

***Interactive comment on “Brief Communication  
“Importance of slope-induced error correction in  
elevation change estimates from radar altimetry””  
by R. T. W. L. Hurkmans et al.***

**A. Brenner (Referee)**

anita.c.brenner@nasa.gov

Received and published: 15 February 2012

1. Overall Quality – General comments a. This is a valid and important issue, so the underlying premise that one needs to take into account that the measurement is not to the sub satellite location when deciding which measurements to include in calculating  $dh/dt$  for a specific region is important.
- b. The paper makes an important point and is certainly worth publishing.
2. Addressing individual scientific questions/issues – specific comments
  - a. The authors state it is very important to use contemporaneous estimates of slope

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because a small error in slope would cause a 10% error in horizontal relocation. However the crossover clusters contain data spanning 3 years, 2003-2006 and the slope grid used was published in 2001 so it was calculated with data several years previous to the ENVISAT data used. They should say something about what time period they consider to be contemporaneous and why that is acceptable.

b. Please define the exact region over which  $DH/dt$  is calculated. In Fig 3 only Envisat  $dH/dt$  values between -2.0 and 1.0 are shown, what happened to the values  $< -2.0$ . In the result discussion it says the authors use all the data to within 3km of the grounding line. The transect in 3b shows ENVISAT values lower than -2m/yr. What happens to the correlation if all the clusters are included in 3a? Or were they used but not shown in 3a?

c. I think more thought should be given to the effect of the up to 40km orbital altitude difference between the crossing passes. The authors state that it only causes a 5% error in the horizontal distance correction. Assuming a horizontal relocation of 10km, a 5% error (due to 40km difference in orbital height) over a 1 deg slope would translate to 500m horizontally with an 8m vertical displacement. Obviously the orbital differences aren't always 40km but even 10km is not at all unusual and that would still give several meters of elevation difference. This error may average out, but the authors should show how to support their results.

d. For the discussion on volume change, the authors do not include the value for the ATM/ICESat data, but only state that it is larger. I think they should include the value so the reader can see how far off it is from the ENVISAT numbers. Including the ATM/ICESat number would give a qualitative value of how close it is to the smaller footprint results that do not have a slope-induced error.

3. Technical Corrections

- a. Figure 1, cannot see the velocity contours. Perhaps use thicker lines.

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- b. Line 1 page 162; suggest measured “to” an upslope location.
- c. Figure 2 – Please increase the font used for the axes titles in B and C and put units on the color scale
- d. Uses different nomenclature in Figure 2 than in the text – line 24 p 162, E vs Rc – make them consistent
- e. Figure 3 – increase the font on the axes labels.
- f. P 164 line 7 Isn't the correction to  $dH/dt$  a change in elevation and not elevation. Why are units in meters and not meters/year?

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Interactive comment on The Cryosphere Discuss., 6, 159, 2012.