

Pond thermal stratification and turnover

-A 1 Year Experiment – Last updated on 9 Dec 2008

Have you ever wondered how the temperature of a farm pond changes with?

Day/night cycle.

Weather/cloud conditions.

Air temperature.

To answer these questions and possible others I am recording the temperature of the water in a 10 ft (~3M) deep pond.

Temperature probes are positioned ~20 inches (50cm) apart from **top** to **bottom** in the center of the pond, the deepest part. The pond is ~350 ft long and ~125 ft wide at its maximum width, it is oval shape.

The air temperature just above the surface of the water is also recorded. We recorded the temperatures once every 50 sec continuously. The voltage output of a solar cell is also recorded. The solar cell shows sunrise and sunset and the passing of clouds.

The pond is located in the Town of Binghamton, Broome Co., NY, Latitude 42.033N, and Longitude -75.880W.

Graphs pond water **temperature vs. time** will be updated from time to time as more data is collected.

If you have comments, suggestions or questions I will be glad to discuss them.

James D. Brownridge (9 Dec 08) jdbjdb@binghamton.edu.

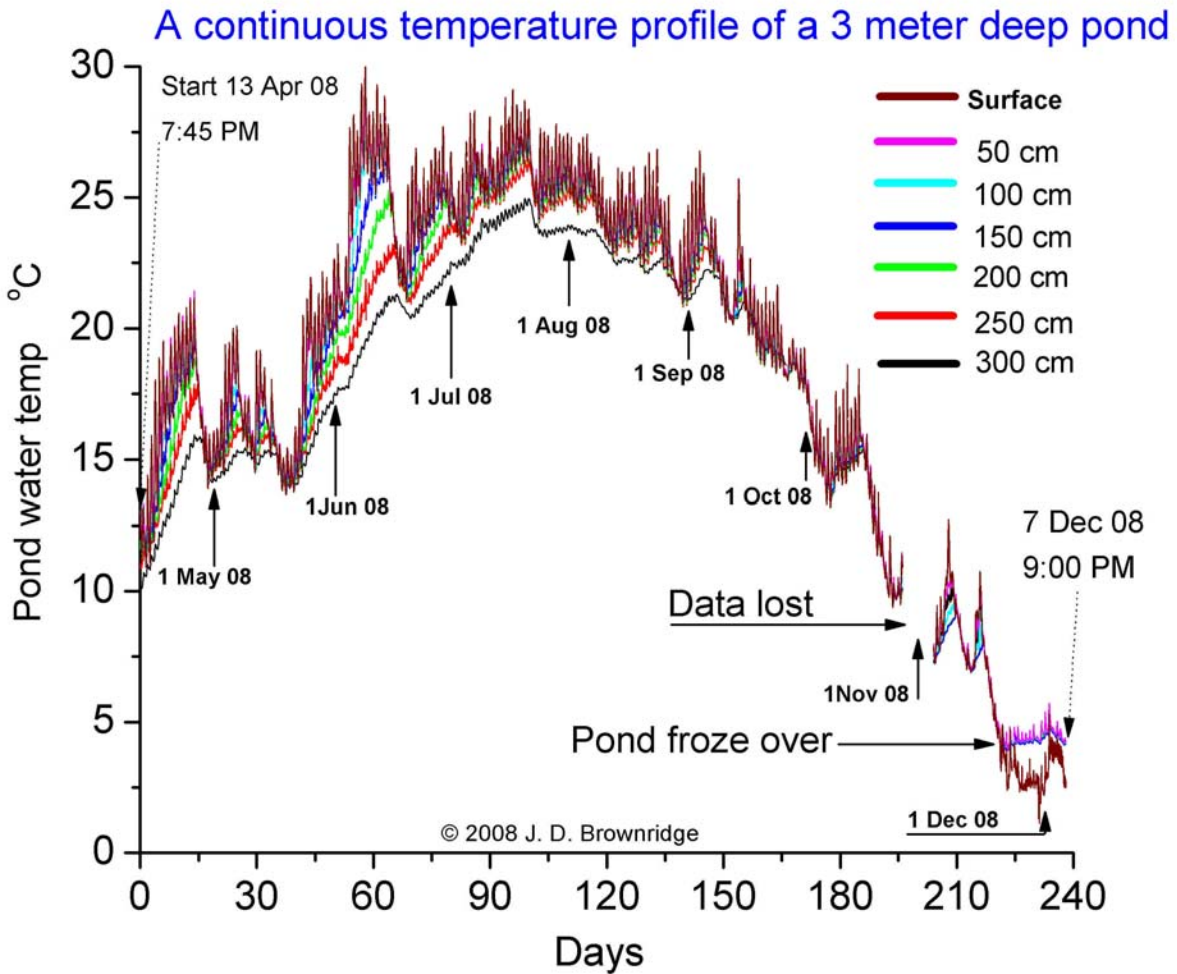


The pond is feed by precipitation runoff from a meadow and the overflow of a much smaller spring feed pond.

