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

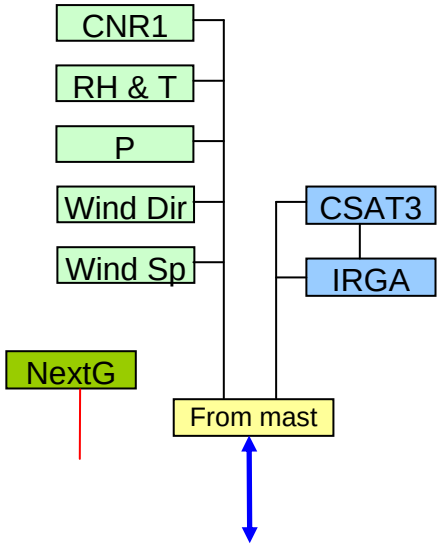
Flux station data

Typical flux station data streams:

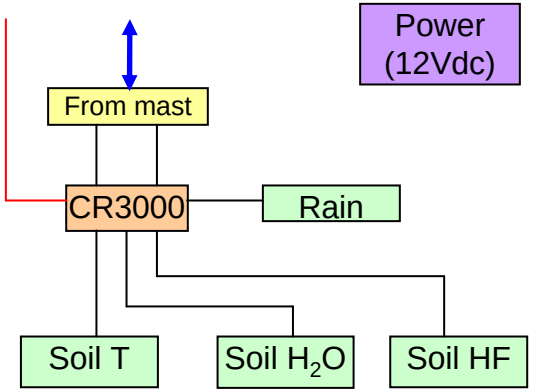
- CO_2 and H_2O concentrations in air (10/20Hz)
- 3-D wind vector (10/20Hz)
- Net radiation (15/30 min average)
- Incoming and reflected longwave & shortwave radiation (15/30 minute average)
- RH and air temperature (15/30 minute average)
- 2-D wind speed and direction (15/30 minute average)
- Soil temperature (15/30 minute average)
- Soil heat flux (15/30 minute average)
- Soil water content (15/30 minute measurement)
- Rainfall (15/30 minute sum)

TERN flux station schematic

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 & disaster proofing

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:

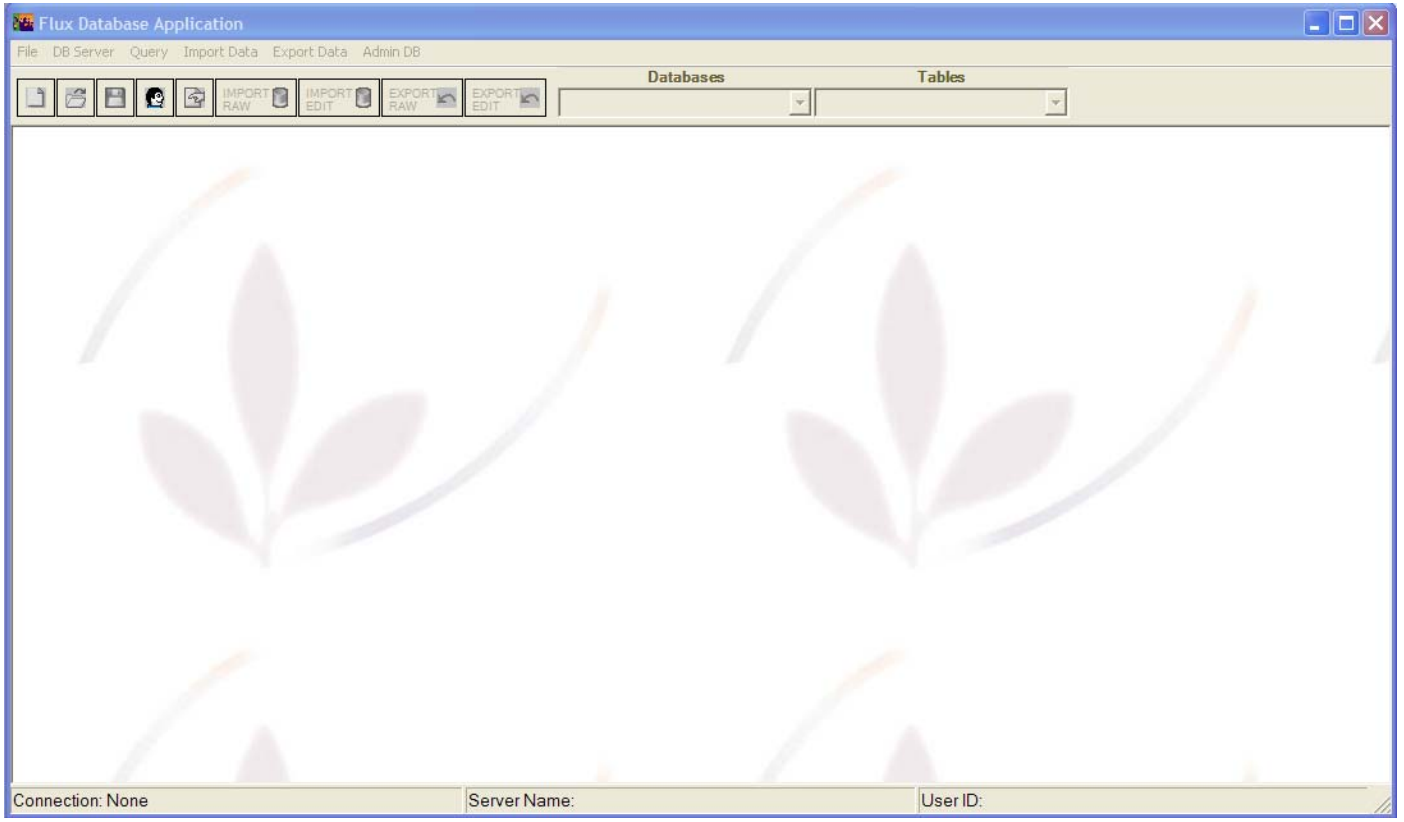
- Ultimate versatility in storing and accessing data
- Simple system for accessing data from multiple sources
- Data input from files (csv, txt) or spreadsheets
- Maintain database tables for raw, QC, gap-filled, final data sets
- Data output to spreadsheets, csv files

