

## GK-12 and My Thesis: Biogeochemistry and Hydrology of Three Alpine Proglacial Environments Resulting From Glacier Retreat

Monica Z. Bruckner  
Dept. of Earth Sciences



### A Bit About Me...

← Geology isn't just rocks for jocks...

- B.A. in Geology from Augustana College, IL (minors in biology and environmental studies)
- Did an REU project on the Matanuska Glacier, AK, looking at ice velocities near the terminus
- Now a student in ESCI dept looking at biogeochemistry and hydrology of a Yukon glacier.

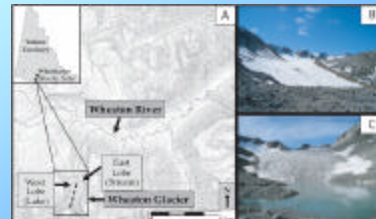


### A Bit About My Project: Significance

- Climate-induced deglaciation is occurring worldwide; what is the consequence of this in high alpine catchments?
- Headwater environments affect downstream hydrology and ecology.
- Few studies have explored the effect of recently-formed proglacial lakes on water chemistry and hydrology.
- Few studies regarding non-temperate glacier hydrology and biogeochemistry.
- High alpine environments are sensitive to climate change and have little to no direct anthropogenic activities influencing them (ideal environment to study climate change).

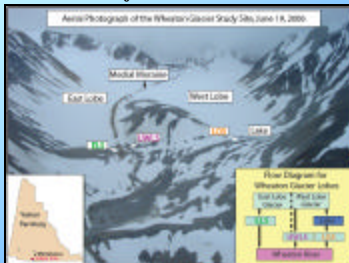
### Site Description

- Wheaton Glacier (informal name), Yukon Territory, Canada.
- Approximately 4 km<sup>2</sup> catchment.
- 1705-2225 m asl from terminus to head.
- Likely non-temperate, based on small size, lack of crevassing, and lack of evidence for subglacial drainage outlets.



### Research Question 1

- How do different headwater environments (stream vs lake) affect fluctuations in water, suspended sediment concentrations, major dissolved ions, and carbon?



### Research Question 2

- Does primary productivity by organisms living within the proglacial lake alter carbon export from the lake outlet stream as compared with proglacial streams stemming directly from the glacier terminus?



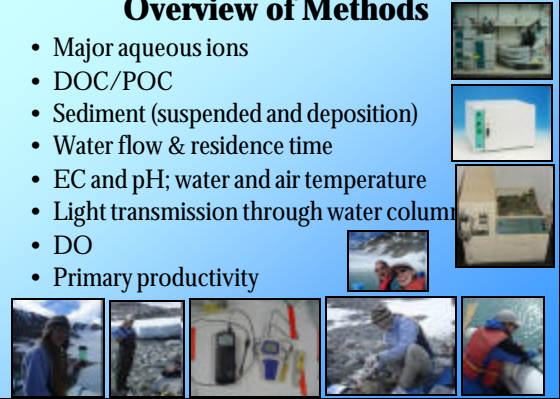
### Research Question 3

- How does water flow path and interaction with supraglacial and proglacial sediments affect meltwater chemistry and suspended sediment concentrations at a non-temperate glacier?



### Overview of Methods

- Major aqueous ions
- DOC/POC
- Sediment (suspended and deposition)
- Water flow & residence time
- EC and pH; water and air temperature
- Light transmission through water column
- DO
- Primary productivity



### So Tying This in with GK-12...

### And the kids get experience too...

### Other Ideas...

- Repeat (historical/present) photos from GNP
- Albedo experiment – what melts faster, dirty or clean ice?
- Greenhouse Effect in a jar demo
- Look at water quality indicators (e.g. bugs)
- Explore groundwater more so (e.g. test EC)
- Spend more time with soils (geo, bio)

## Questions?