

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 also appreciate thoughtful comments from Reviewer #2 and in the spirit of TC Discussions would like to respond. We agree it is a very good idea to examine both driving stress and ice velocity in relation to the basal reflectivity we measure with the radar. We spent considerable time exploring this and were unable to reach a completely satisfying conclusion. We calculated driving stress using a DEM with 200m resolution together with an ice thickness grid with spacing of 1Km, both smoothed to remove spatial variations over a distance of several ice thicknesses. We observed greater variability in the driving stress North of 86 deg (where the DEM is better constrained) as expected. But we found no correlation of driving stress with basal reflectivity for the entire data set, or within any sub region. This is in contrast to the strong correlations

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with both balance velocity and (where it exists) satellite velocities in the catchments of glaciers crossing the Transantarctic Mountains, the northern part of the traverse. An obvious conclusion is that driving stress is only part of the story of ice velocity, especially in areas of faster flow where thawed bed conditions are intermittent. In the spirit of presenting a concise report on the significant findings of this work, we have opted to set aside the discussion of driving stress.

Our organizational structure for the paper examines results from the radar first, followed by the velocity measurements. Within the radar section we first describe efforts to quantify dielectric attenuation (Section 2) before deriving values of basal reflectivity (Section 3). The possibility that basal roughness on different scales might confound interpretations of conditions of thawed versus frozen bed seems to us to follow best after we have introduced the results on basal reflectivity. The roughness discussion then leads logically into the interpretation of Figure 4, where we have an example of the independence of reflectivity and topography.

Several of the specific points raised by this reviewer are very helpful. We will clarify these in the final version if the paper is accepted. In Figure 4 the last sentence of the caption states that the velocity colors scale with the range of balance velocities, 0-70m/a. We will move this more forward in the caption and make the other suggested changes.

Interactive comment on The Cryosphere Discuss., 4, 1225, 2010.

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