How to run the Matlab script

We developed a MATLAB® routine which can perform different regressions including residual analysis of data from a wide range of chamber experiment set-ups.

1. **Preparation of data files**

   Three different datasheets are needed:

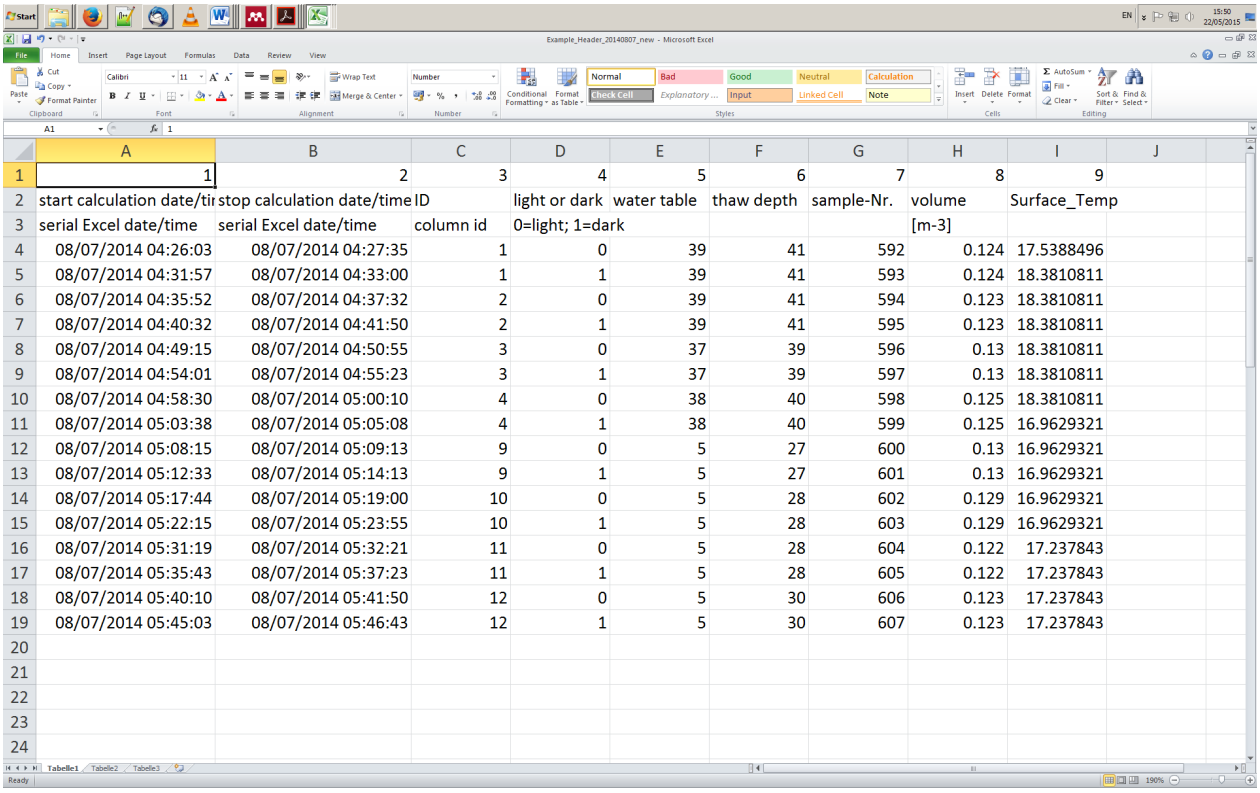
   The Headerfile must contain two timestamp columns (starttime and endtime) to define the measurement period. Further additional information for each of the single measurements (e.g. ID of sampling site, basal area of sampling plot, light or dark measurement) can also be added.

   The Rawdatafile must contain a timestamp column and data from the gas analyzer. It can also contain other parameters (in this example: PAR, T and VWC) if they are recorded with the same timestamp.