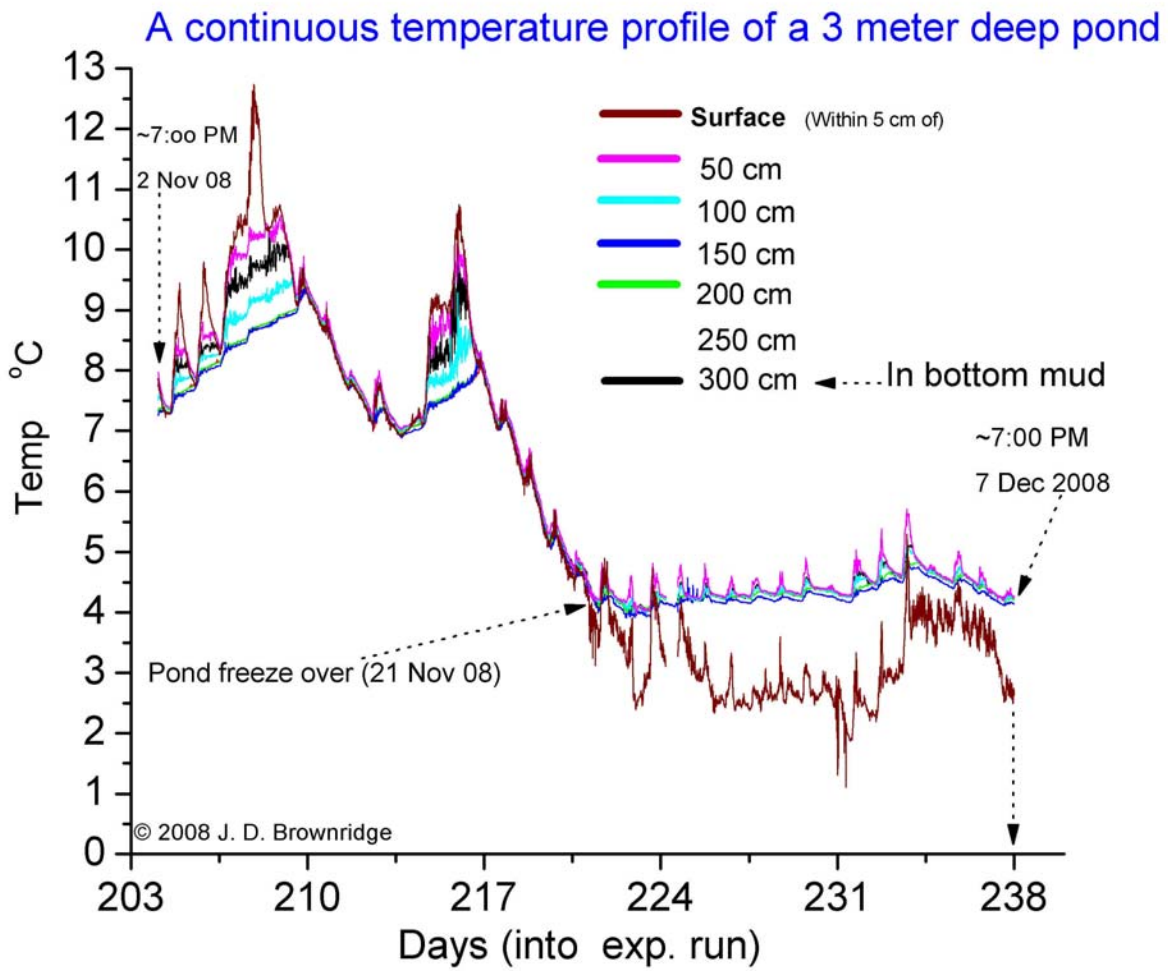


The temperature probes are supported by floats held in place by a cable stretched across the pond.

We have freeze over! See also graph 9.

