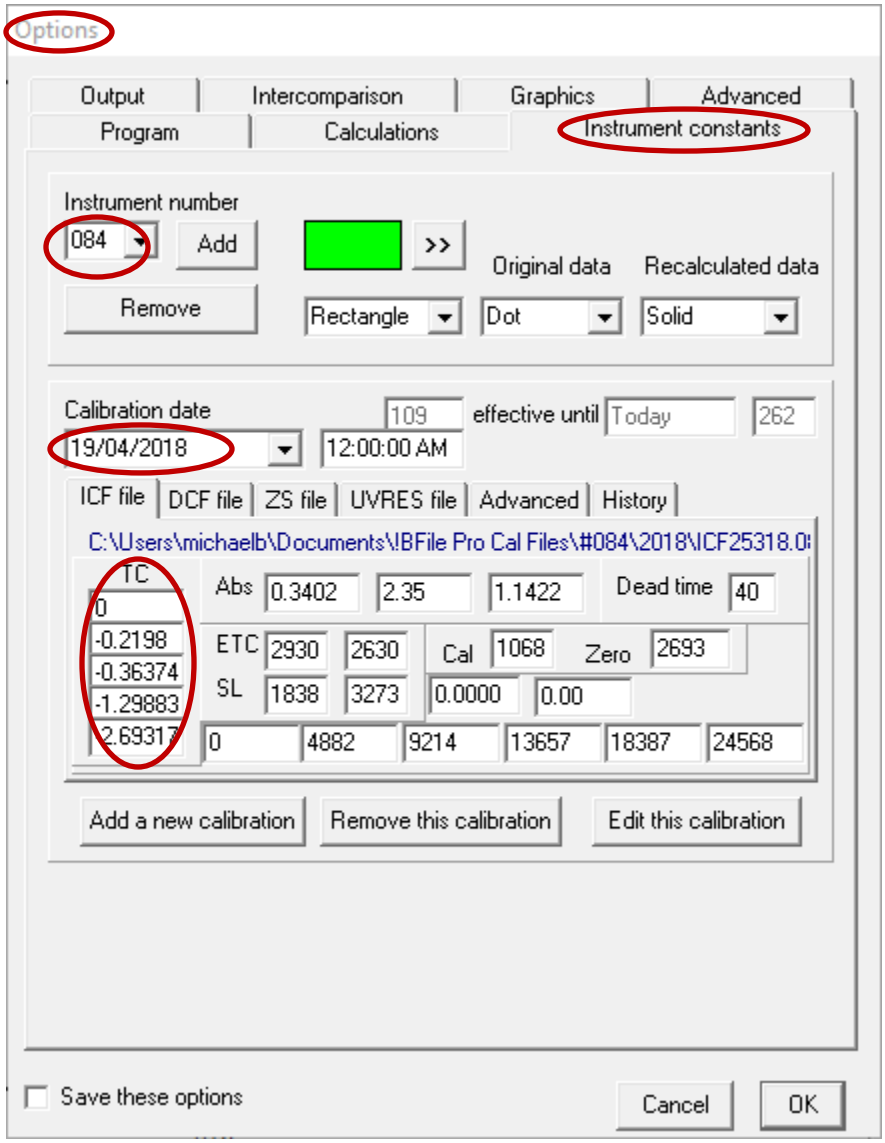
10. Open the newly created temperature coefficients file, sl-tc, in this example, sl-tc.084.



11. The values within the parentheses are the new temperature coefficients to be applied



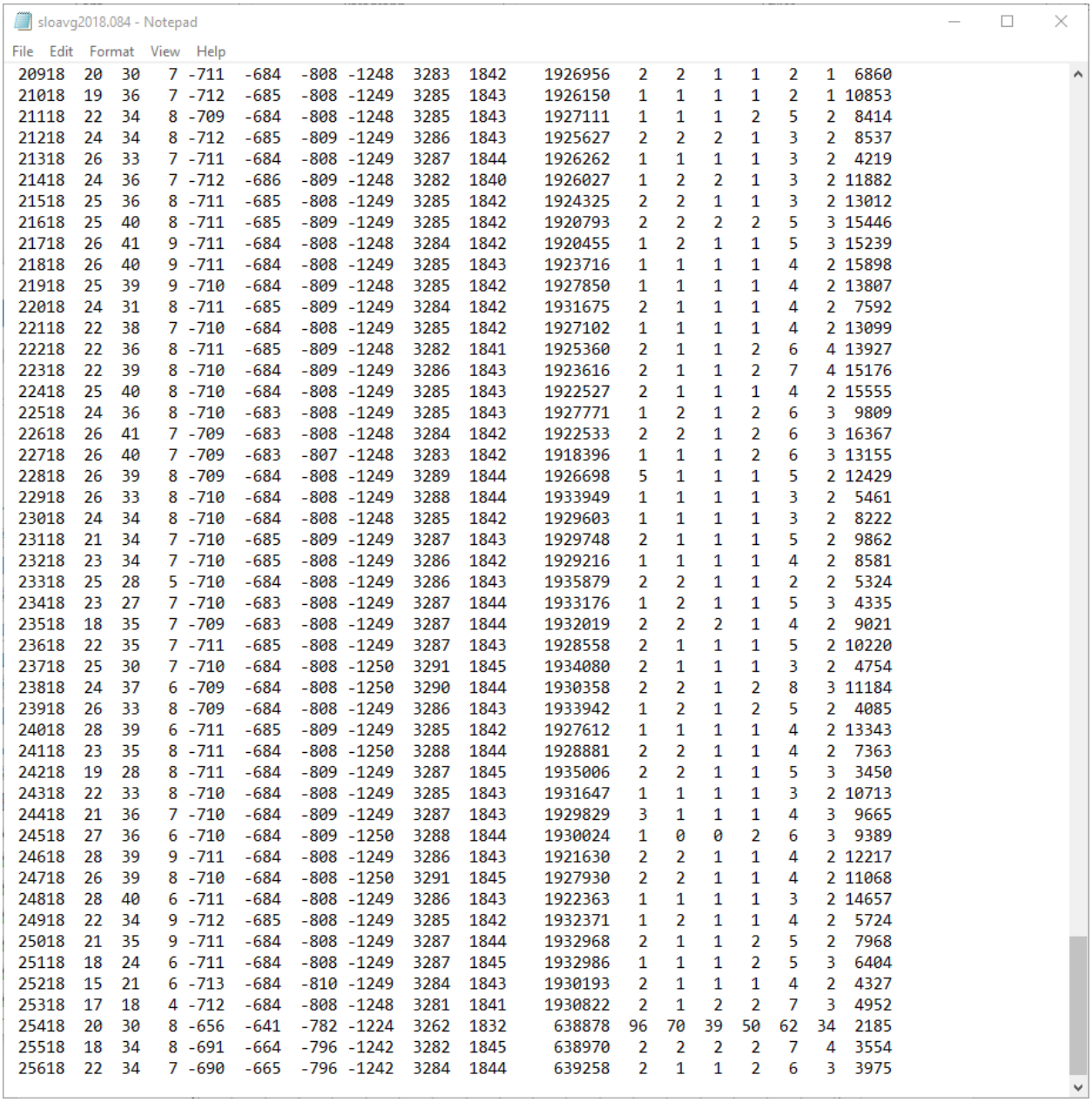
12. Reviewing historic data and consulting with the scientific authority for guidance will determine what date range requires reprocessing and new coefficients to be applied.
    a. To apply the new coefficients to Bfile Pro for instrument ozone calibration:
        i. Select **Options**
        ii. Select **Instrument Constants**
        iii. Under **Instrument Number**, select the instrument from the drop down menu
        iv. Under **Calibration Date**, select the starting calibration date
        v. Under **TC**, edit the temperature coefficients
        vi. Press the "OK" button.