   The Metdatafile must again contain a timestamp column. In this example it contains a timestamp (30:00 minutes; time interval 10:00:00-10:30:00 = 10:30:00) whose frequency is not the same as the timestamp in the Rawdata file (selection of matching metdata is done in lines 375-380 in the script).

   Note: If the timestamp of your datafiles differs from those used in these example files, small corrections to the script are needed.

   All files have to be formatted into .csv and should not contain any text (Header title rows have to be removed). The timestamp columns have to be formatted as a number with 10 decimal places (Fig. 1 and Fig. 2)



	A	B	C	D	E	F	G	H	I	J
1	1	2	3	4	5	6	7	8	9	
2	start calculation date/tir	stop calculation date/time	ID	light or dark	water table	thaw depth	sample-Nr.	volume	Surface_Temp	
3	serial Excel date/time	serial Excel date/time	column id	0=light; 1=dark				[m-3]		
4	08/07/2014 04:26:03	08/07/2014 04:27:35	1	0	39	41	592	0.124	17.5388496	
5	08/07/2014 04:31:57	08/07/2014 04:33:00	1	1	39	41	593	0.124	18.3810811	
6	08/07/2014 04:35:52	08/07/2014 04:37:32	2	0	39	41	594	0.123	18.3810811	
7	08/07/2014 04:40:32	08/07/2014 04:41:50	2	1	39	41	595	0.123	18.3810811	
8	08/07/2014 04:49:15	08/07/2014 04:50:55	3	0	37	39	596	0.13	18.3810811	
9	08/07/2014 04:54:01	08/07/2014 04:55:23	3	1	37	39	597	0.13	18.3810811	
10	08/07/2014 04:58:30	08/07/2014 05:00:10	4	0	38	40	598	0.125	18.3810811	
11	08/07/2014 05:03:38	08/07/2014 05:05:08	4	1	38	40	599	0.125	16.9629321	
12	08/07/2014 05:08:15	08/07/2014 05:09:13	9	0	5	27	600	0.13	16.9629321	
13	08/07/2014 05:12:33	08/07/2014 05:14:13	9	1	5	27	601	0.13	16.9629321	
14	08/07/2014 05:17:44	08/07/2014 05:19:00	10	0	5	28	602	0.129	16.9629321	
15	08/07/2014 05:22:15	08/07/2014 05:23:55	10	1	5	28	603	0.129	16.9629321	
16	08/07/2014 05:31:19	08/07/2014 05:32:21	11	0	5	28	604	0.122	17.237843	
17	08/07/2014 05:35:43	08/07/2014 05:37:23	11	1	5	28	605	0.122	17.237843	
18	08/07/2014 05:40:10	08/07/2014 05:41:50	12	0	5	30	606	0.123	17.237843	
19	08/07/2014 05:45:03	08/07/2014 05:46:43	12	1	5	30	607	0.123	17.237843	
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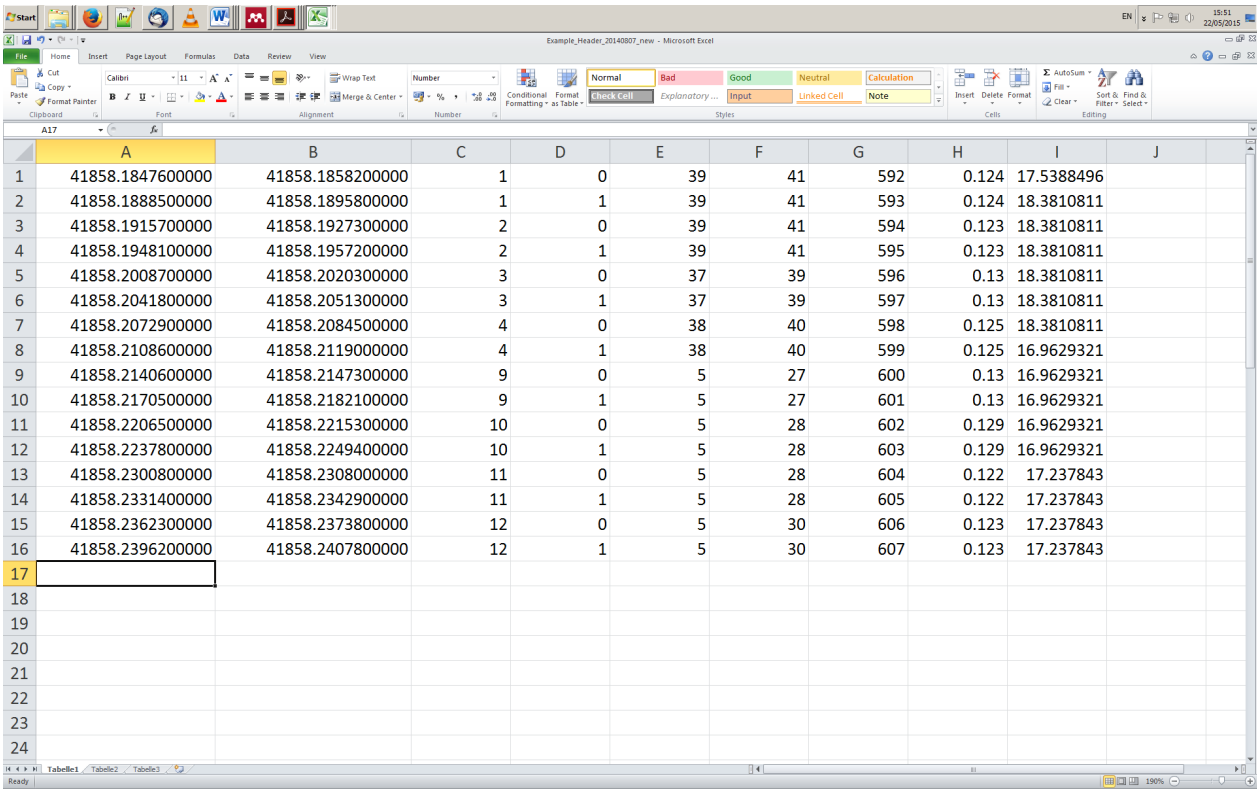
24										