Database features

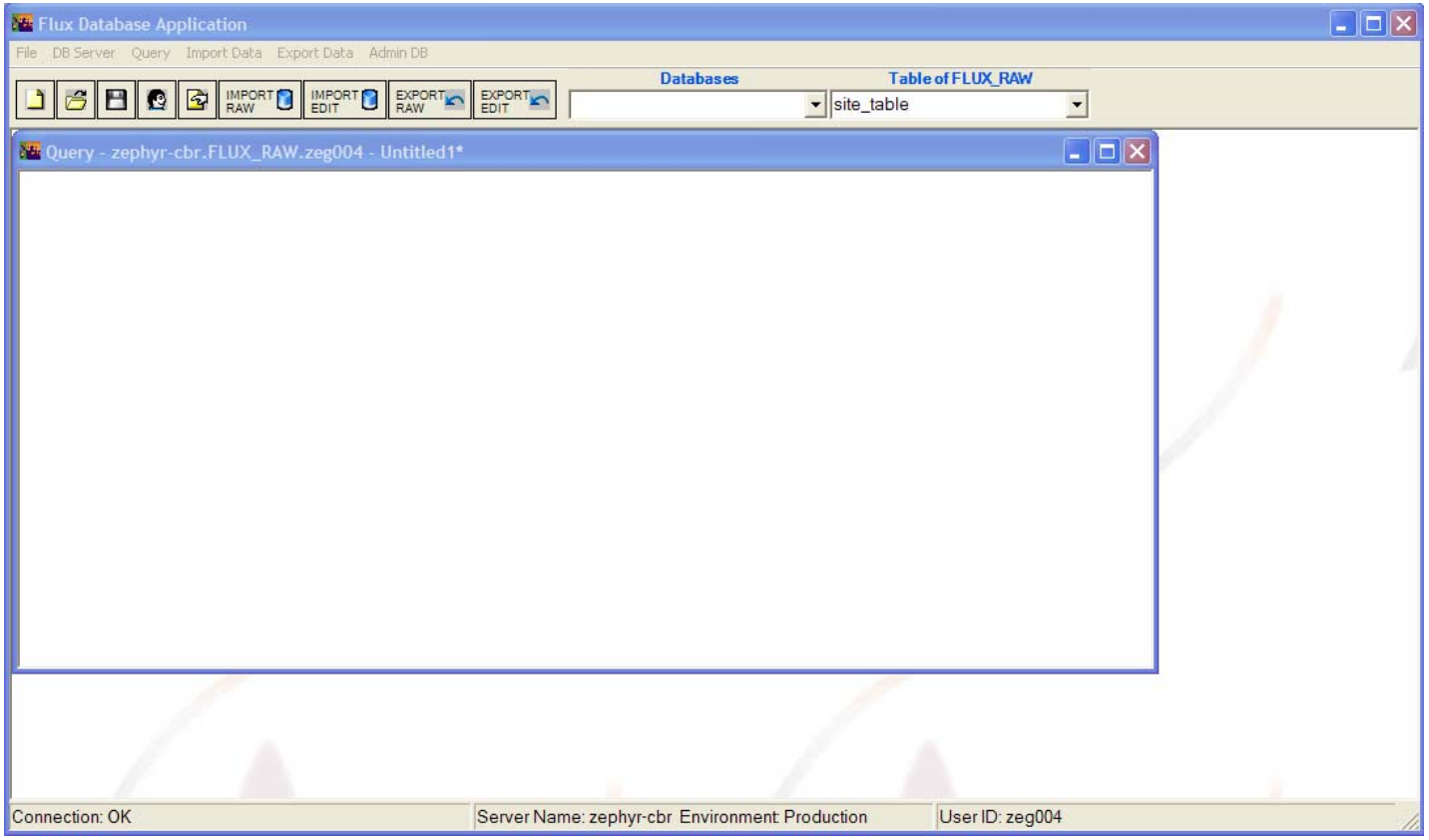
All data except for date/time stored in database as strings

