

**ESS 431 PRINCIPLES OF GLACIOLOGY**  
**ESS 505 THE CRYOSPHERE**

**Lecture 02 – Natural Occurrences of Ice and Measuring Occurrences of Ice**

*Due Monday, October 2 2017, at start of class*

Marshall, S., 2012. *The Cryosphere*. Chapter 1.  
Bamber and Kwok. *Mass Balance of the Cryosphere: Observations and Modeling of Contemporary and Future Changes* (59-77).

- 1) Approximately how many glaciers does the Earth have?
- 2) What is the difference between sea-ice “area” and sea-ice “extent”?
- 3) Which month of the year has maximum sea ice extent in the northern hemisphere?
- 4) Explain why certain frequency bands are better for remote sensing of the cryosphere. (Hint: what is an atmospheric window?)

*For the following question, we are asking you to sketch out relative trends by hand. The exact values you provide do not need to be precise, they are just intended to be estimates you derive from a source of your choosing, to provide some intuition about the relative roles of the two hemispheres:*

- 5) (a) Plot the total Earth surface area as a function of latitude. (b) As a function of latitude, plot the percentage of surface area covered by land. Using plots (a) and (b), plot the total land surface area as a function of latitude.

Now, with these plots in hand, does the northern hemisphere or southern hemisphere have a higher percentage of snow cover? Why?