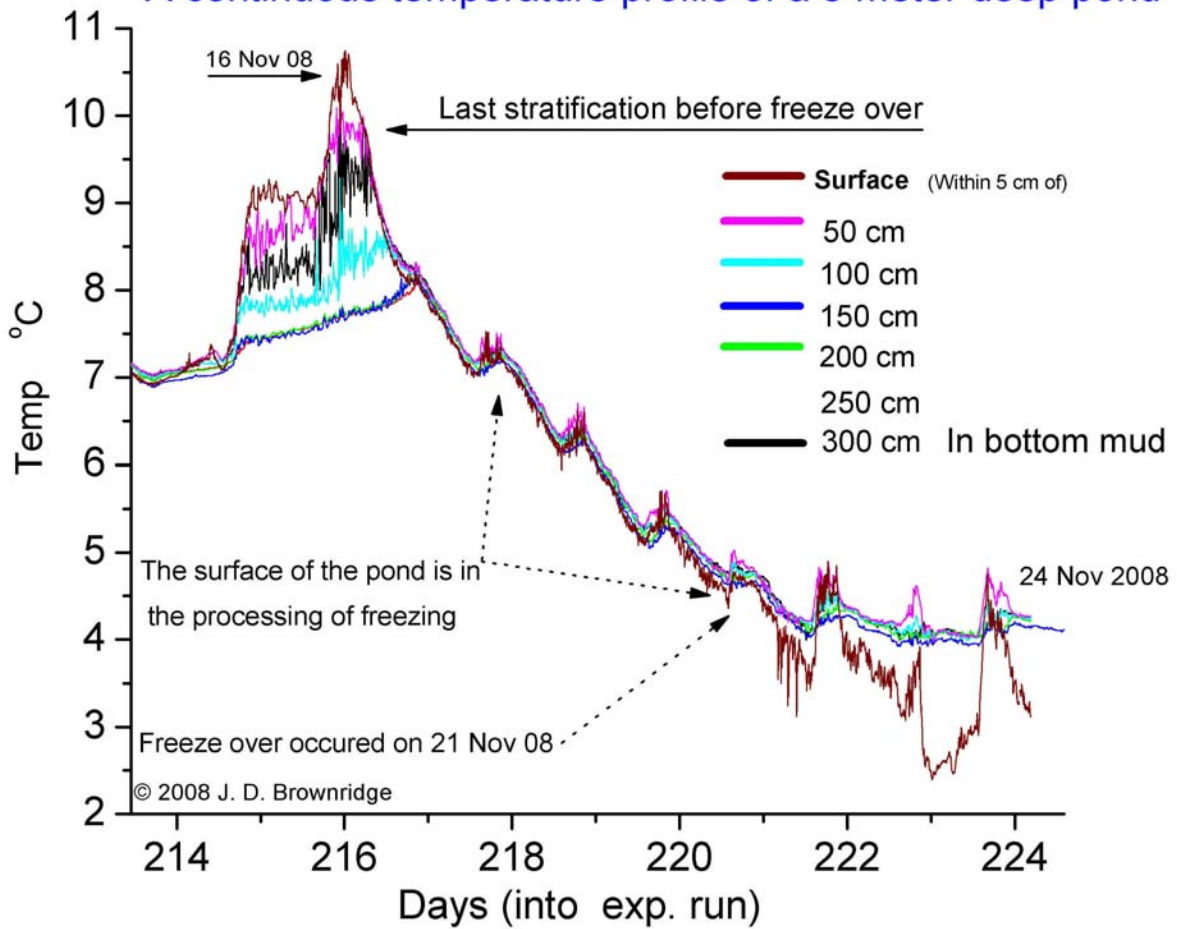


Graph 1. Here we show the temperature of the water between 13 April 2008 and 7 Dec 2008. The pond froze over on 21 Nov 2008.