Front-end GUI programmed in VisualBasic.net

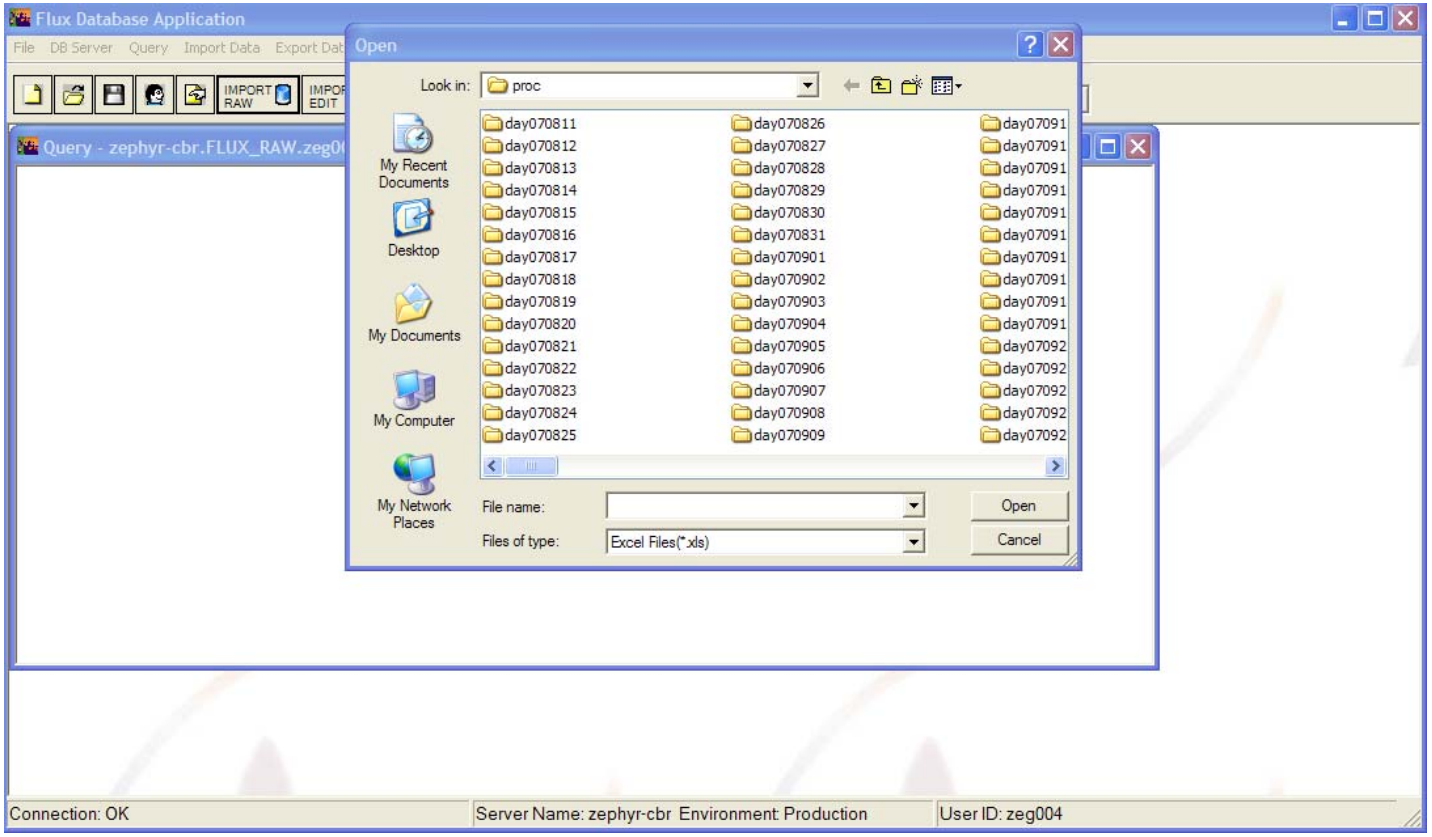
PyeLab database – start screen



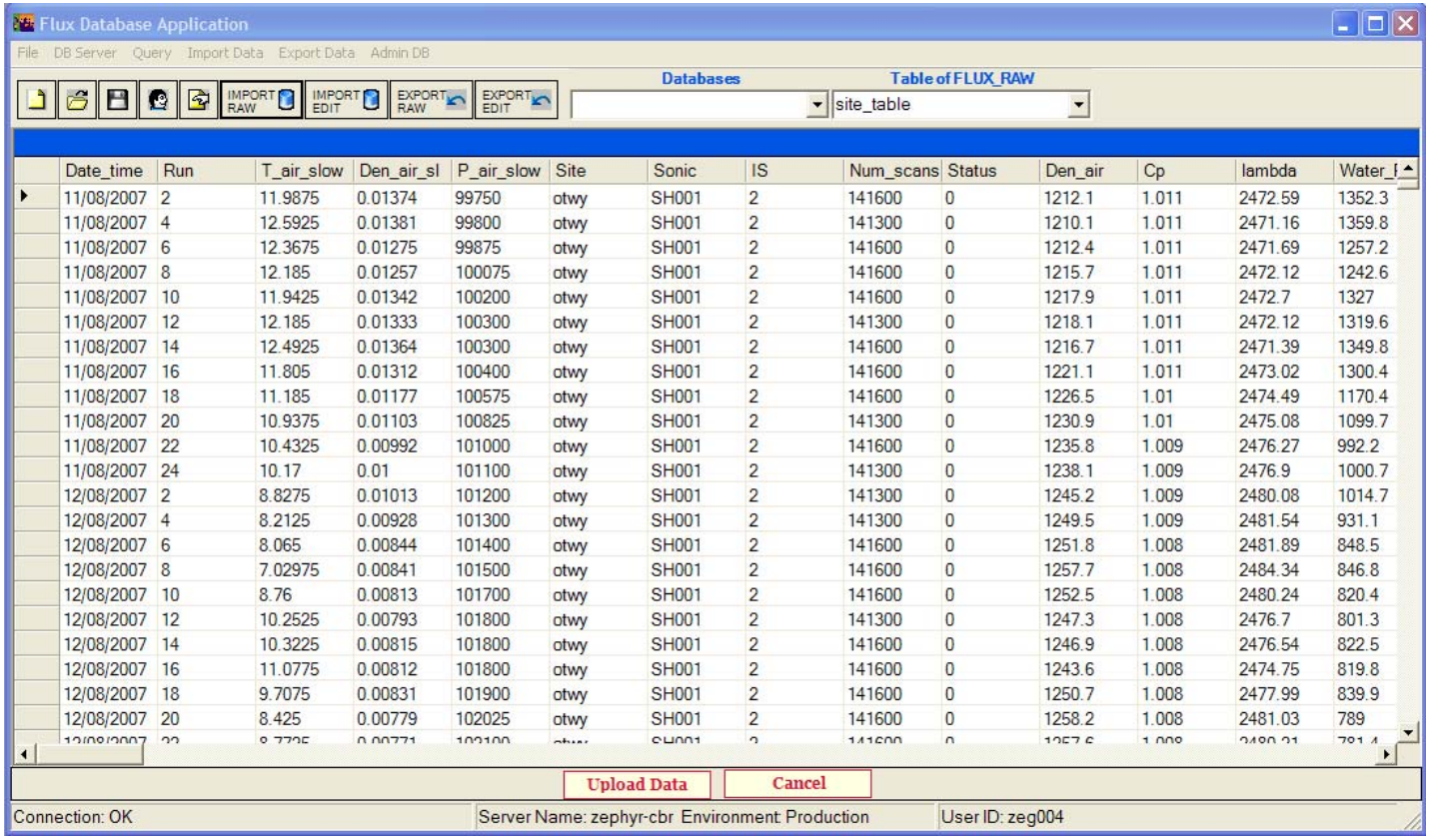
PyeLab database – main screen



