Interactive comment on "Regional modeling of the Shirase Drainage Basin, East Antarctica: Full-Stokes vs. shallow-ice dynamics" by Hakime Seddik et al.

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The manuscript "Regional modeling of the Shirase Drainage Basin, East Antarctica: Full-Stokes vs. shallow-ice dynamics" presents model results on Shirase Drainage Basin produced by different methods of force balance approximations (full-Stokes and Shallow-Ice Approximation). The basal friction coefficient for both force methods is obtained with FS dynamics based on the control inverse method and the observed velocity data. Experiments 100 years into the future are taken with different scenarios defined by the SeaRISE project. The conclusion is that FS is superior to SIA in the area.

General comments:

The manuscript is easy to follow and well organized.

There are quite a few of model inter-comparison studies on ideal and real ice sheets and have already showed the insufficiency of SIA, hence the conclusion is not novel. However, comparing to the former works, this study maximally exclude influence of factors other than force balance approximation by using the same settings in Elmer/Ice. On this typical drainage basin, this study quantified the importance of longitude and lateral stress in different regions. It can be taken as a reference for ice dynamical studies of such regions in East Antarctica.

Minor comments:

P2L20 shows that Seddik et al., (2012) found Elmer/Ice with FS was more sensitive than SICOPO-LIS with SIA for the double basal sliding experiment, which is not the case in your study. Can you discuss the possible explanations of the difference?

P10L21-22: The sentence is confusing to me. In general, SIA produce higher surface velocity in your simulations, so surface velocity ratio (FS/SIA) < 1 in general. When the ratio is less than 1, increasing of the ratio means SIA produces velocities nearer to FS, which means the higher performance of SIA. Then this sentence means SIA performs better in slipperier region, which is contradict with the following sentence.

Definition of T' and T in eqs 4 and 5 are missed.