

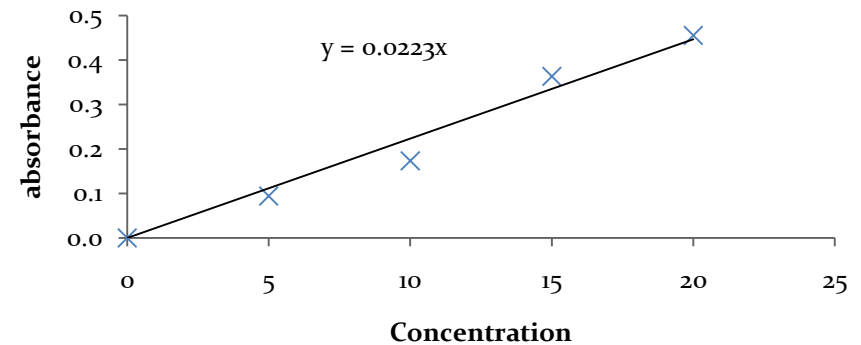
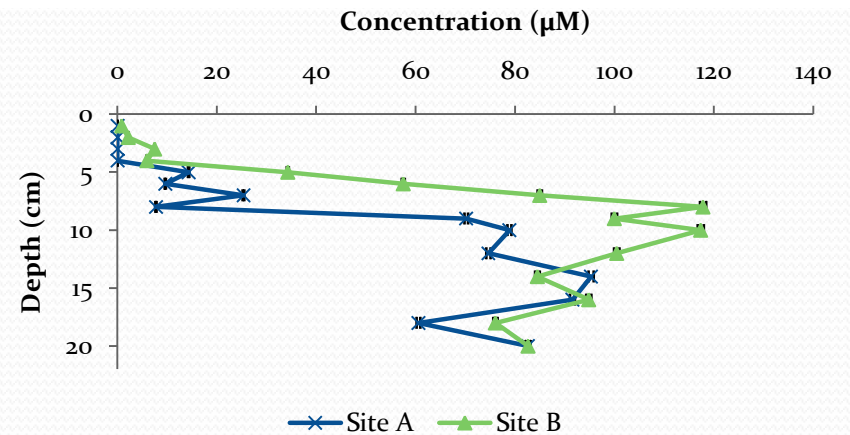
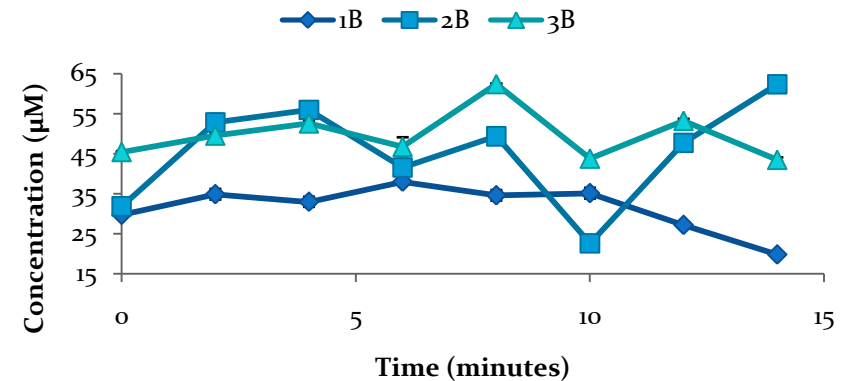
# Statistically Significant Findings: Nutrients in a Salt Marsh System



Samuel Snow  
April 22<sup>nd</sup>, 2008  
(Happy Earth Day!)

