Message ID: **12** Entry time: **Mon Jul 11 14:11:23 2005**	
Author:	Greg Meade
Type:	Routine
Category:	General
Subject:	Melville Research

My problem/assignment for today was to try to figure out exactly what a Melville is. For some reason, the MOLAR detector uses pressure readings in a peculiar unit named after the programmer who designed the system last year. In order to correctly adjust our data to what it should be in kPa, we needed a better way to correlate the 2. The current method, given to me by Mr. Willie, is to add 831 to the reading in Melvilles then divide by 10 to get kilopascals.

I started off by finding a site I could use to find Rochester pressure ratings in 5 minute intervals. I stumbled upon a site called uweather.com. I found a way to import data into my excel spreadsheets by finding days where pressure was measured in about 5 minute intervals. I assume there is some error in the non-exact measuring of the times, especially because I am using that data to exactly correlate to the 5-minute intervals of the MOLAR detector. After a few attempts, I was able to find a portion of data that fit well. After putting the data together I found that both the original Melvilles and the 831'd units both fit the ideal data very well. The bigger issue was how exact they needed to be. I tried to graph Melvilles against ideal pressure (from uweathe.com). The equation of the best fit line was y = 0.0831x + 85.385 so I went back and tried to recalibrate Melvilles using those numbers. I used the Fahrenheit to Celsius formula as a base to come up with the equation ((Melvilles - 85.385) + (Melvilles*.0831)). However, this formula did not work as well as I hoped. Another issue is that the day I picked (December 11th 2004) was the lowest pressure day of the month. I will surely need to find data from higher pressure days if I am ever going to zero in on the definition of a Melville.

Important sites I used:

http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KNYROCHE10&day=11&year=2004&month=12

http://www.pas.rochester.edu/~jmelvil1/logs/

Message ID: **17**	Entry time: **Tue Jul 12 10:57:22 2005**
Author:	Greg Meade
Type:	Routine
Category:	General
Subject:	Melville Research - day 2

9:25

I was able to contact Mr. Willie who sent me an excel file with pressure readings form the airport, in hour intervals from October 5th to December 26th. I set these up in an excel file and graphed them. I found that the units of melvilles and millibars were almost exactly the same, the slope was .9972. The intercept difference was 828.31, so I have hypothesized that the DAQ board measurements might actually be in millibars, just with an offset of 828.31. I then plugged that equation back into the excel spreadsheet to get calculated pressure. When I graphed that against airport pressure, it looked pretty good. However, there was an interesting trend. At the beginning of the graph, the calculated data is slightly below the airport data, but as it moves on, the calculated pressure switches to the top side of the airport data. This may be because of temperature, because as it moves from October to December, the temperate goes lower. Therefore for the rest of the day I am going to try comparing the data with temperature included.

2:11

My brain hurts. I figured out how to graph temperature, difference between pressures and pretty much any other piece of data in the world. I have a few trends right now of note. When temperature was graphed against pressure, there was a very strong inverse correlation. This would usually be very peculiar, but in weather, tempurate and pressure are inverse much more. Anyways, I am tired and im going to take the night to think about all my data.

Message ID: **22**	Entry time: **Wed Jul 13 15:03:34 2005**
Author:	Greg Meade
Type:	Routine
Category:	General
Subject:	Pressure Data

I made great progress today. I figured out the relationships between temperature and pressure (inverse) and I was successfully able to include temperature data in my Melvilles to millibars conversion. I found tat the difference between what my original calculation should be and what it actually was was directly related to pressure. So after a bit of algebraic maneuvering, I came up with a formula to calculate raw Indoor Melvilles into Outdoor Millibars. The equation goes as follows:

Pressure at the airport [(slope of the airport pressure vs. Melville pressure graph)*(Pressure in Melvilles)+(y intercept of the pressure vs. pressure graph)] + [(slope of the difference vs. temperature graph)*(Temperature as measured on the DAQ board)+(y intercept of the temperature graph)]

or more simply written:

Pa = [(mP)(PM)+bP)] + [(mT)*(T)+(bT)]

This may seem complicated but it can easily be broken down. The first bracket is the relationship that Melvilles and Millibars have. This data was acquired when I graphed the 2 against each other. The second part is the effect that temperature had on the original pressure.

Because my new formula allows conversion from indoor pressure to outdoor pressure, we should be able to get more effective pressure corrected data. This is because the outside pressure is what the muons go through the most.

However, there is one slight issue. The data I used spanned from October to December so I was unable to include any temperatures above 28 C. Because just last month in June the detector temperature got up to 37.7, that is a rather large chunk of data. However, the way the original pressure data was collected was daily from the NOAA website. We could do that now, but considering that the detector is not running as of now, we would have no Melville Pressure data to convert. We have 2 major options. The first is to use Wunderground.com data in inconsistent intervals and somehow manipulate that data to fit the Melvilles. This is the harder option and I am doubtful I could figure out how to correctly manipulate the data. The other option is to call around to weather stations and such to try to see if we could request pressure data from a few hot days in June to add into our equation so it would be more precise.

Message ID: **23**	Entry time: **Thu Jul 14 14:30:25 2005**
Author:	Greg Meade
Type:	Routine
Category:	General
Subject:	Pressure Issues

I spent most of today trying ways to solve the pressure problem i mentioned yesterday, with pretty much no luck at all. I did find another site that did pressure hourly but it was very cumbersome as well as inaccurate. If you asked for data at say, 4AM on June 27th, it would give you the data for noon, and someitmes it wouldnt even tell you what data you had. I did email WROC and WHAM news but I have no idea how successful that idea will be. I spent a few hours working to somehow combine data from wunderground and molar but i failed there as well. Right now the plan is to hope i get a response from one of the stations by monday and if not, to wait until the detector is back up and use the NOAA site Mr. Willie gave me.

Message ID: **25**	Entry time: **Tue Jul 19 14:54:31 2005**
Author:	Greg Meade
Type:	Routine
Category:	General
Subject:	Muons and Pressure, a match made in Hell

Over the past 2 days I have decided to abandon my goal of getting higher temperature data into my calculation and have instead moved onto the relationship of muons and pressure. My main goal at the moment is to figure out a coefficiant i can use for pressure at any time. Sounds much easier than it is. No matter what times i graph, no matter how stable they appear to be, the coefficiants range from .72 to .94. Even my best graphs range from .83 to .89. I even tried graphing all of the slow times together and still did not get an r squared value of over .95. I dont really know any other ways to narrow down my pressure coefficiant so i may move on to solar data and go backwards.