Figure S1. (a) Bed geometry and ice velocity map at ER and KIS boreholes. (b, c) Cross sectional geometry and ice velocity along the $\overline{AA`}$ and $\overline{BB`}$ section lines in (a). Red vertical lines in (b,c) indicate the location of KIS and ER boreholes.
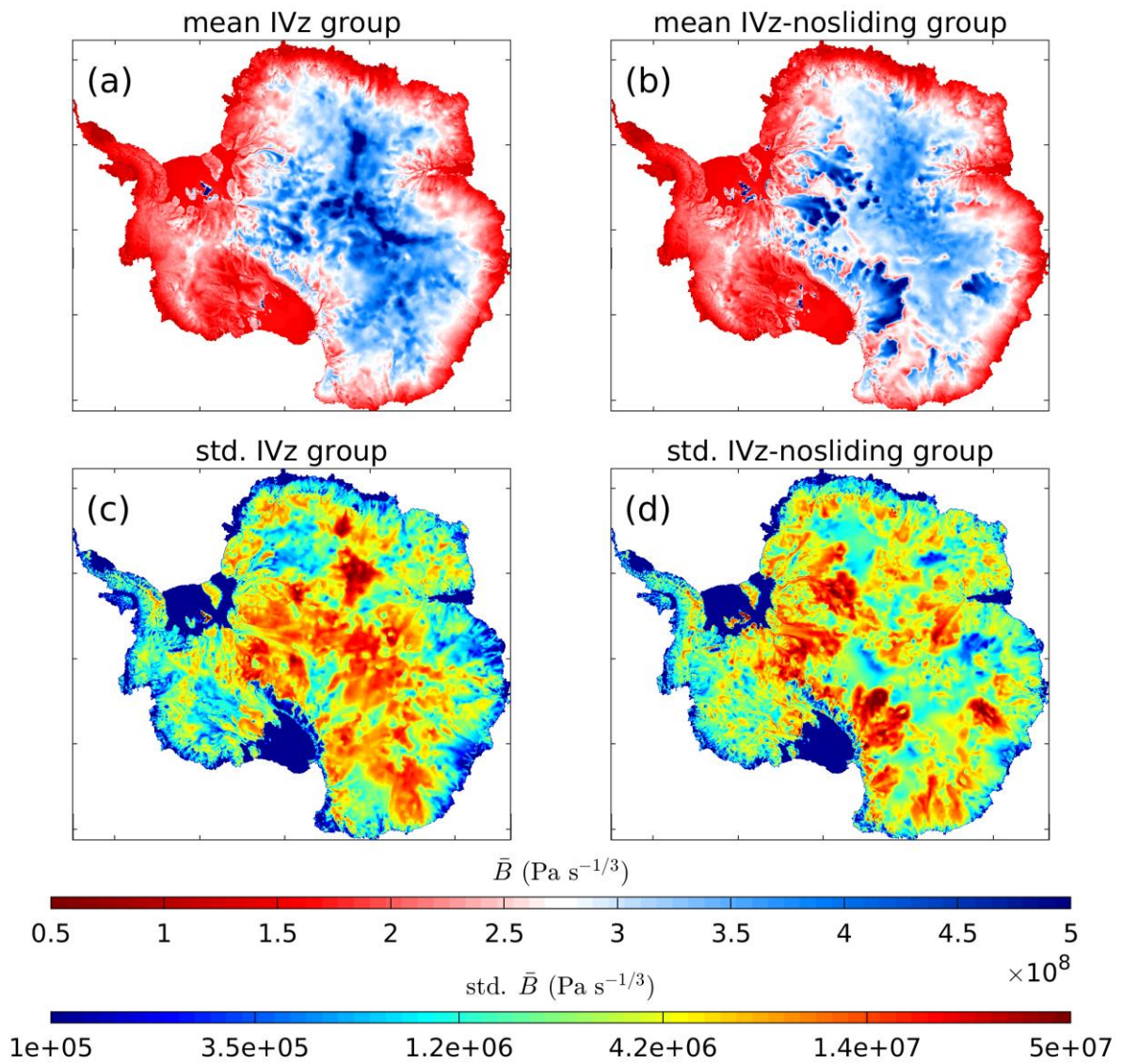
Figure S2. Mean (a,b) and standard deviation (c,d) of depth averaged rigidity for IVz and IVz-nosliding groups.