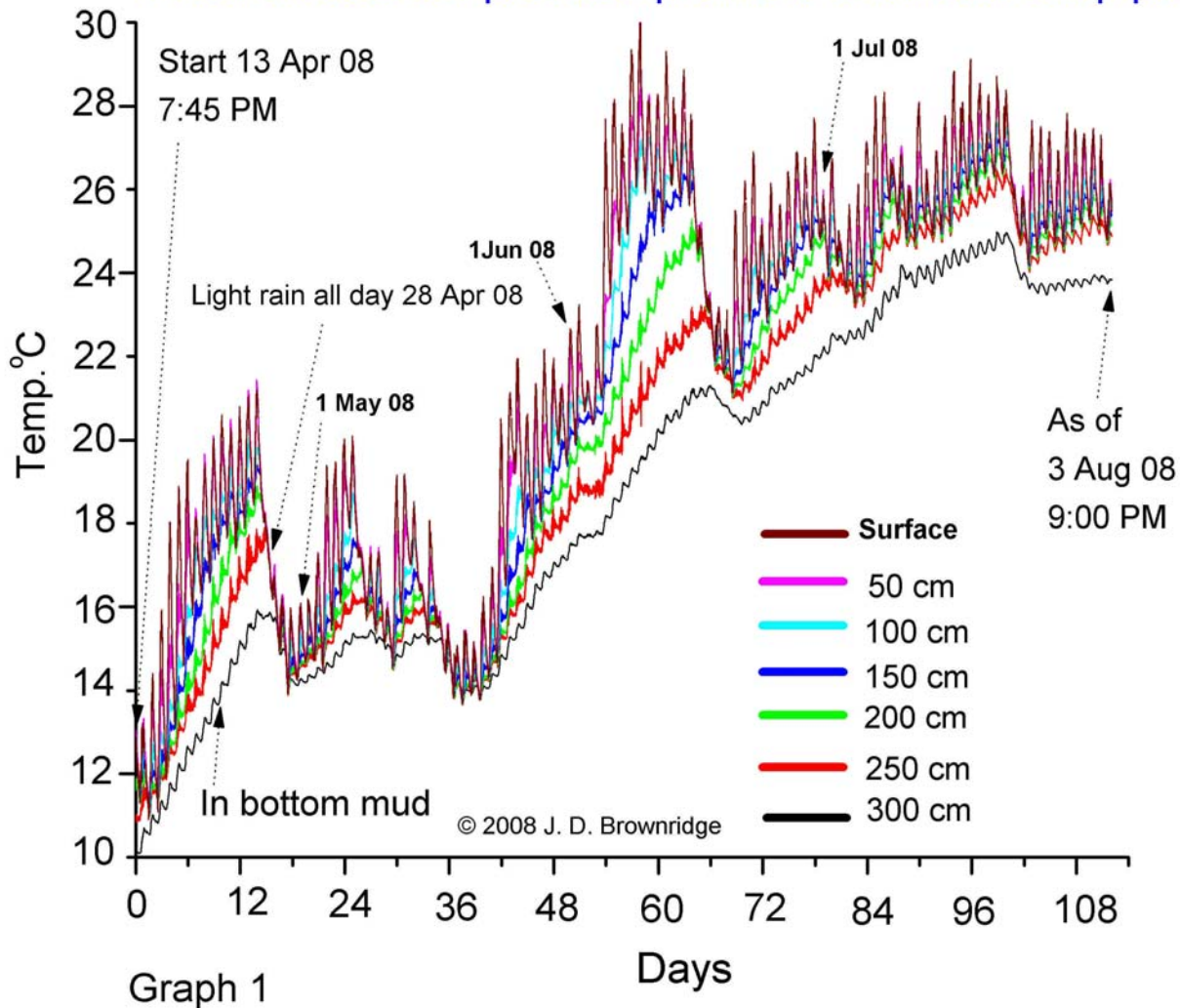
Graph 2. Here we show the water temperature several weeks before freeze over and several weeks after freeze over. The ice is ~5 mm thick.

