

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

**Lecture 09 – Ice Sheets, Ice Streams, and Ice Shelves**

*Due Wednesday, October 25 2017, at start of class*

Joughin and Alley, Stability of the West Antarctic ice sheet in a warming world, *Nature Geoscience* 2011.

- 1) What types of data have helped us deduce the past size of the West Antarctic Ice Sheet?
- 2) How do the spatial patterns of thinning (shown in Figure 1) relate to the ice flow speeds (shown in Box 1)?
- 3) Redraw the curve from figure (a) in Box 2, highlighting the relationship between ice flux to the ocean and total accumulation as a function of glacier length. Now, describe in words, and sketch along the plot, what happens to a glacier whose terminus sits at the 1000 km length.
- 4) What would be the total sea-level rise contribution, and the rate of sea-level rise (estimated in mm/yr), for a West Antarctic collapse scenario?