



The PyeLab database

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OzFlux09

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Overview

How do we cope with the data generated by flux stations?

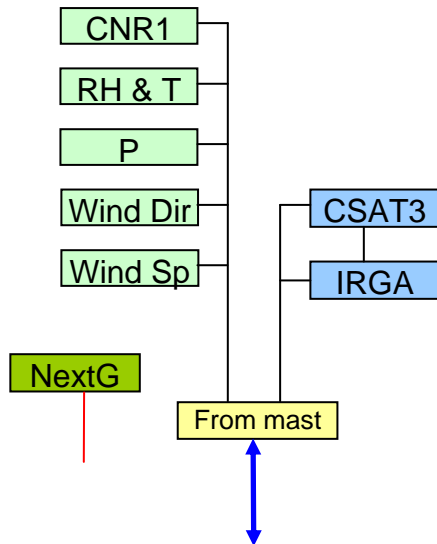
Data storage, archiving, disaster proofing

The PyeLab database

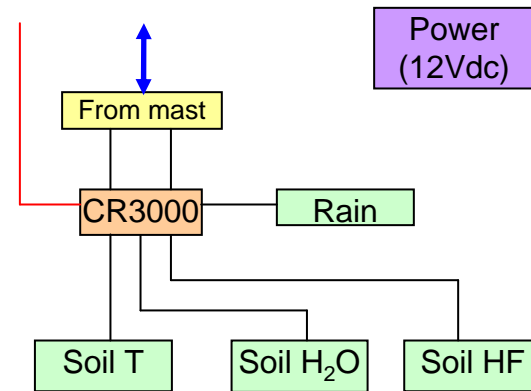
Typical flux station data streams:

- CO₂ and H₂O concentrations in air (10/20Hz)
- 3-D wind vector (10/20Hz)
- Net radiation (15/30 min average)
- Incoming and reflected longwave & shortwave radiation (15/30 minute average)
- RH and air temperature (15/30 minute average)
- 2-D wind speed and direction (15/30 minute average)
- Soil temperature (15/30 minute average)
- Soil heat flux (15/30 minute average)
- Soil water content (15/30 minute measurement)
- Rainfall (15/30 minute sum)

Mast Instruments



Ground Instruments





Flux station data

Daily data collection (stored on site):

- 10 to 20 MB of raw “fast” data
- 100K to 200K of “slow” and processed “fast” data

Daily data collection (transmitted to base):

- 100K to 200K of “slow” and processed “fast” data

Fast raw data collected manually during site visits

Data archiving:

- Keep all raw data for probable future reprocessing
- Data copies to at least two types of media:
 - Hard disk (good long term storage > 10 years)
 - CD/DVD (medium term storage up to 10 years)
 - Online (reliability of provider)
 - Tape
- Be aware of changing technology – ability to access archived data!

Disaster proofing:

- Keep at least one copy of data off site
- Ensure accessibility of stored data
- Document archive contents, storage location(s), review regularly



PyeLab database

Database requirements:

- Ultimate versatility in storing and accessing data
- Simple system for accessing data from multiple sources
- Data input from files (csv, txt) or spreadsheets
- Maintain database tables for raw, QC, gap-filled, final data sets
- Data output to spreadsheets, csv files