A continuous temperature profile of a 3 meter deep pond

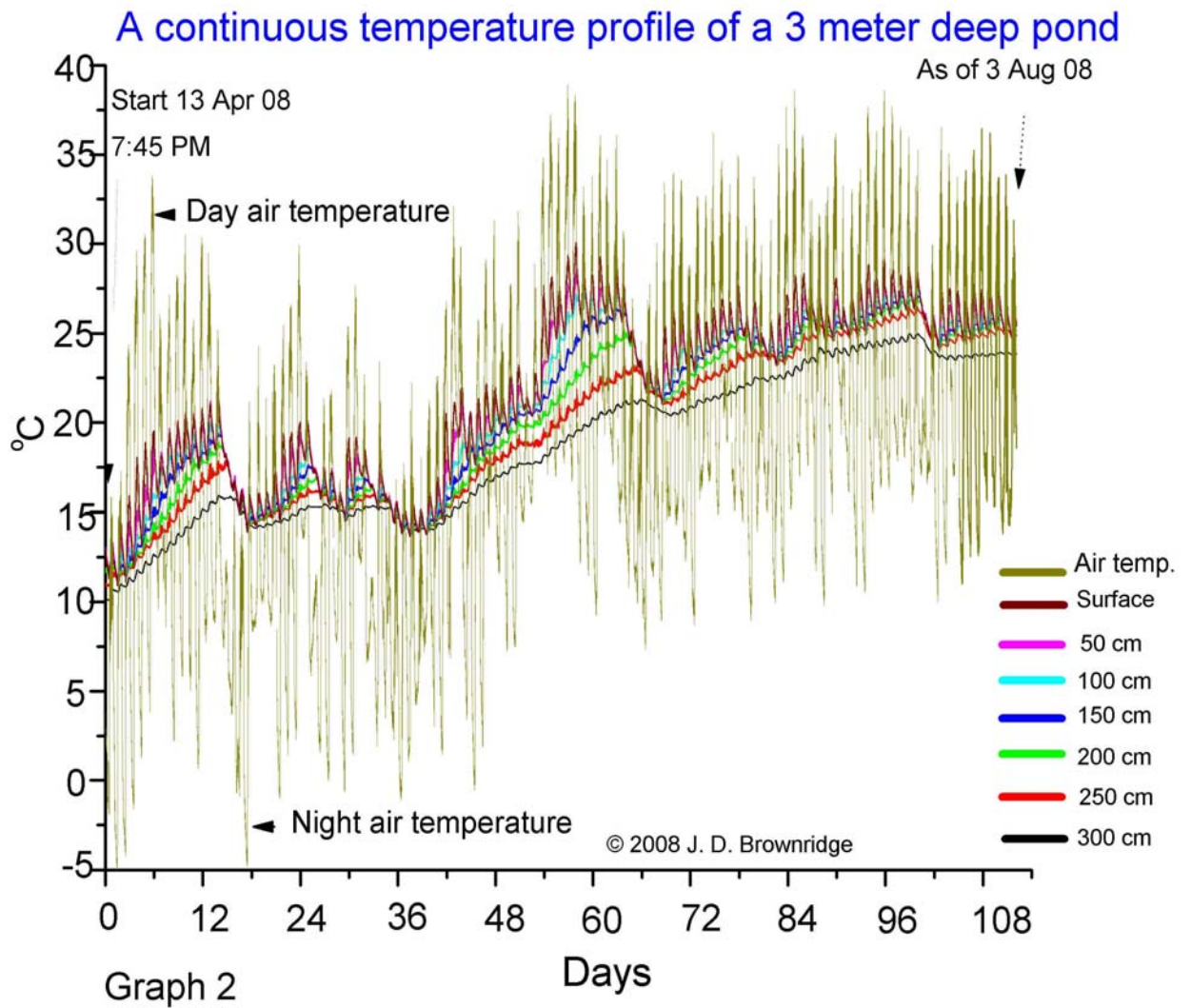


Graph 3. Here we show the last stratification before freeze over.

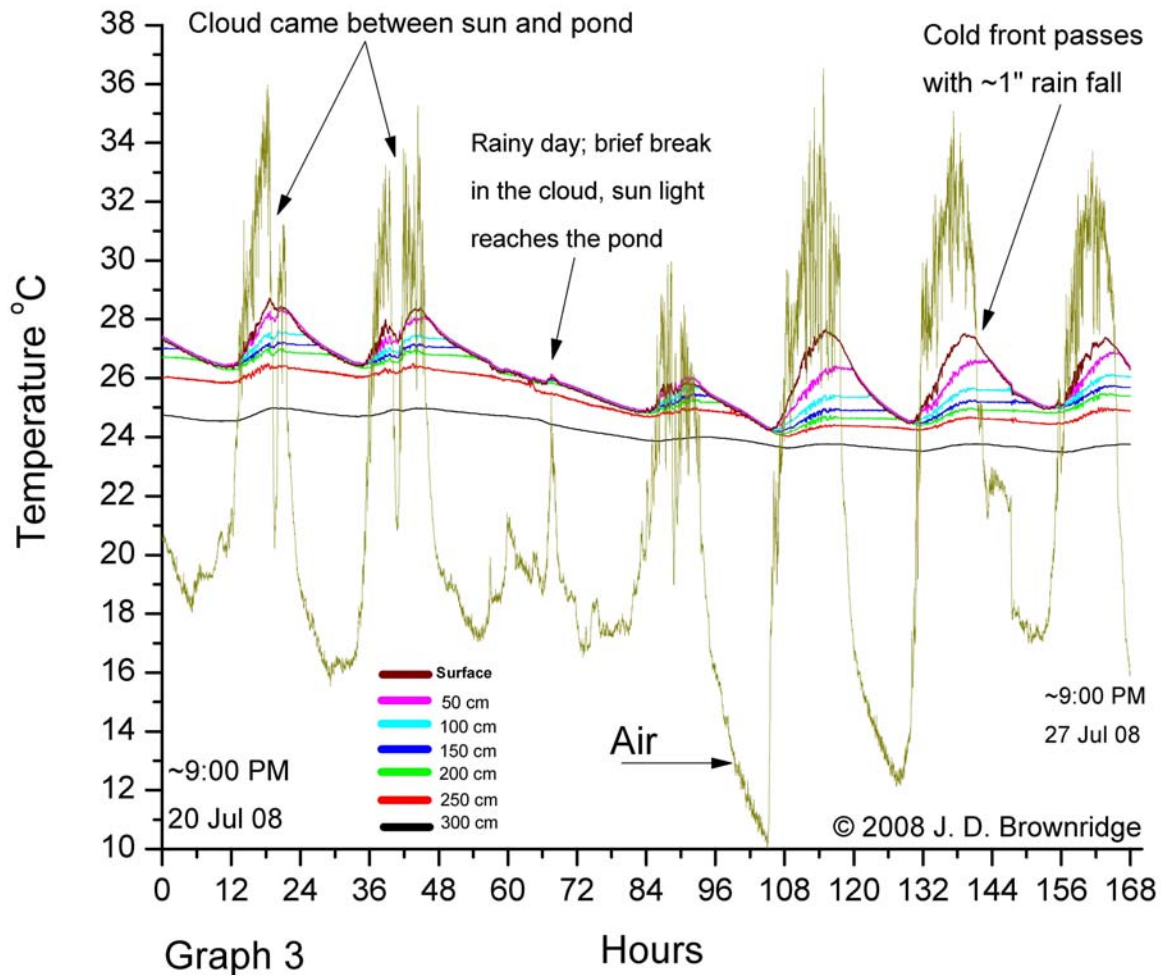
A continuous temperature profile of a 3 meter deep pond



