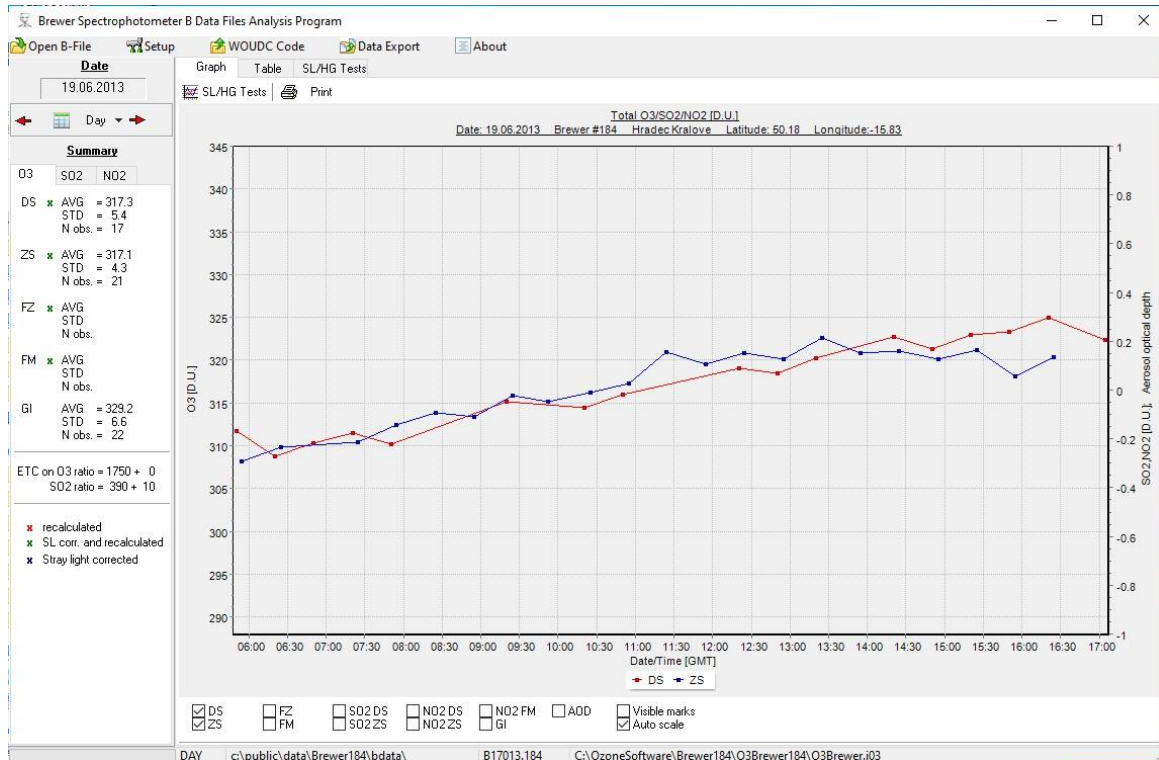


# O3Brewer

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## 1. Introduction

O3Brewer is the Brewer B-files analysis program. The program is used to process Brewer B-files. The output can be graph and file in ASCII code of O3, SO2, NO2, AOD or HG, SL tests for one day, month, year or selected period of time.