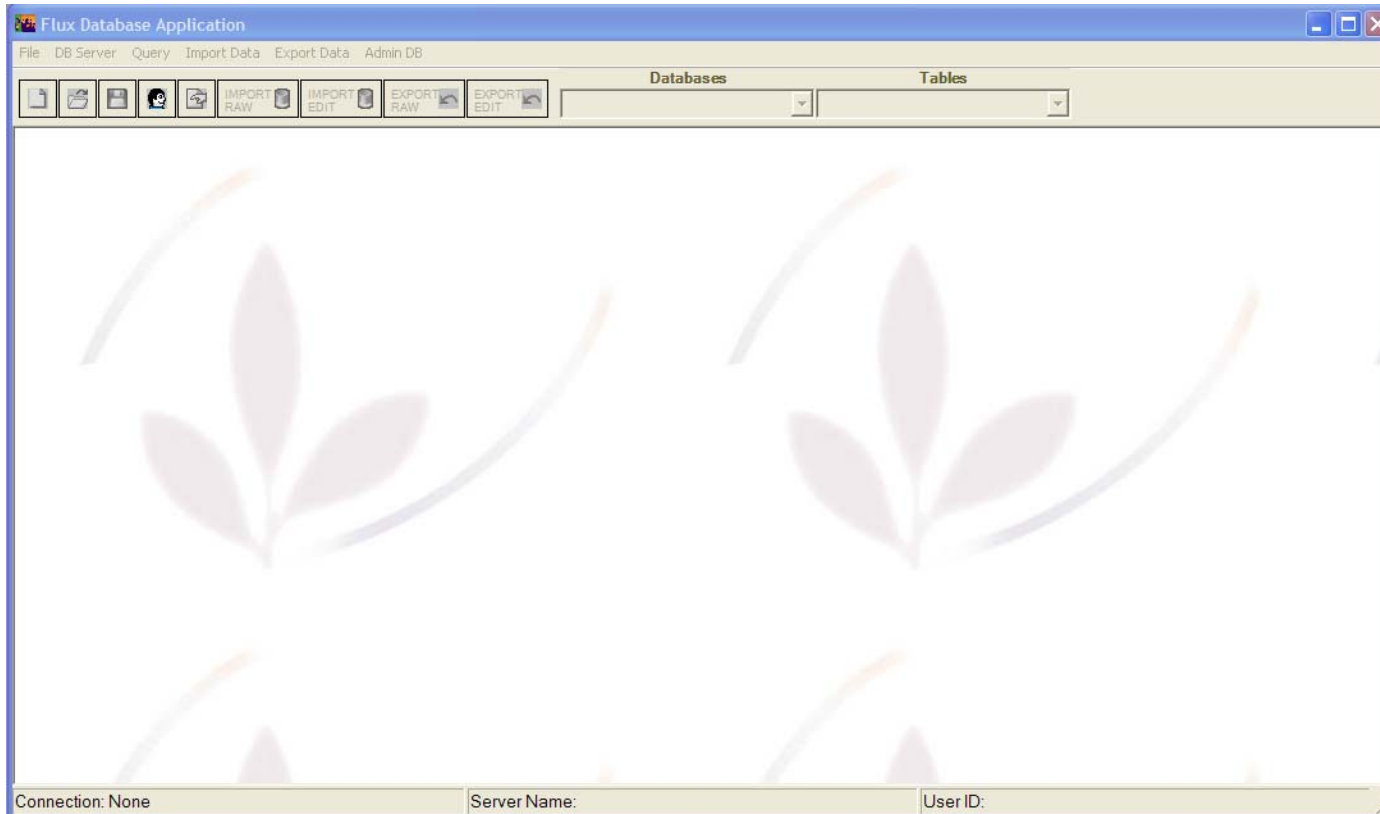
Database features

All data except for date/time stored in database as strings

Front-end GUI programmed in VisualBasic.net

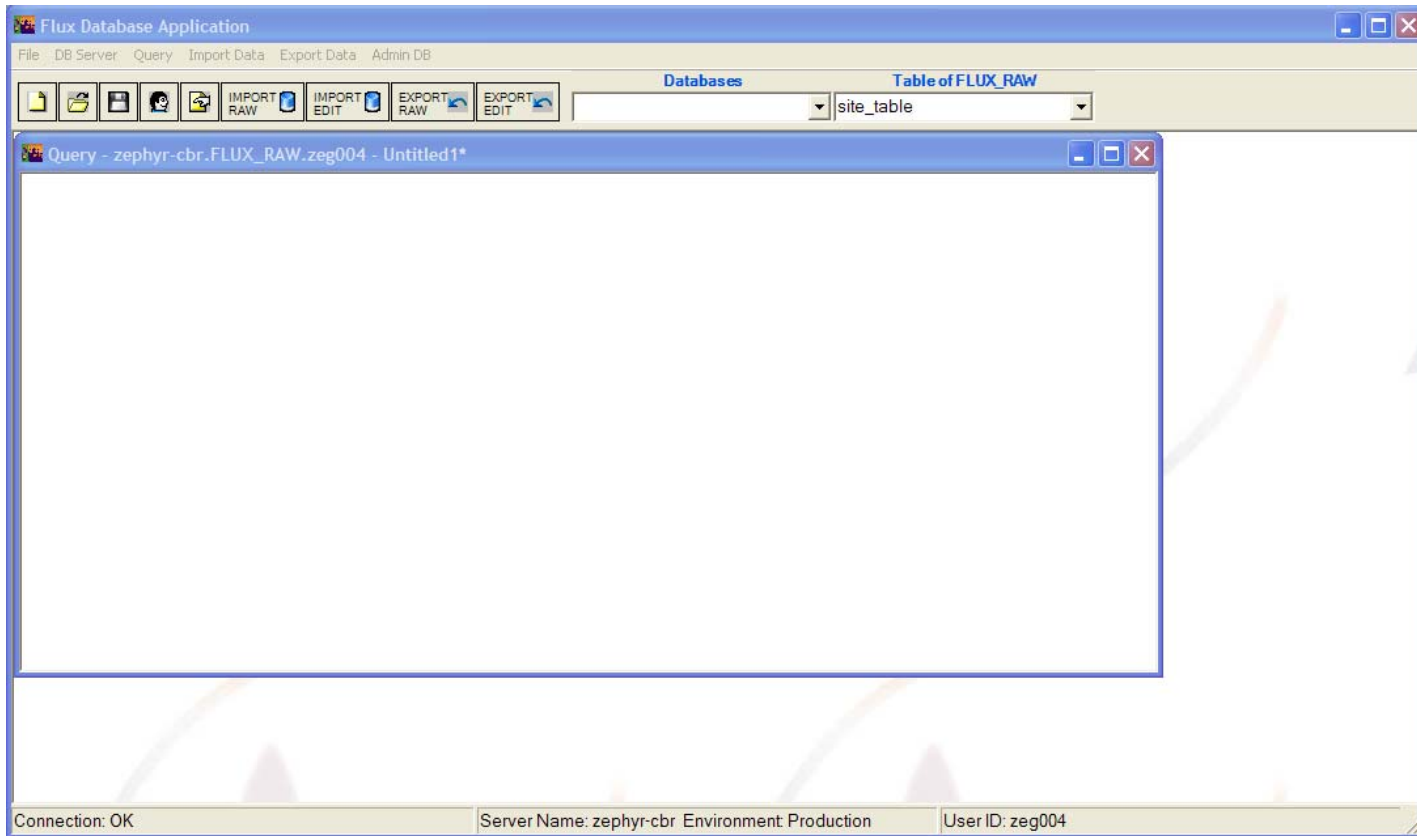


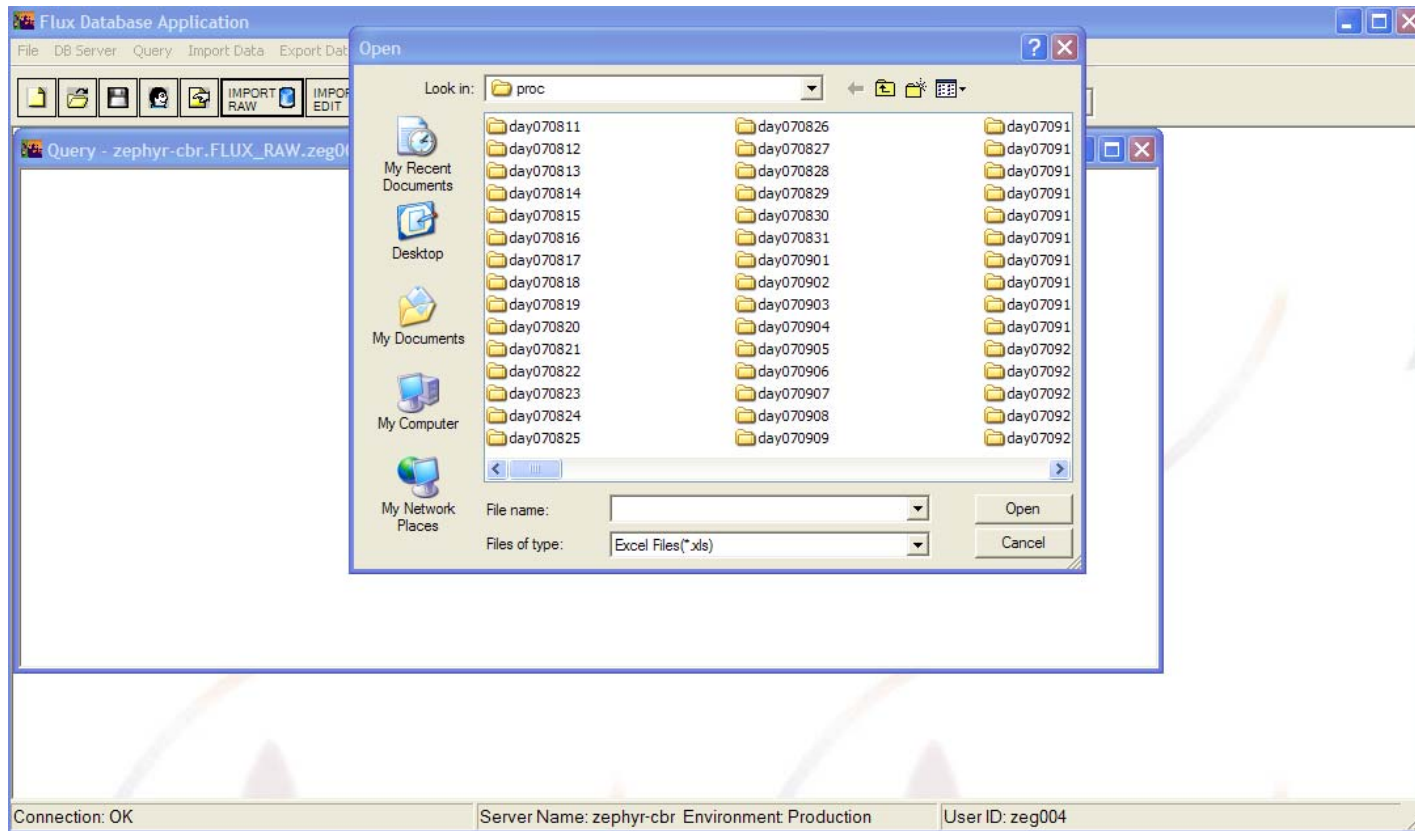
PyeLab database – start screen





PyeLab database – main screen







PyeLab database – data import from csv file 1

Flux Database Application

File DB Server Query Import Data Export Data Admin DB

Databases Table of FLUX_RAW

IMPORT RAW IMPORT EDIT EXPORT RAW EXPORT EDIT

Site_table

	Date_time	Run	T_air_slow	Den_air_sl	P_air_slow	Site	Sonic	IS	Num_scans	Status	Den_air	Cp	lambda	Water_I