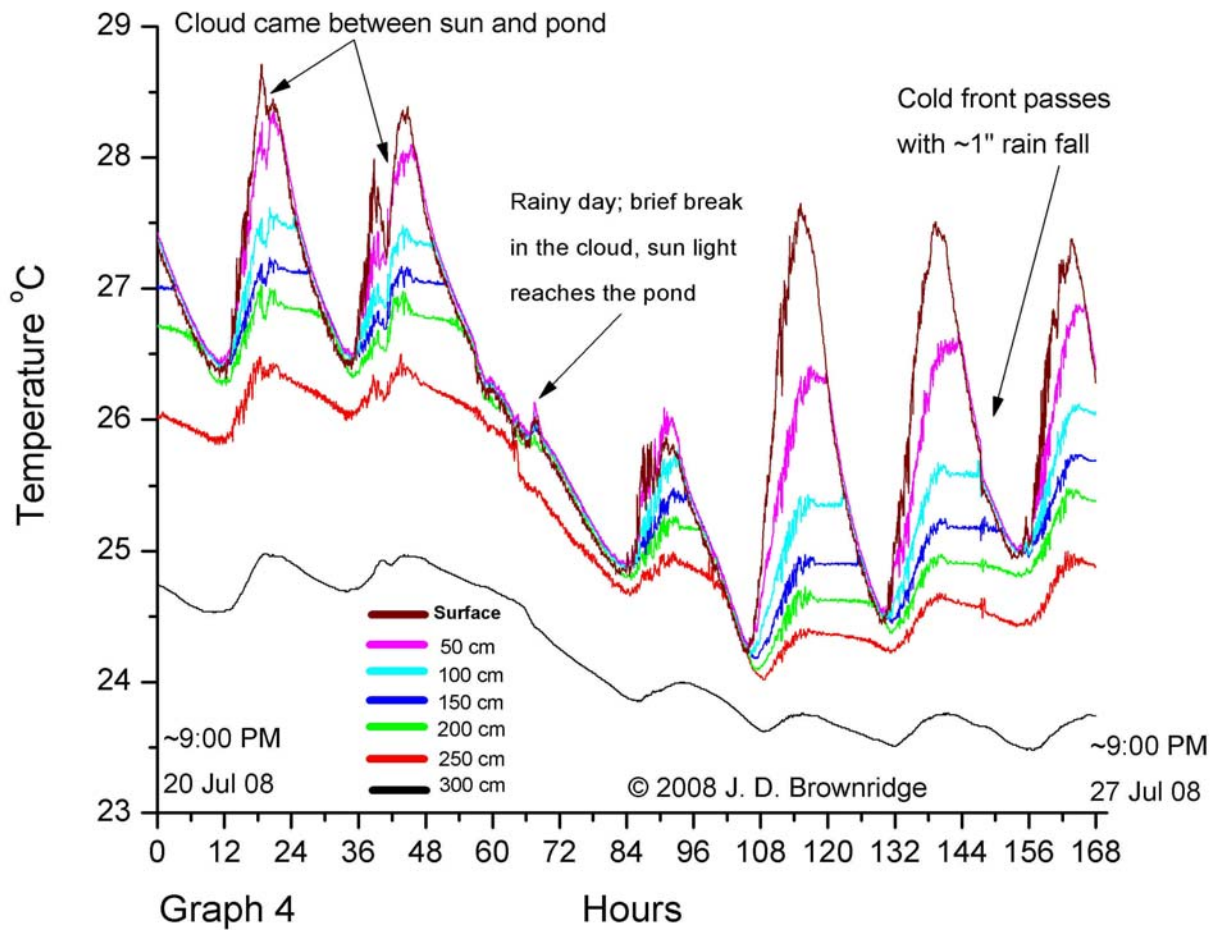
Graph 4. Here we show the temperature of the water between 13 April 2008 and 3 Aug 2008. A response to the day/night cycle and weather conditions is quite clear.