Figure 1 - Headerfile with two date columns and additional information



	A	B	C	D	E	F	G	H	I	J
1	41858.1847600000	41858.1858200000	1	0	39	41	592	0.124	17.5388496	
2	41858.1888500000	41858.1895800000	1	1	39	41	593	0.124	18.3810811	
3	41858.1915700000	41858.1927300000	2	0	39	41	594	0.123	18.3810811	
4	41858.1948100000	41858.1957200000	2	1	39	41	595	0.123	18.3810811	
5	41858.2008700000	41858.2020300000	3	0	37	39	596	0.13	18.3810811	
6	41858.2041800000	41858.2051300000	3	1	37	39	597	0.13	18.3810811	
7	41858.2072900000	41858.2084500000	4	0	38	40	598	0.125	18.3810811	
8	41858.2108600000	41858.2119000000	4	1	38	40	599	0.125	16.9629321	
9	41858.2140600000	41858.2147300000	9	0	5	27	600	0.13	16.9629321	
10	41858.2170500000	41858.2182100000	9	1	5	27	601	0.13	16.9629321	
11	41858.2206500000	41858.2215300000	10	0	5	28	602	0.129	16.9629321	
12	41858.2237800000	41858.2249400000	10	1	5	28	603	0.129	16.9629321	
13	41858.2300800000	41858.2308000000	11	0	5	28	604	0.122	17.237843	
14	41858.2331400000	41858.2342900000	11	1	5	28	605	0.122	17.237843	
15	41858.2362300000	41858.2373800000	12	0	5	30	606	0.123	17.237843	
16	41858.2396200000	41858.2407800000	12	1	5	30	607	0.123	17.237843	
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Figure 2 - Formatted Headerfile contains only numbers, all description has been removed

2. Running the script

To run the script the function “chamberflux_example” has to be entered into MATLAB Command Window as shown in Figure 3.