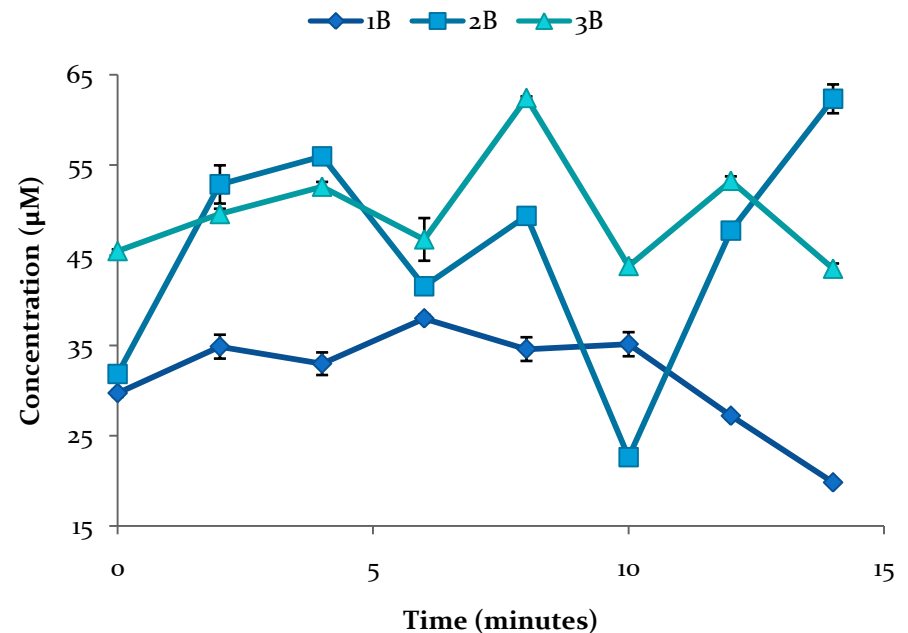
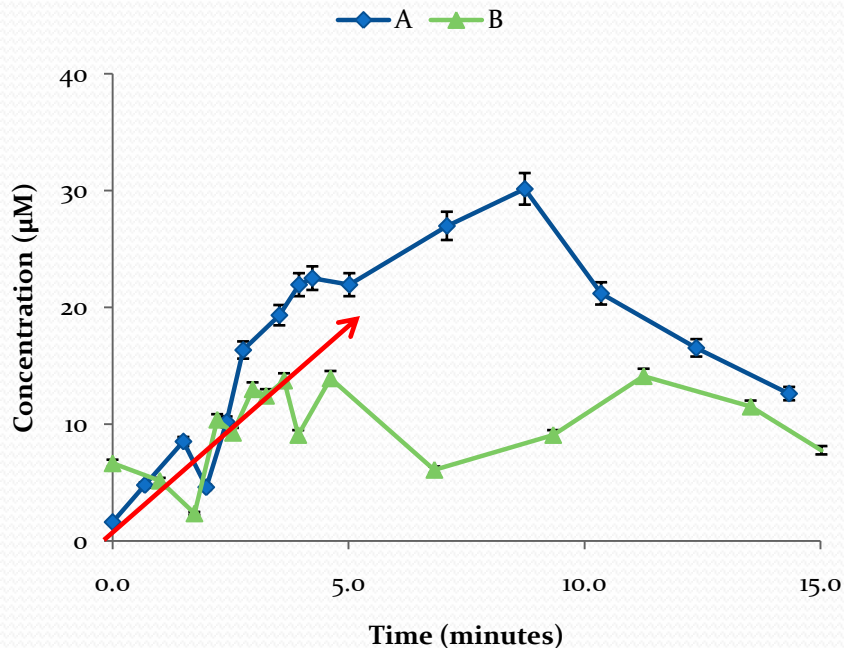
# The Data:

- **Surface Waters:** spatial and temporal data between two sampling sites with average concentrations at low tide. Chi-squared test, F-test, Student's T-Test
- **Sediment Cores:** spatial data between the sites as a function of depth. Chi-squared test, F-test, Student's T-Test
- **Standard Curves:** regression calculations & error calculations. Jackknife Method



