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Interactive comment on "Changes of Wilkins Ice Shelf over the past 15 years and inferences on its stability" *by* M. Braun et al.

M. Pelto

mspelto@nichols.edu

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Braun and others, (2008) provide a thorough review of Wilkins Ice Shelf (WIS) behavior illustrating its dynamic nature. Given that the process of ice shelf collapse is not understood detailed reviews of the evident changes in ice shelf physical characteristics offered here and by Glasser and Scambos (2008), are of great importance. Three key observations of this paper are: 1. That no continuous ordinary calving events occur on WIS. 2. That the central part of WIS did not have rifts prior to 1990, that by 1994 rifts had begun to expand in the northern front of the WIS and that today the central area is intersected by long rifts. 3. That surface meltwater ponds and channels are not related to the WIS breakup of 2008. It is worth noting that on Larsen B the large shear rifts that were key in the collapse were not evident more than 20 years prior to

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the collapse either (Glasser and Scambos, 2008). Is this a sign of changing buoyancy forces allowing the bending stresses to develop the extensive rifts?

Most of the following comments are offered to encourage the authors to more clearly and convincingly answer this question. A figure illustrating terminus position of ice front at least in vicinity of Charcot and Latady Island would be useful. This map could further illustrate via shading the two discussed areas prone to further collapse. A map based figure more fully illustrating the structural characteristics of the ice shelf similar to those used by Glasser and Scambos (2008) would be quite useful at least in the Charcot and Latady Island area.

The comments to follow are offered as they appeared in the paper with an aim of enhancing the clarity of the paper.

352-3 It is noted that beyond the fast edge there is an area of open water in some years. How wide is the fast ice? What is the size of the open water fetch? How long does the open water tend to last? What was the sea ice state in 2008?

353-22 After defining crack types, it is important to consistently identify rifts as either tensile or shear stress induced based on orientation. This will aid the reader in developing a sense of the relative importance of each crack type. For example when fractures are discussed on 354-14-25.

355-5 ...Crack propagation toward the ice front... is this in general or in reference to a specific crack? Are the associated cracks in this paragraph tensile or shear in origin?

358-17 It is noted that ice rises have been viewed as key pinning points in the past, and not key zones of weakness development. There is a fine line separating these two differing roles. I would guess that the authors are suggesting that there is a limit beyond which the thickness of the ice shelf is insufficient for the pinning point to be a stabilizing force. That thinning is the preconditioning of the ice shelf to reach this point. The change in buoyancy forces as a result and bending stresses would then tend to

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help develop rifts. Whether this is correct or an incorrect, the reasoning sequence for ice rises being a locus of failure needs to be completed. The authors may in fact be saying this in this sentence...Hence, ice rises are, in the absence of a compressive stress zone that hinders rift propagation, a destabilising factor... Simply more attention is needed to at least qualitatively clarify the process.

359-9 ...drastic rift extension in coherence with break-up events... Can this observation be quantified in some fashion?

361-9 I agree with the conclusion that bending stresses and changing buoyancy forces are a cause for break-up. However, a better explanation of the nature and cause of the changes in bending stresses and buoyancy forces is required to sell this point.

Figure 6. Identify type of crack formation.

Figure 9. Identify type of crack formation of rifts. Any other information quantifying rift changes, such as length or width?

Referrences:

Glasser, N. F. and Scambos, T. A.: A structural glaciological analysis of the 2002 Larsen B ice shelf collapse, J. Glaciol., 54(184), 3-16, 2008.

Interactive comment on The Cryosphere Discuss., 2, 341, 2008.