PyeLab database – data import

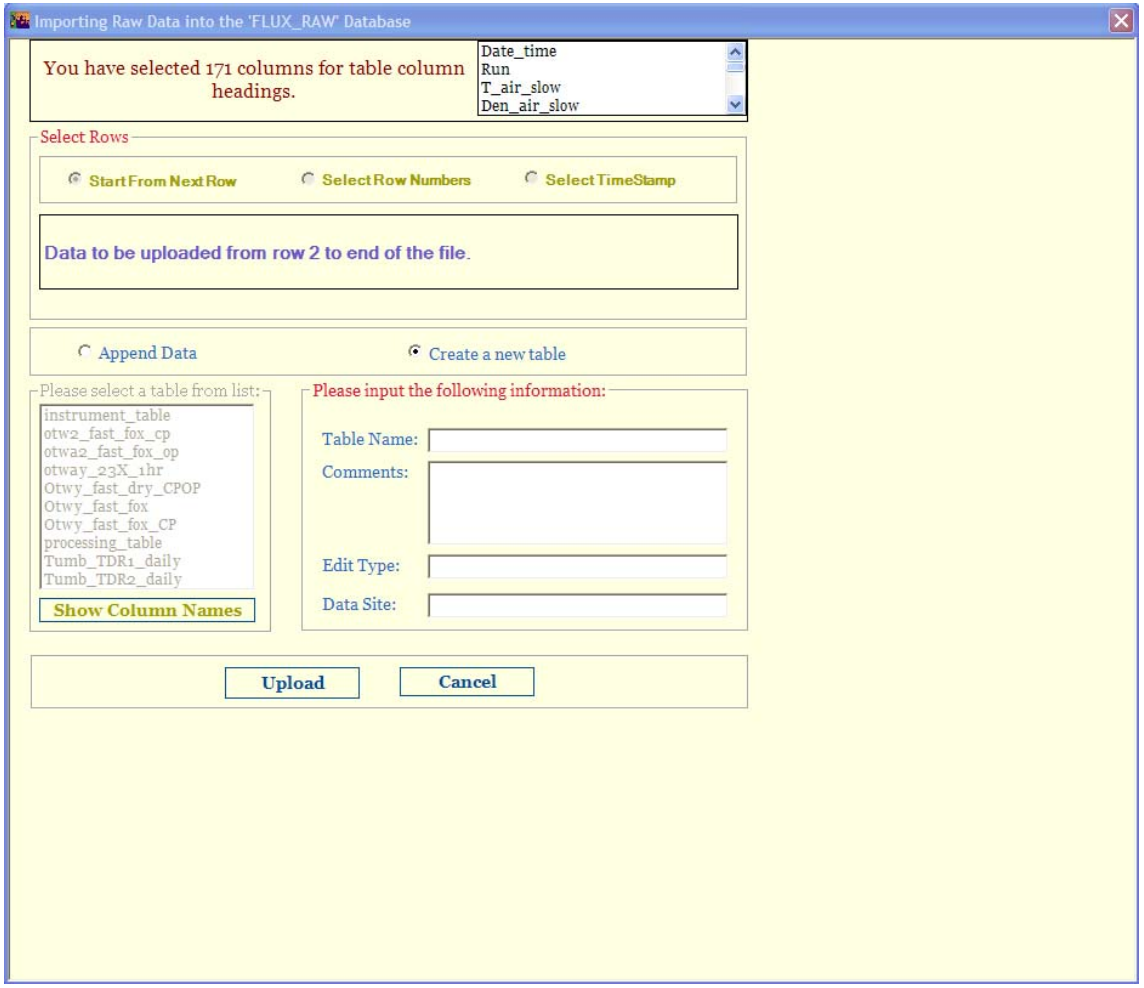


PyeLab database – data import from csv file 1

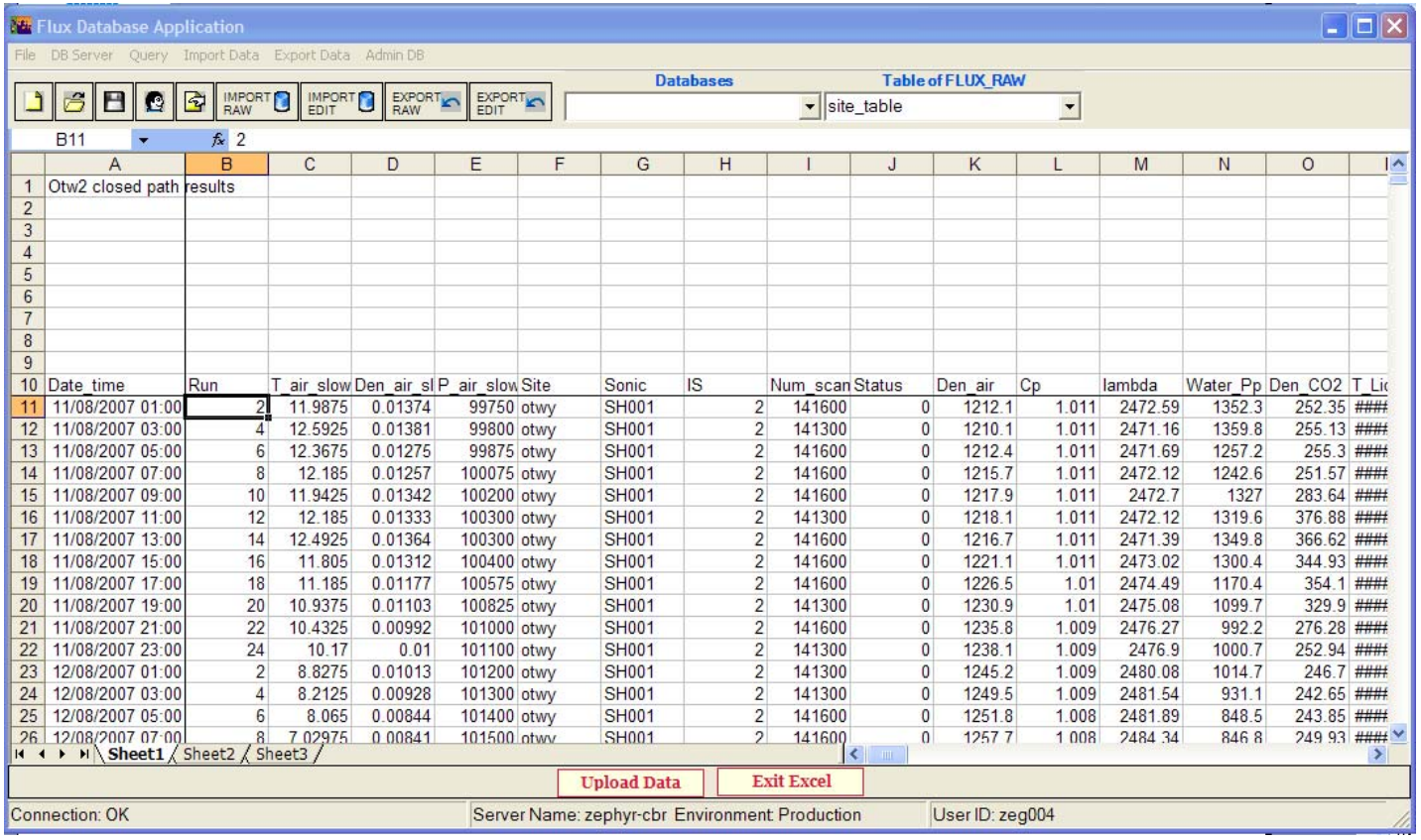


Date_time	Run	T_air_slow	Den_air_sl	P_air_slow	