ESS 431 PRINCIPLES OF GLACIOLOGY
ESS 505 THE CRYOSPHERE

Lecture 07 – Ice Dynamics I: Ice Deformation

Due Wednesday, October 18 2017, at start of class

Marshall, S., 2012. *The Cryosphere.* Chapter 6.

1) What is the typical shear stress at the base of a glacier?
2) What is a constitutive equation (look it up elsewhere, if it isn't clear from the reading)? What is the name for the constitutive equation for ice flow? What variables does it relate?
3) There are several physical properties not explicitly captured in Glen's Flow Law, that are often wrapped up in the flow rate parameter. What are these complicating factors?
4) Draw a typical ice-flow velocity profile for a glacier, as a function of depth. Where are the velocity gradients (du/dz) the strongest? Given the fact that high values of du/dz mean high values within the strain-rate tensor ($\dot{\varepsilon}$), where do you expect heat generation within the ice to be greatest? (Hint, look at the last term of Eq. 6.7 in Marshall).