Type	ND	Time	ZA	MU	Temp	DS O3	ZS O3	Error	DS SO2	ZS SO2	Error	FZ O3	Error	FM O3	Error	GI O3	Error	DS NO2	Error
gi	0	04:25:59	77.016	4.207	23											318.2	1.4		
gi	0	04:40:25	74.856	3.672	24											318.3	1.5		
ds	1	05:50:06	64.009	2.252	26	311.8		1.4	0.5		0.5								
zs	0	05:54:23	63.327	2.200	27		308.2	2.2		-6.8	1.0								
gi	0	05:57:52	62.773	2.160	27											321.1	1.0		
ds	2	06:20:03	59.228	1.937	28	308.8		2.0	1.0		0.9								
zs	0	06:24:24	58.533	1.899	29		309.9	1.9		-5.2	0.6								
gi	0	06:27:53	57.977	1.871	29											322.6	0.9		
ds	2	06:49:59	54.448	1.709	30	310.4		0.7	1.0		0.3								
gi	0	06:57:49	53.205	1.660	31											325.0	1.0		
ds	2	07:19:59	49.704	1.539	32	311.6		0.7	0.4		0.2								
zs	0	07:24:20	49.024	1.519	33		310.5	2.2		-3.3	0.5								
gi	0	07:27:49	48.483	1.502	33											326.3	1.6		
ds	2	07:50:00	45.072	1.411	34	310.3		1.6	1.1		0.5								
zs	0	07:54:20	44.415	1.396	34		312.5	1.6		-3.2	0.5								
gi	0	07:57:50	43.892	1.384	34											326.3	1.2		
zs	0	08:24:30	39.995	1.302	35		313.9	1.9		-3.6	0.5								
gi	0	08:27:59	39.503	1.293	36											326.2	1.0		
zs	0	08:54:22	35.945	1.233	37		313.4	1.4		-3.5	0.4								
gi	0	08:57:52	35.501	1.226	37											325.1	0.6		
ds	3	09:20:01	32.846	1.189	38	315.2		1.7	0.2		0.5								
zs	0	09:24:22	32.365	1.182	38		315.9	1.5		-4.1	0.5								
gi	0	09:27:52	31.990	1.178	38											328.0	1.0		

## 2. Hardware requirements

- IBM PC compatible, 64 bit application
- MS Windows 7...11

## 3. O3Brewer directory and file structure

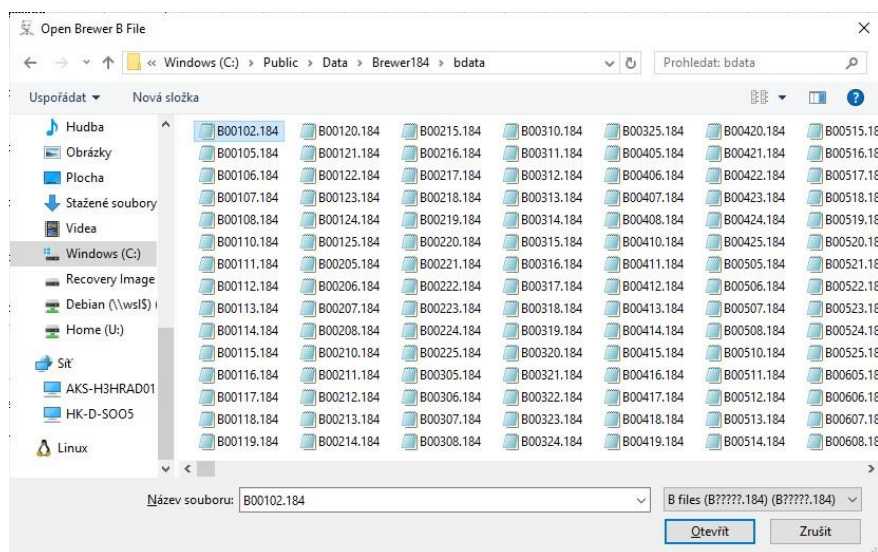
In the same directory must be these files:

- O3Brewer.exe - main program
- O3Brewer.i01,O3Brewer.i02,...O3Brewer.i99 - files of constant, each for a different time period
- GI\_const.txt – constant file for GI ozone calculation

## 4. Description of menu system

- Open File

The command opens Brewer data file and processes it based on initialization file. The default directory is set in Setup menu - Path to data files (B-files).



If you want to change date to open another file, it is faster to click on some of these buttons:



or press '+', '-'.

To see the data from one month or year press "Day" button and select Month or Year.

- **Setup**

The command involves to change all parameters for the calculation of O3,SO2 and NO2.