13. The newly created corrected SL average file needs to be manually applied to the master sloavg.III file in the instrument data directory.
    a. Ensure a backup copy is made prior to any changes to the master file in case problems occur or mistakes are discovered and a recovery is required. i.e. copy sloavg.III to sl_oldYYYYJJJ.III (todays date).
    b. In this example, the data from the new file sloavg2018.084 would be used to overwrite the matching date range within the instrument sloavg file, In this case sloavg.084 in \BR#084\Data.

This is a manual copy and paste process

ENSURE ONLY THE DATA THAT HAS BEEN REPROCESSED IS REPLACED, NOT THE WHOLE RECORD.


sloavg2018.084 - Notepad

File Edit Format View Help

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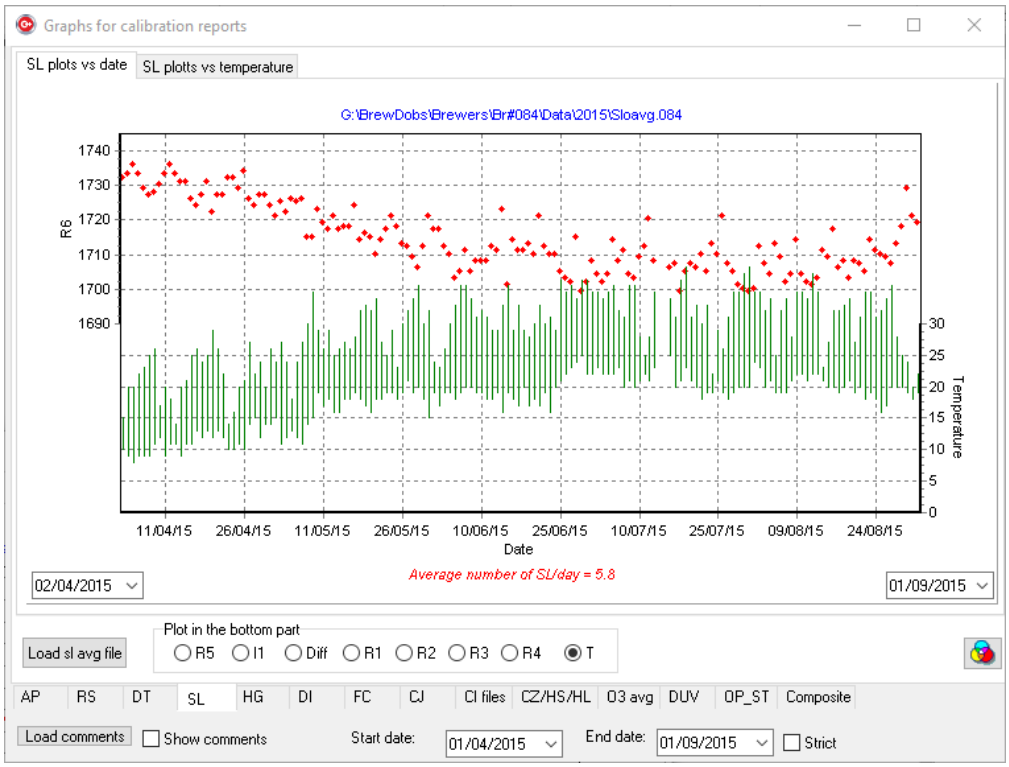
```

New Temperature coefficients Results

SL R6 ratio decreases as temperature increases (original slavg.084 - old TC - plotted in PReport)



SL R6 ratio is stable with temperature fluctuations (new sloavg.084 using new TC - plotted in PReport)