▶	11/08/2007	2	11.9875	0.01374	99750	otwy	SH001	2	141600	0	1212.1	1.011	2472.59	1352.3
	11/08/2007	4	12.5925	0.01381	99800	otwy	SH001	2	141300	0	1210.1	1.011	2471.16	1359.8
	11/08/2007	6	12.3675	0.01275	99875	otwy	SH001	2	141600	0	1212.4	1.011	2471.69	1257.2
	11/08/2007	8	12.185	0.01257	100075	otwy	SH001	2	141600	0	1215.7	1.011	2472.12	1242.6
	11/08/2007	10	11.9425	0.01342	100200	otwy	SH001	2	141600	0	1217.9	1.011	2472.7	1327
	11/08/2007	12	12.185	0.01333	100300	otwy	SH001	2	141300	0	1218.1	1.011	2472.12	1319.6
	11/08/2007	14	12.4925	0.01364	100300	otwy	SH001	2	141600	0	1216.7	1.011	2471.39	1349.8
	11/08/2007	16	11.805	0.01312	100400	otwy	SH001	2	141600	0	1221.1	1.011	2473.02	1300.4
	11/08/2007	18	11.185	0.01177	100575	otwy	SH001	2	141600	0	1226.5	1.01	2474.49	1170.4
	11/08/2007	20	10.9375	0.01103	100825	otwy	SH001	2	141300	0	1230.9	1.01	2475.08	1099.7
	11/08/2007	22	10.4325	0.00992	101000	otwy	SH001	2	141600	0	1235.8	1.009	2476.27	992.2
	11/08/2007	24	10.17	0.01	101100	otwy	SH001	2	141300	0	1238.1	1.009	2476.9	1000.7
	12/08/2007	2	8.8275	0.01013	101200	otwy	SH001	2	141300	0	1245.2	1.009	2480.08	1014.7
	12/08/2007	4	8.2125	0.00928	101300	otwy	SH001	2	141300	0	1249.5	1.009	2481.54	931.1
	12/08/2007	6	8.065	0.00844	101400	otwy	SH001	2	141600	0	1251.8	1.008	2481.89	848.5
	12/08/2007	8	7.02975	0.00841	101500	otwy	SH001	2	141600	0	1257.7	1.008	2484.34	846.8
	12/08/2007	10	8.76	0.00813	101700	otwy	SH001	2	141600	0	1252.5	1.008	2480.24	820.4
	12/08/2007	12	10.2525	0.00793	101800	otwy	SH001	2	141300	0	1247.3	1.008	2476.7	801.3
	12/08/2007	14	10.3225	0.00815	101800	otwy	SH001	2	141600	0	1246.9	1.008	2476.54	822.5
	12/08/2007	16	11.0775	0.00812	101800	otwy	SH001	2	141600	0	1243.6	1.008	2474.75	819.8
	12/08/2007	18	9.7075	0.00831	101900	otwy	SH001	2	141600	0	1250.7	1.008	2477.99	839.9
	12/08/2007	20	8.425	0.00779	102025	otwy	SH001	2	141600	0	1258.2	1.008	2481.03	789
	12/08/2007	22	8.7725	0.00771	102100	otwy	SH001	2	141600	0	1257.6	1.008	2480.31	781.4