Setup - O3Brewer.i07

Save O3Brewer.i07 file Close Setup Open Brewer Configuration File

Data O3/SO2/NO2/SL Data Submission

Calibration history

Date: 2023-06-20

Name of file: O3Brewer.i07

Validity: from: 2023-06-20 to: -

Rejection criteria

<input checked="" type="checkbox"/>	O3DS	Max STD	2.50
<input checked="" type="checkbox"/>	O3ZS	Max STD	2.50
<input checked="" type="checkbox"/>	O3FZ_GI	Max STD	2.00
<input checked="" type="checkbox"/>	O3FM	Max STD	5.00
<input checked="" type="checkbox"/>	NO2DS	Max STD	0.20
<input checked="" type="checkbox"/>	NO2ZS	Max STD	0.20
<input checked="" type="checkbox"/>	NO2FM	Max STD	0.50
<input checked="" type="checkbox"/>	MU-DS_ZS	Value	5.00
<input checked="" type="checkbox"/>	MU-FZ_GI	Value	8.00
<input checked="" type="checkbox"/>	MU-FM	Value	3.20
<input checked="" type="checkbox"/>	MU-NO2	Value	5.00

Recalculation

Recalculate O3DS, O3FZ, O3FM measurements

Recalculate O3ZS measurements

Recalculate NO2DS, NO2FM measurements

Recalculate NO2ZS measurements

SL test O3 correction and recalculation

SL test NO2 correction and recalculation

Recalculate SL and N2SL tests

Apply smoothing filter - SISmooth.prn file

Straylight correction

Instrument number: 184

GO3DS number: 096

Path to data files (B-files): \\HK-D-S002\B184\bdata\

Path to WOUDC files: c:\public\data

New Delete

Setup - O3Brewer.i07

Save O3Brewer.i07 file Close Setup Open Brewer Configuration File

Data O3/SO2/NO2/SL Data Submission

Calibration history

Date: 2023-06-20

Name of file: O3Brewer.i07

Validity: from: 2023-06-20 to: -

O3/SO2 NO2 SL Setup Other Constants Straylight

DS Setup

ETC Values	O3	1775.0	O3 Abs. Coeff.	O3	0.3396
	SO2	415.0		SO2	1.1410
			SO2 Abs. Coeff.	SO2	2.3500

ZS Setup

Coefficients of Polynomial

A	-0.15995	D	0.90522	G	-1.36771
B	0.10995	E	-0.38833	H	1.25097
C	-0.02641	F	0.16758	K	-0.33063

Temperature Coefficients

TC1	0.00000	TC3	0.00000	TC5	0.00000
TC2	0.00000	TC4	0.00000		

New Delete

Setup - O3Brewer.i07

Save O3Brewer.i07 file Close Setup Open Brewer Configuration File

Data O3/SO2/NO2/SL Data Submission

Calibration history

Date: 2023-06-20

Name of file: O3Brewer.i07

Validity: from: 2023-06-20 to: -

Meta-Data Content

DATA GENERATION

Agency: CHMI-HK

Version: 0.0

Scientific Authority: [ ]

PLATFORM

Name: Hradec Králové

Country: CZE

GAW\_ID: HKR

INSTRUMENT

Model of instrument: MKIII

TIMESTAMP

UTC Offset: +00:00:00

LOCATION

Latitude: 50.177

Longitude: 15.839

Height: 285

Data fields - DAILY

WLCODE  UTC\_Begin  mMu

ObsCode  UTC\_End  Column SO2

Column O3  UTC\_Mean

StdDevO3  nObs

New Delete

- **WODC Code**

Menu is used to code O3 data in extCSV data format.

The screenshot shows a window titled "WODC Code Wizard" with a close button. The main heading is "What date period do you want to code?". Below this, there are three rows of input fields:

- "From date [month, year]" with a dropdown menu set to "1" and a text box set to "2025".
- "To date [month, year]" with a dropdown menu set to "1" and a text box set to "2025".
- "FW2 positions to include" with a series of checkboxes labeled 0, 1, 2, 3, 4, and 5, all of which are checked.

At the bottom of the dialog, there are three buttons: "< Back", "Next >", and "Cancel".

The screenshot shows a window titled "WODC Code Wizard" with a close button. The main heading is "Total Ozone Data Submission File Format". Below this, the text "extCSV [extended Comma Separated Values format]" is displayed.