Explanation of function arguments:

chamberflux_example – function name
headerfilename – name of Header file (‘Example_Header.csv’)
rawdatafilename – name of Rawdata file (‘Example_Rawdata.csv’)
metdatafilename – name of Metdata file (‘Example_Metdata.csv’)
resultsfilename – name of Results file (‘Example_Results.csv’)
startrowheader – number of row in the Header file from which calculation should be started
control – manual adjustment of discard intervals (‘m’) or automatic run with fixed intervals (‘f’)
discardstart – interval which should be discarded at the start of each flux calculation (in s; e.g. ‘10’)
interval – time interval for flux calculation (in s)
mode - options: '0': t=0 at headerdata(i,1)+discardstart; '1': t=0 at headerdata(i,1)
before – interval to be plotted in output prior to flux calculation begins (in s)
after – interval to be plotted in output at end of flux calculation window (in s)
gas – gas of interest (in this script: ‘CH_4’, ‘CO_2’ or ‘H_2O’)
watercorrection - options: '0' water correction will not be applied; '1' water correction will be applied

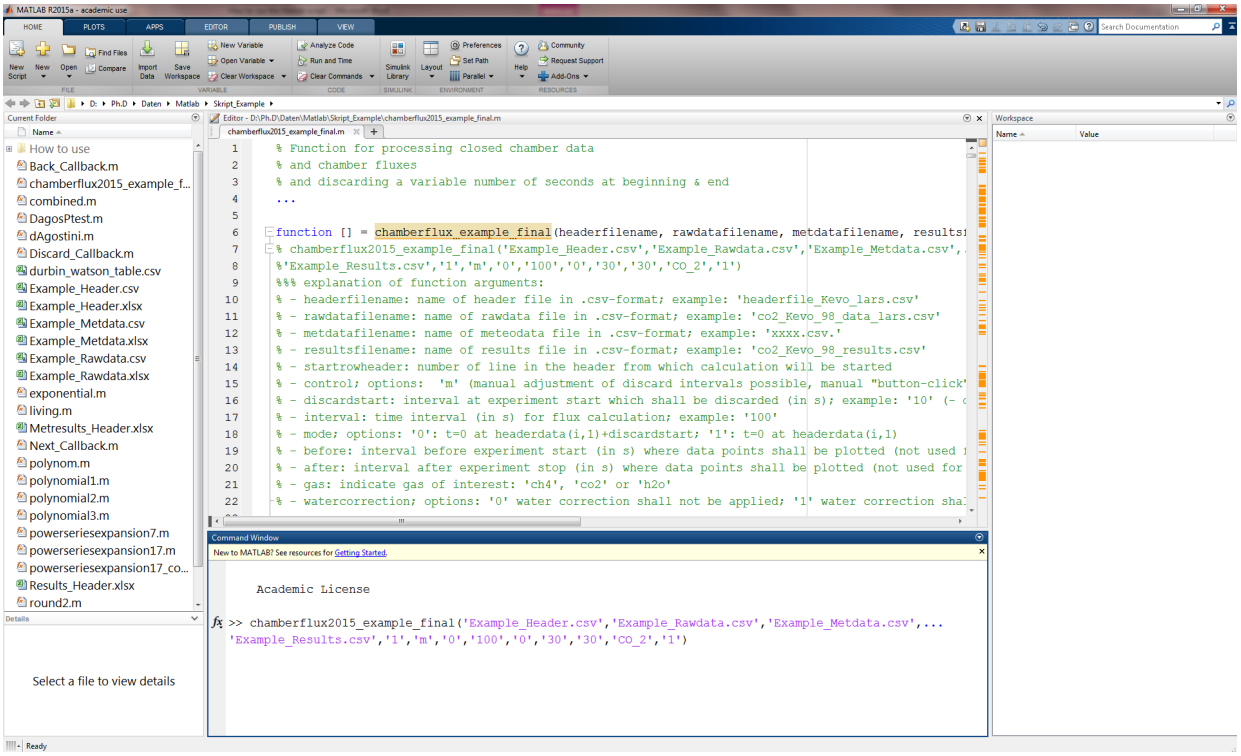

Figure 3 - calling the function in the command window

3. **Manually shifting of the start- and endtime of flux calculations**
   It is possible to change start- and endtime of flux calculation on a visual basis (Fig. 4) by using the ‘discardint.’-button. By moving the position of the vertical blue lines the start- and end-time can be adjusted. The new calculation using this manual time window will be run upon clicking the ‘recalculate’-button.

