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Interactive comment on "Brief Communication: Newly developing rift in Larsen C Ice Shelf presents significant risk to stability" *by* D. Jansen et al.

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Jansen et al (2015) provide a compelling observation of rift extension on Larsen C Ice Shelf that could have important implications. This is an important finding and will prompt further investigation of this feature. Most of the comments below are simply a request for more detail that would help us learn more from this interesting dynamic change in the ice shelf that could have large consequences. This includes possibly referencing other ice shelves that experienced ice losses that could have had similar changes in flow stress fields (flow angles) besides Larsen B. Providing a brief example of model validation is essential. It would be worth noting briefly whether or not there

are there any velocity output differences between models or with present observations. The model does not have to be reviewed in detail as that is in previous papers.

862-21: A different specific example of a rift tip ending at a confluence flow unit would be useful.

863-3: Given previous satellite imagery, has a rift not propagated across the suture zone before? This needs to be stipulated along with the interval that imagery was observed. Does not need to be detailed, and can be done at 865-11.

864-2: Has the width changed near the actual width tip as it has propagated, for example 500 m from the tip how wide is it now compared to at the initiation of the expansion, can be reported later.

864-9: What are the existing weaknesses?

864-25: This model has in other studies been validated with comparison of simulated and observed velocities. Details of the model do not have to be reviewed here; however, some means of validation needs to be offered. Haug et al (2010) Figure 3 provides a velocity field for validation.

865-11: If not addressed earlier refer to the period of observations in satellite images that the rift had not crossed the suture zone.

865-19: Is this November 2010? What is the current rift width at this point and what does that imply? Over what length has the rift width reached a value of twice the ice surface elevation or some critical width versus thickness?

865-21: How does the actual velocity change as it crosses into the new flow unit? Haug et al (2010) Figure 3 provides a velocity for this region to address this.

866-7: What were and are the angles? The difference needs to be better illustrated and quantified in Figure 3 it is hard to accurately identify the difference field.

866-17: What angles area very low? Is there any thickness or velocity output from the

models that would provide further insight to future changes?

867-11: Is Larsen B the best analog since surface melt played such a key role there? Do either George VI (Figure 2 and 5; Holt et al (2013), Wordie (Figure 4.3; Cook and Vaughan, 2010) or Wilkins (Figure 5, Braun et al (2009)) provide a good example in terms of rift development, ice rise impact or changing flow angle versus calving front? If not no need to cite.

Braun, M., Humbert, A., and Moll, A.: Changes of Wilkins Ice Shelf over the past 15 years and inferences on its stability, The Cryosphere, 3, 41-56, doi:10.5194/tc-3-41-2009, 2009.

Cook, A. J. and Vaughan, D. G.: Overview of areal changes of the ice shelves on the Antarctic Peninsula over the past 50 years, The Cryosphere, 4, 77-98, doi:10.5194/tc-4-77-2010, 2010.

Haug, T., Kääb, A., and Skvarca, P.: Monitoring ice shelf velocities from repeat MODIS and Landsat data – a method study on the Larsen C ice shelf, Antarctic Peninsula, and 10 other ice shelves around Antarctica, The Cryosphere, 4, 161-178, doi:10.5194/tc-4-161-2010, 2010.

Holt, T. O., Glasser, N. F., Quincey, D. J., and Siegfried, M. R.: Speedup and fracturing of George VI Ice Shelf, Antarctic Peninsula, The Cryosphere, 7, 797-816, doi:10.5194/tc-7-797-2013, 2013.

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