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The Cryosphere Discussions

Interactive comment on "A comparison of basal reflectivity and ice velocity in East Antarctica" *by* R. W. Jacobel et al.

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We very much appreciate the insightful comments from Dr. King and also the technical corrections he suggests, all of which we accept and for which modifications will appear in our revised version. In the spirit of TC Discussions I'd like to respond to his substantive points.

As a practitioner in the same kinds of radar studies, Dr. King appreciates the small number of observations of dielectric attenuation in the literature and, like us, is interested in comparisons. We will certainly add a sentence comparing these new results to our earlier work in West Antarctica where generally warmer ice led to somewhat higher attenuation rates in the range of 15 to 20 db/km. For the US-ITASE traverse (this study), in general we found lower values of attenuation in the colder ice nearer

South Pole (1230, lines 2-3) likely related to temperature (1229, 16-17) as he points out. Departures from this overall trend do not seem correlated with velocity or anything obvious to us. We will add a sentence about this at the conclusion of section 2.2. Dr. King points out that we changed (relative to a previous publication) to a perhaps more intuitive depiction of warm vs. cold basal conditions in our color scale for Figure 2 (warm colors = thawed bed). This is a very careful observation requiring knowledge of our previous work and I think it best to leave this change without remark.

Dr. King raises a very good point about the difference in correlations between basal reflectivity and velocity across the basins of glaciers draining through the Transantarctic Mountains, as opposed to areas lacking organized flow nearer the pole. He wonders if this is related to the decreased accuracy of the DEM south of 86 S used by Bamber et al., 2009 to obtain balance velocities. It is true that balance velocities are poorly constrained by topography south of 86 degs. However, there is no evidence of fast flow features extending inland from lower latitudes (Fig 1) so it is very difficult, if not impossible, for fast flow regions to exist in the region south of 86 degs shown in Fig 1. So the statement that the balance velocities capture well the spatial pattern of fast flow is certainly correct. The correlation shown in Fig 5 is for the fast flow areas only and the line is a fit to these points. These areas all lie north of 86 degs (see Fig 1). It is possible that the blue points in Fig 5 may show a better correlation with improved velocity data south of 86 degs, but the generally high values of basal reflectivity in a region where velocity can not be very fast requires the conclusion we have reached, namely that a thawed bed is necessary but not sufficient for fast flow. We have added a sentence to clarify this point and make it clear that the fit in Fig 5 does not include data from south of 86 degs.

AS mentioned, the technical corrections listed are all appreciated and will result in changes to the final version of the paper if accepted.

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