Site	Sonic	IS	Num_scans	Status	Den_air	Cp	lambda	Water_I
11/08/2007	2	11.9875	0.01374	99750	otwy	SH001	2	141600	0	1212.1	1.011	2472.59	1352.3
11/08/2007	4	12.5925	0.01381	99800	otwy	SH001	2	141300	0	1210.1	1.011	2471.16	1359.8
11/08/2007	6	12.3675	0.01275	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

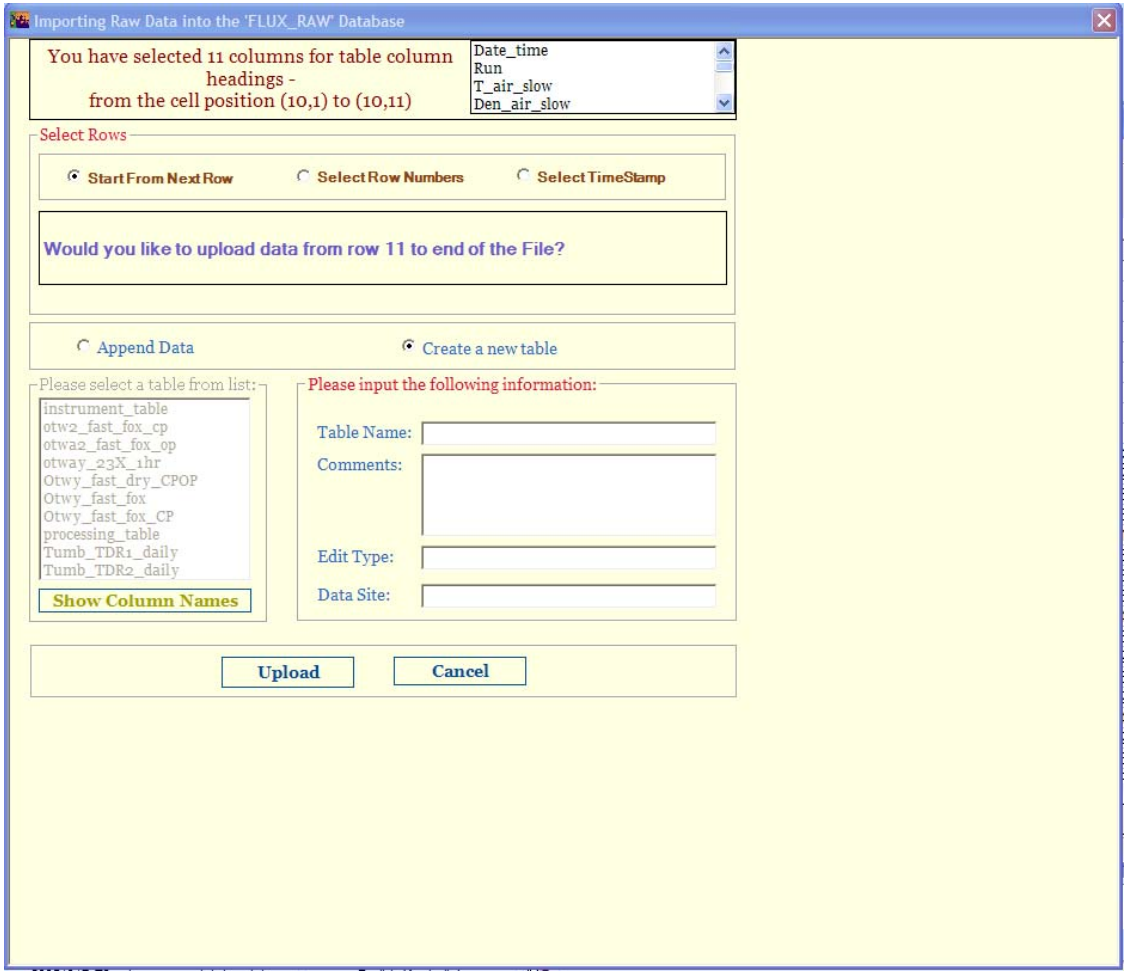
PyeLab database – data import from csv file 2