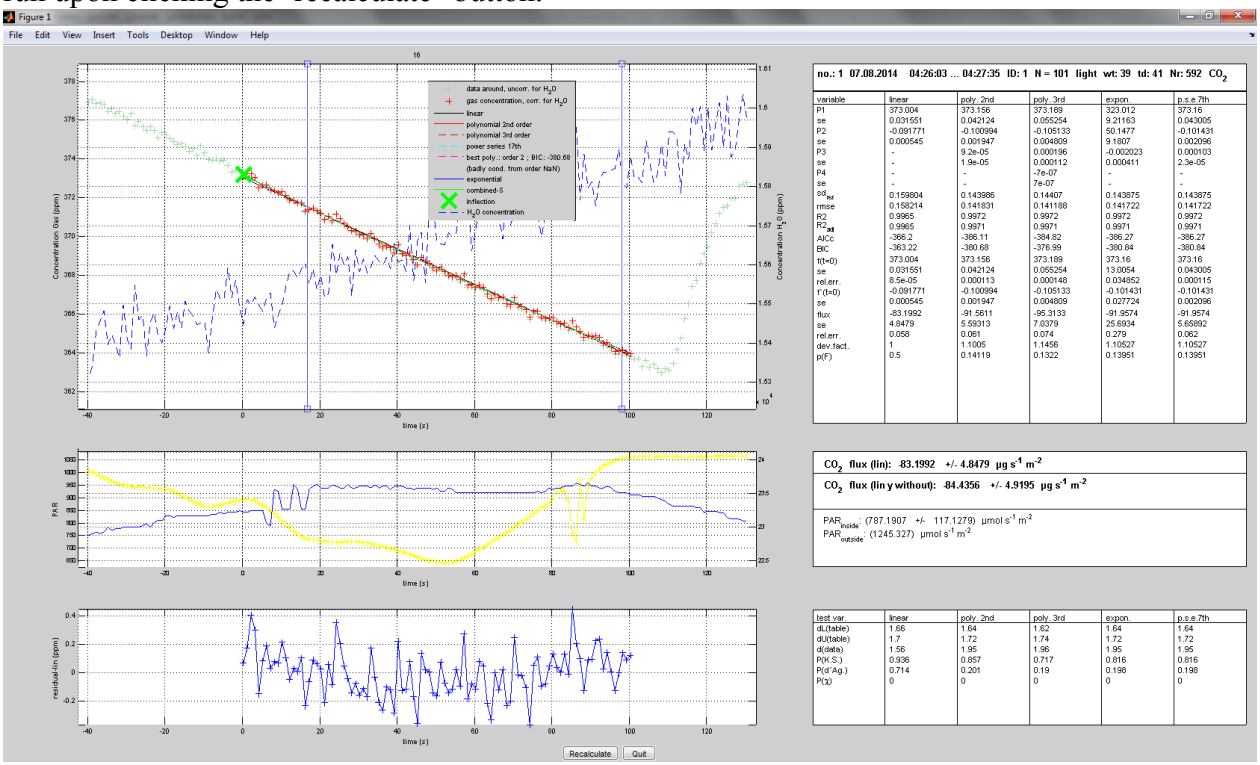

Figure 4 - Adjustment of flux calculation window

4. **Results**
   Each flux calculation result is saved in the Results file after clicking the ‘Next’-button. Two Headers (Results and Metresults) are in the folder which can be inserted into the Results files via ‘copy & paste’. Date columns have to be reformatted from a number with 10 decimal places to a date.

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