Upload Data Cancel

Connection: OK Server Name: zephyr-cbr Environment Production User ID: zeg004



PyeLab database – data import from csv file 2

Importing Raw Data into the 'FLUX_RAW' Database

You have selected 171 columns for table column headings.

Date_time
Run
T_air_slow
Den_air_slow

Select Rows

Start From Next Row Select Row Numbers Select TimeStamp

Data to be uploaded from row 2 to end of the file.

Append Data Create a new table

Please select a table from list:

- instrument_table
- otw2_fast_fox_cp
- otwa2_fast_fox_op
- otway_23X_ihr
- Otway_fast_dry_CPOP
- Otway_fast_fox
- Otway_fast_fox_CP
- processing_table
- Tumb_TDR1_daily
- Tumb_TDR2_daily

Show Column Names

Please input the following information:

Table Name:

Comments:

Edit Type:

Data Site:

Upload Cancel



PyeLab database – data import from spreadsheet 1

Flux Database Application

File DB Server Query Import Data Export Data Admin DB

Databases Table of FLUX_RAW

IMPORT RAW IMPORT EDIT EXPORT RAW EXPORT EDIT

site_table

B11 2

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	Otw2 closed path	results														
2																
3																
4																
5																
6																
7																
8																
9																
10	Date_time	Run	T air slow	Den air sl	P air slow	Site	Sonic	IS	Num_scan	Status	Den air	Cp	lambda	Water_Pp	Den CO2	T Lic
11	11/08/2007 01:00	2	11.9875	0.01374	99750	otwy	SH001		2	141600	0	1212.1	1.011	2472.59	1352.3	252.35 ####
12	11/08/2007 03:00	4	12.5925	0.01381	99800	otwy	SH001		2	141300	0	1210.1	1.011	2471.16	1359.8	255.13 ####
13	11/08/2007 05:00	6	12.3675	0.01275	99875	otwy	SH001		2	141600	0	1212.4	1.011	2471.69	1257.2	255.3 ####
14	11/08/2007 07:00	8	12.185	0.01257	100075	otwy	SH001		2	141600	0	1215.7	1.011	2472.12	1242.6	251.57 ####
15	11/08/2007 09:00	10	11.9425	0.01342	100200	otwy	SH001		2	141600	0	1217.9	1.011	2472.7	1327	283.64 ####
16	11/08/2007 11:00	12	12.185	0.01333	100300	otwy	SH001		2	141300	0	1218.1	1.011	2472.12	1319.6	376.88 ####
17	11/08/2007 13:00	14	12.4925	0.01364	100300	otwy	SH001		2	141600	0	1216.7	1.011	2471.39	1349.8	366.62 ####
18	11/08/2007 15:00	16	11.805	0.01312	100400	otwy	SH001		2	141600	0	1221.1	1.011	2473.02	1300.4	344.93 ####
19	11/08/2007 17:00	18	11.185	0.01177	100575	otwy	SH001		2	141600	0	1226.5	1.01	2474.49	1170.4	354.1 ####
20	11/08/2007 19:00	20	10.9375	0.01103	100825	otwy	SH001		2	141300	0	1230.9	1.01	2475.08	1099.7	329.9 ####
21	11/08/2007 21:00	22	10.4325	0.00992	101000	otwy	SH001		2	141600	0	1235.8	1.009	2476.27	992.2	276.28 ####
22	11/08/2007 23:00	24	10.17	0.01	101100	otwy	SH001		2	141300	0	1238.1	1.009	2476.9	1000.7	252.94 ####
23	12/08/2007 01:00	2	8.8275	0.01013	101200	otwy	SH001		2	141300	0	1245.2	1.009	2480.08	1014.7	246.7 ####
24	12/08/2007 03:00	4	8.2125	0.00928	101300	otwy	SH001		2	141300	0	1249.5	1.009	2481.54	931.1	242.65 ####
25	12/08/2007 05:00	6	8.065	0.00844	101400	otwy	SH001		2	141600	0	1251.8	1.008	2481.89	848.5	243.85 ####
26	12/08/2007 07:00	8	7.02975	0.00841	101500	otwv	SH001		2	141600	0	1257.7	1.008	2484.34	846.8	249.93 ####

Sheet1 Sheet2 Sheet3

Upload Data Exit Excel

Connection: OK Server Name: zephyr-cbr Environment Production User ID: zeg004

PyeLab database – data import from spreadsheet 2

Importing Raw Data into the 'FLUX_RAW' Database

You have selected 11 columns for table column headings - from the cell position (10,1) to (10,11)

Date_time
Run
T_air_slow
Den_air_slow

Select Rows

Start From Next Row Select Row Numbers Select TimeStamp

Would you like to upload data from row 11 to end of the File?

Append Data Create a new table

Please select a table from list:

- instrument_table
- otw2_fast_fox_cp
- otw2_fast_fox_op
- otway_23X_ihr
- Otway_fast_dry_CPOP
- Otway_fast_fox
- Otway_fast_fox_CP
- processing_table
- Tumb_TDR1_daily
- Tumb_TDR2_daily

Show Column Names

Please input the following information:

Table Name:

Comments:

Edit Type:

Data Site:

Upload Cancel



PyeLab database – export data 1

Data Download \\Connected DataBase: FLUX_RAW

Export Raw Data

Do you want to activate a saved request?

Create your request:

Select Group	Tables	Select Columns	Add in Basket >	Data Basket
flux_user	instrument_tabl otw2_fast_fox_t otwa2_fast_fox otway_23X_1hr Otwy_fast_dry_ Otwy_fast_fox Otwy_fast_fox_ processing_tat			

Select All
 Select Date



PyeLab database – export data 2

Data Download \\Connected DataBase: FLUX_RAW

Export Raw Data

Do you want to activate a saved request?

Create your request:

Select Group	Tables	Select Columns	Data Basket
flux_user	otway_23X_1hr Otway_fast_dry_ Otway_fast_fox Otway_fast_fox_ processing_tab_ Tumb_TDR1_c Tumb_TDR2_c	<input type="checkbox"/> Den_air <input type="checkbox"/> Den_air_slow <input type="checkbox"/> Den_CO2 <input type="checkbox"/> Flx_CO2_lbl <input type="checkbox"/> Flx_CO2_raw <input checked="" type="checkbox"/> Flx_H2O_corr <input type="checkbox"/> Flx_H2O_lbl <input type="checkbox"/> Flx_H2O_raw	zeg004.otw2_fast_fox_cp.Date_ti zeg004.otw2_fast_fox_cp.Den_ai zeg004.otway_23X_1hr.LiCP_P zeg004.Otway_fast_dry_CPOP_CP zeg004.Otway_fast_fox.Flx_CO2_c

Select All
 Select Date



Best way to learn is by playing with it...