Subject: Fit program for the Callendar - Van Dusen equation
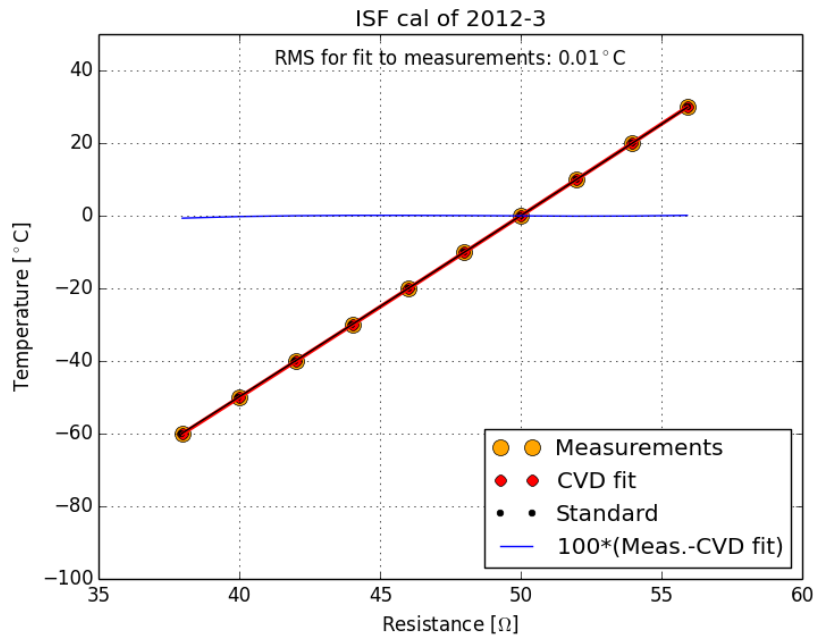Al Cooper
17 May 2014

This memo describes usage of the program CVDfit.py to obtain fits of the Callendar - Van Dusen equation to measurements from bath calibrations. The program resides on EOL file space in the directory ~cooperw/TCal. This can be run from tikal.eol.ucar.edu or barolo.eol.ucar.edu. These steps are needed to use the program:

1. Copy this file to a directory in your own workspace.

2. Put the calibration data into a file called BathCal.csv located in the same directory as CVD-fit.py. An example is in ~cooperw/TCal. The file should have this format:

   (a) Title line as the first line of the file. Use this for ID and include information like which sensor/element, where the calibration was performed, the date of the calibration, etc. This is only used for ID.

   (b) A series of lines, one line per calibration point, that contain the temperature and corresponding resistance from the calibration. Lines should have the format %f,%f – i.e., floating point numbers separated by a comma.

3. Run the program using this command line from a linux machine:
   python CVDfit.py [filename]
   'filename' is optional and can be used to select a calibration file other than 'BathCal.csv', but that file should have the format as above.

See the output listing for the fit coefficients and for a set of resistances and temperatures to use in on-board calibration. See also the figure 'CVD1.png' left in the working directory. It is a plot of the calibration points, the fitted line, the nominal-value CVD equation (labeled 'standard'), and the RMS of the fit. An example of the output is shown below:

```
ISF cal of 2012-3
cvd coefficients from fit are  50.008073 0.003914
(expected coefficients:        50.0      0.003925)
T -60.000 R 37.991
T -50.000 R 40.008
T -40.000 R 42.020
T -30.000 R 44.025
T -20.000 R 46.025
T -10.000 R 48.020
T   0.000 R 50.008
T  10.000 R 51.991
T  20.000 R 53.968
```

A program copy and an example calibration file are included as attachments. These and a copy of this memo (UsingCVDfit.pdf) are included in the directory /h/eol/cooperw/TCal .

—- END —-

Attachments: CVDfit.py
                    BathCal.csv