# Pearson's Chi-Squared Test of Normality

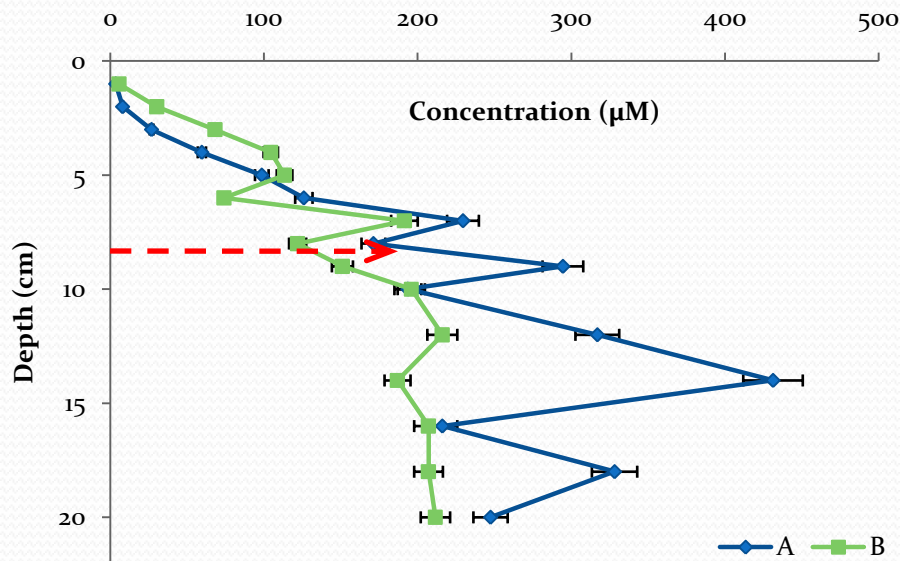
- Null Hypothesis: the relative frequencies of observation follow a normal distribution
- All distributions were normal within the surface water data
- 95% confidence
- Syntax: “ChiInv = chizinv(0.95, dof)”



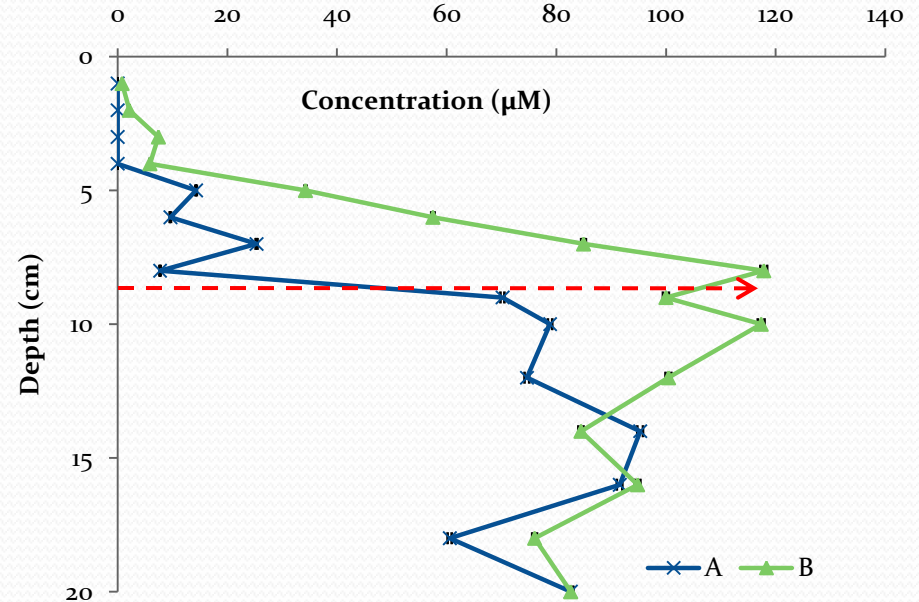
# Pearson's Chi-Squared Test of Normality

- Core data are not normally distributed for the first ~8 cm, but afterwards they are
- 95% confidence

