**Dating retreat of the Laurentide Ice Sheet**

This week, we will focus on dating the retreat of the Laurentide Ice Sheet through New England. This is a large part of Chris’ doctoral dissertation, so you have one of the world’s experts on retreat of the Laurentide Ice sheet with you this fall.

The age of this retreat was first established using radiocarbon dating of material recovered mostly by coring sediment in lakes and ponds. The earliest radiocarbon dates were from *bulk sediment* at the base of cores. As dating technology improved, and smaller samples were dated using accelerators rather than decay counting, individual plant parts (*macrofossils*) were dated. Chris has compiled all of these data and has provided you a subset to work with for lab in two spread sheets. Each spreadsheet contains the location of the sample (lat/long) and its age and uncertainty.

Before you do the lab, please **read three papers** posted to the lab website. Two are Lee Corbett’s and are about cosmogenic dating of the deglaciation of the Laurentide moraine in New Jersey and of Mt. Mansfield right here in our back yard! These will give you a good feel for how the technique works and some comparison with radiocarbon ages. Then please try and read the Lambeck paper. It’s a tough one (loads of geophysics) so focus on figures 1 and 4 which show sea level over time and thus reflect the volume of water released by melting ice sheets (more than half of which is from the Laurentide by also from the other ice sheets). Here’s what to do next

1. Download the two spreadsheets and make plots of age vs latitude for 1. Bulk sediment radiocarbon; 2. Plant macrofossil radiocarbon; 3. Cosmogenic ages. Feel free to add in the Mansfield deglacial age of Corbett et al from the paper you read.

2. Calculate the retreat rate of the Laurentide Ice sheet for each data set (hint, you’ll need to plot some locations using Google Earth or GIS and measure a distance since rate is distance/time).

3. Compare the ages between these three ways of dating retreat, both the ages of initial deglaciation along the terminal moraine (in NJ, PA, NY, CT and MA) and the time that ice reaches northern Vermont and New Hampshire. Compare the retreat ages and times to the sea level rise curve in Lambeck for which the Laurentide is responsible for at least half the rise.

4. Make a web page entitled *Dating Deglaciation*. On that page, include

Plots of age vs latitude for 1. Bulk sediment radiocarbon; 2. Plant macrofossil radiocarbon; 3. Cosmogenic ages and then show a combined plot with all three data sets.

Show your calculations for retreat rates for each of the age dating techniques.

Write a paragraph comparing the dates and rates from each technique and a second paragraph explaining why your results are similar or are different between techniques. Speculate on why and consider relevant processes and assumptions of each technique. Make sure to tell us which you believe and Why! In this analysis, don’t forget the work of Lambeck and whether is helps you sort this all out.