There are two radio button options under the heading "Ozone data table":

- Total Ozone Observations
- Total Ozone (daily values)

To the right of these options is a "Data version" label followed by a text box containing the value "0.0".

At the bottom of the dialog, there is a message: "Press 'Finish' to save data." Below this message are three buttons: "< Back", "Finish", and "Close".

- **Data Export**

Output of processed data in ASCII code with respect to initialization file setting.

Data Export [X]

Save Print Close

Date from [dd mm yyyy] 1 1 2014 to [dd mm yyyy] 28 2 2014

Type of measurement  DS  FZ  DS NO2  FM NO2  
 ZS  FM  ZS NO2  GI

FW2 positions to include  0  1  2  3  4  5

Individual measurements Daily averages

Raw data Summary

Type of measurement  
 Filter  
 ND filter position (steps)  
 Time - minutes  
 Lower slit mask position  
 Upper slit mask position  
 # of cycles  
 Raw counts wavelength #0  
 Dark count  
 Raw counts wavelength #1  
 Raw counts wavelength #2  
 Raw counts wavelength #3  
 Raw counts wavelength #4  
 Raw counts wavelength #5  
 Single ratio #1 MS(4)  
 Single ratio #2 MS(5)  
 Single ratio #3 MS(6)  
 Single ratio #4 MS(7)

Time  
 Month  
 Day  
 Year  
 Zenith angle  
 Airmass  
 Temperature  
 Type of measurement  
 ND filter position  
 Single ratio #1 MS(4)  
 Single ratio #2 MS(5)  
 Single ratio #3 MS(6)  
 Single ratio #4 MS(7)  
 Double ratio #1 MS(8)  
 Double ratio #2 MS(9)  
 SO2 value MS(10)  
 O3 value MS(11)

STD single ratio #1  
 STD single ratio #2  
 STD single ratio #3  
 STD single ratio #4  
 STD double ratio #1  
 STD double ratio #2  
 STD SO2  
 STD O3

AOD 320.1nm

Data Export [X]

Save Print Close

Date from [dd mm yyyy] 1 1 2014 to [dd mm yyyy] 28 2 2014

Type of measurement  DS  FZ  DS NO2  FM NO2  
 ZS  FM  ZS NO2  GI

FW2 positions to include  0  1  2  3  4  5

Individual measurements Daily averages

Date  
 Julian Day  
 Type of measurement  
 Column O3, NO2  
 Number of measurements  
 UTC Begin  
 UTC End  
 UTC Mean  
 Column SO2  
 Harmonic Mu  
 StdDev O3,NO2  
 AOD 320.1nm

Output  
 DS and ZS and FZ and FM / DSN02 and ZSN02  
 DS or ZS or FZ or FM / DSN02 or ZSN02

## SL test O3 correction

### Method of calculation

SL corrections are applied only on "Data export" and "WODC coding". Each B-file must have at least one SL measurement. The program starts to read the B-files 10 days before the selected date period to read SL test results first and to create "SLsmooth.prn" file, and stop 10 days after the selected date period. After the "SLsmooth.prn" file is created the program reads this file together with B-files again for export or data coding. It means that if you want to apply this corrections to data for WODC, you should do it after the tenth day in the next month.

### Example - Direct Sun ozone calculation

$$DS\_O3 = (R6 - XB1 + (XR6 - ra6)) / XA1 / \text{Mu};$$

where

R6	double ratio
XB1	ETC on O3 ratio (from O3Brewer Setup)
XR6	Value of SL R6 from the last intercomparison (from O3Brewer setup)
ra6	Smoothing SL R6 ratio for the day (from SLsmooth.prn file)
XA1	O3 on O3 ratio ((from O3Brewer Setup)
Mu	airmass

### Smoothing filter

$$\text{weights} = Fx = 1 / (\text{sigma} * \text{Sqrt}(2 * \text{PI})) * \text{EXP}(-(\text{Sqr}(\text{DT}) / (2 * \text{Sqr}(\text{sigma}))))$$

$$\text{sigma} = 5$$

$$\text{DT} = [10..0..10]$$