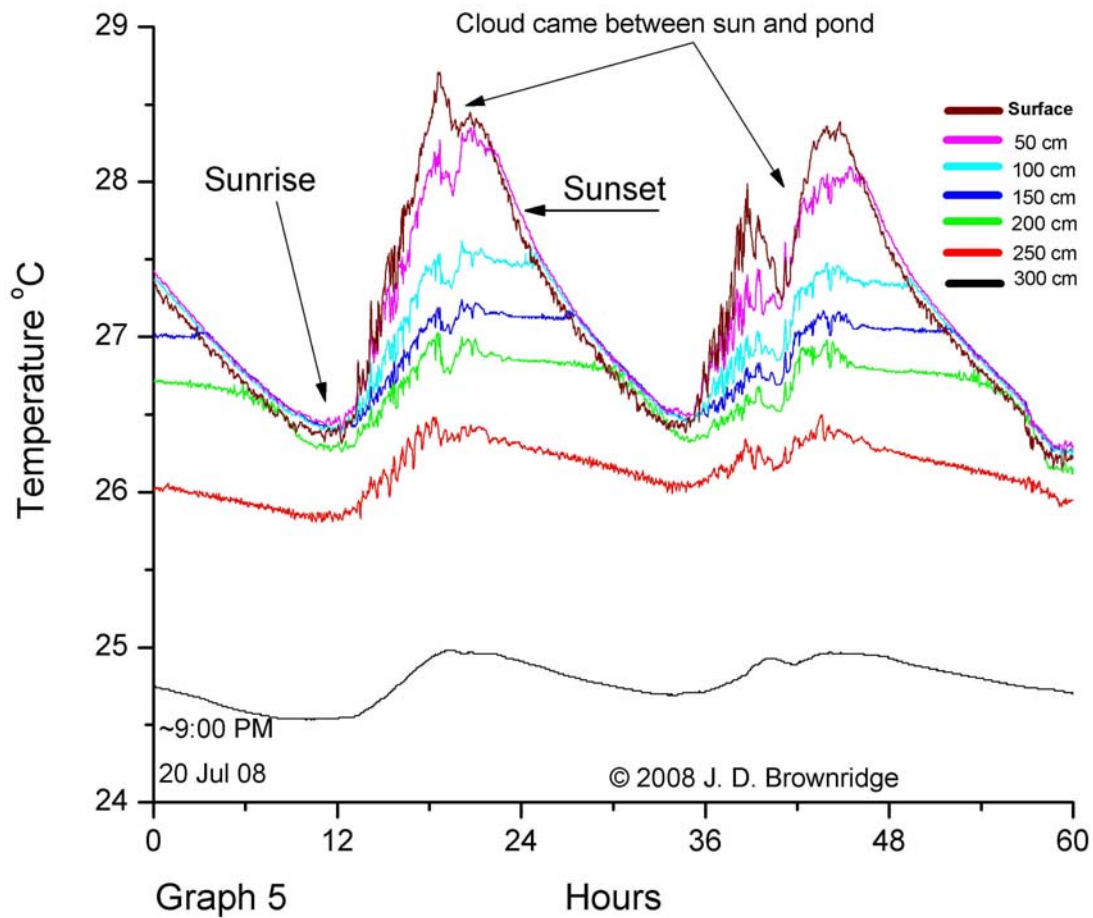
Graph 5. Here the air temperature has been added to graph 1.



Graph 6. Here we show the effect of clouds coming between the sun and pond and what happen when the sun shin through the clouds for a brief period on a rainy day. This air temperature probe is designed to respond to direct sunlight. A second probe is used to record the correct air temperature.