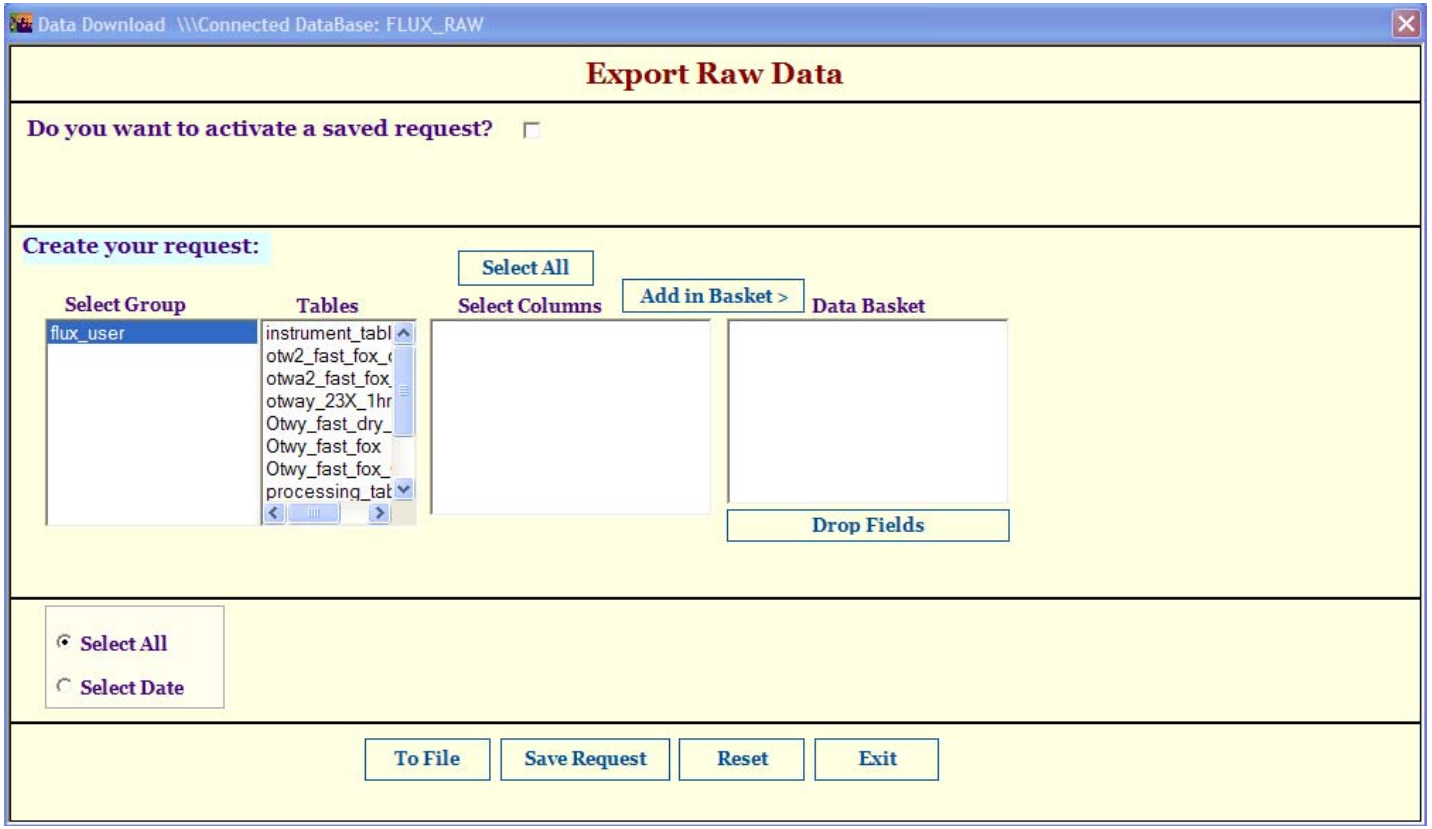
PyeLab database – data import from spreadsheet 1