## Ammonium

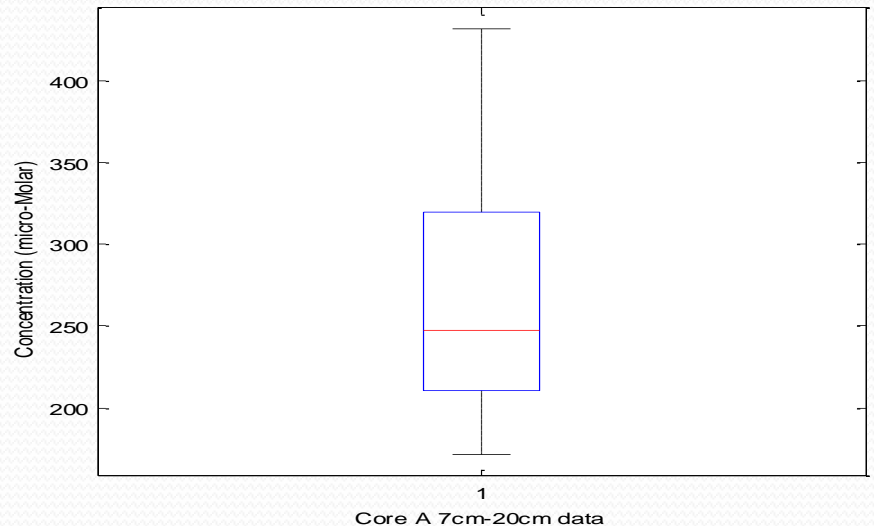
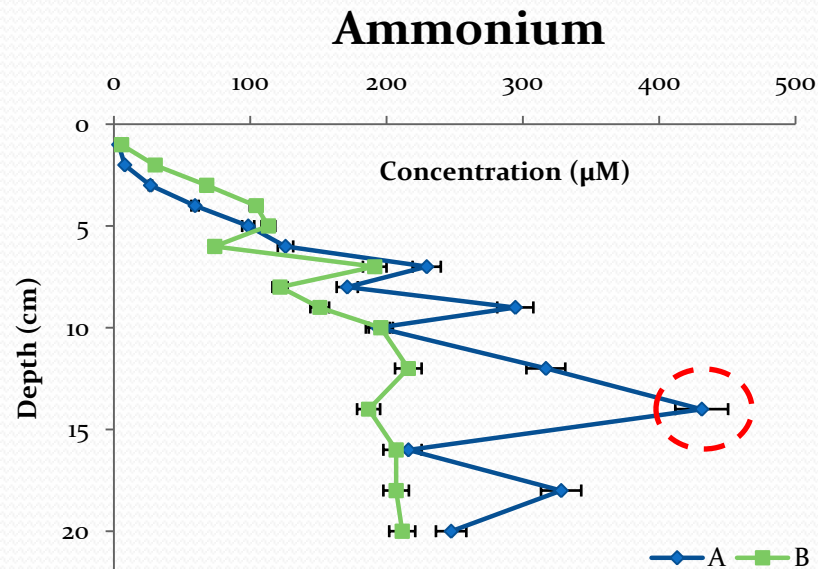


## Phosphorus



# F-Test: Testing For Equal Variance

- Null hypothesis: the standard deviations of two normally distributed populations are equal.
- Surface data from second trip did not have equal variances between sites
- 95% confidence
- Outlier in Ammonium Core data?
- Syntax: “Ftable = finv(0.95, df1, df2)”



# Student's T-test and Final Results:

95% confidence: “[h, sign] = ttest2(data1, data2, .05)”

Sample Series	Normal Dist?	Unequal Variance?	Unequal Mean?
Ammonium A	Yes	No	Yes
Ammonium B	Yes		
Ammonium A (2)	Yes	Yes	N/A
Ammonium B (2)	Yes		
Ammonium A (4min+) (2)	Yes	No	Yes
Ammonium B (4min+) (2)	Yes		
Phosphorus A	Yes	No	Yes
Phosphorus B	Yes		
Ammonium CA (7-20)	Yes	No*	No*
Ammonium CB (7-20)	Yes		
Phosphorus CA (7-20)	Yes	No	Yes
Phosphorus CB (7-20)	Yes		

# Conclusions:

- The two sites are definitely significantly different in terms of concentration of ammonium and phosphorus
- For surface waters, site B has significantly more of both nutrients
- But the pore water data shows more ammonium at site A than at B with depth, but it is not significant to 95% confidence