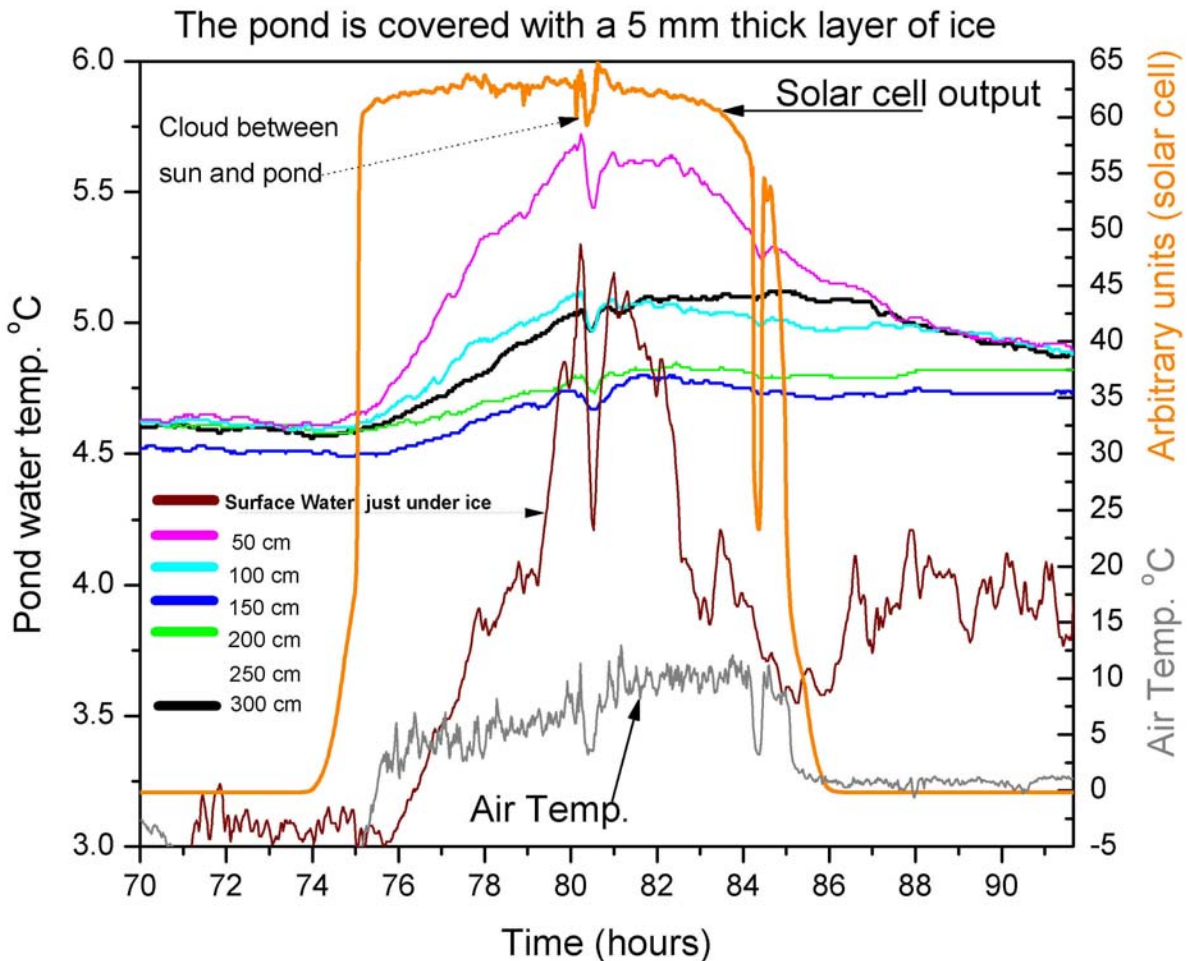


Graph 7. The air temperature data has been removed in order to show more details.



Graph 8. Notice how the water temperature responds to clouds coming between the sun and the pond. The effect is clearly seen 3 meters down in the mud.

We have freeze over!



Graph 9. The pond is now covered with a 5 mm thick layer of ice. Notice how the water temperature responds to a cloud coming between the sun and the pond at midday and late afternoon. The effect is clearly seen 3 meters down in the mud (the thick black line). This was on **3 Dec 2008**. Freeze over occurred on **21 Nov 2008**.

I will update graphs 1 and 2 every 4 to 6 weeks. Detail graphs of unique events will be added as data become available and time permit. I will consider a hail storm or heavy rainfall with high wind to be a unique event.

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James D. Brownridge (9 Dec 08) jdbjdb@binghamton.edu.