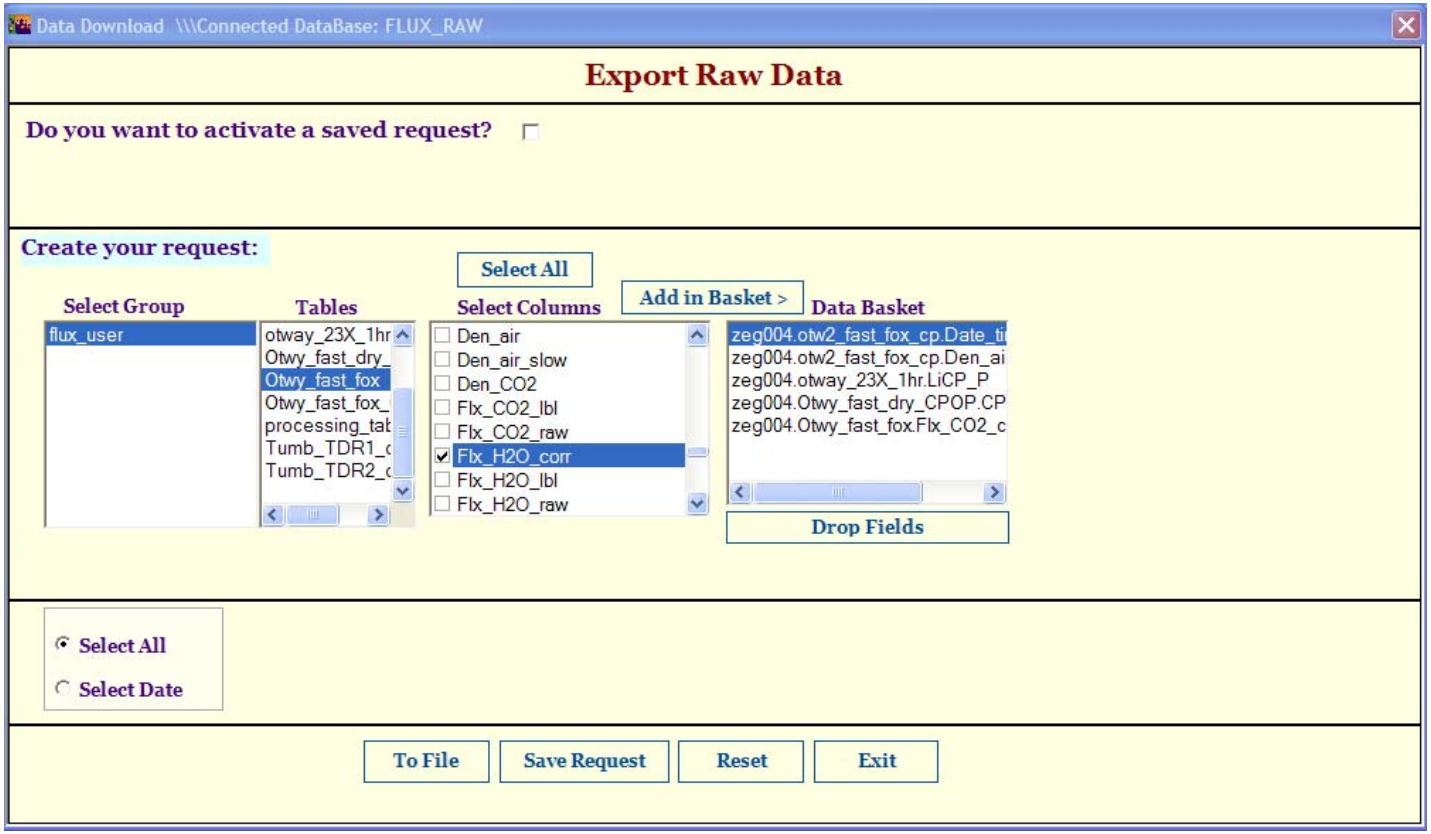
PyeLab database – data import from spreadsheet 2



PyeLab database – export data 1



PyeLab database – export data 2



Best way to learn is by playing with it…