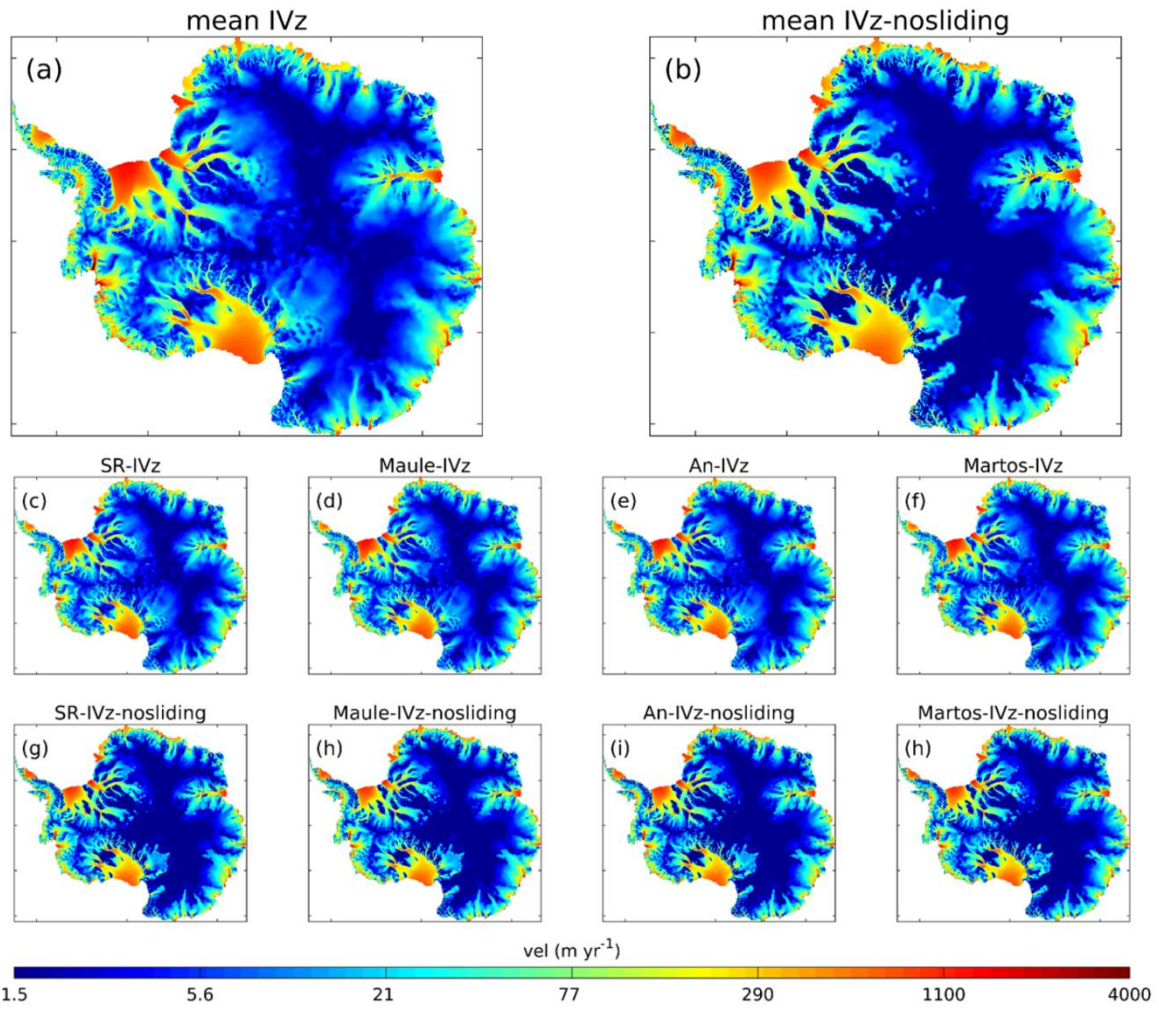
Figure S3. Upper panels (a, b) indicate the mean modeled velocity for (a) IVz group and (b) IVz-nosliding group. Lower panels (c-h) indicate the modeled ice velocity for each initialization.
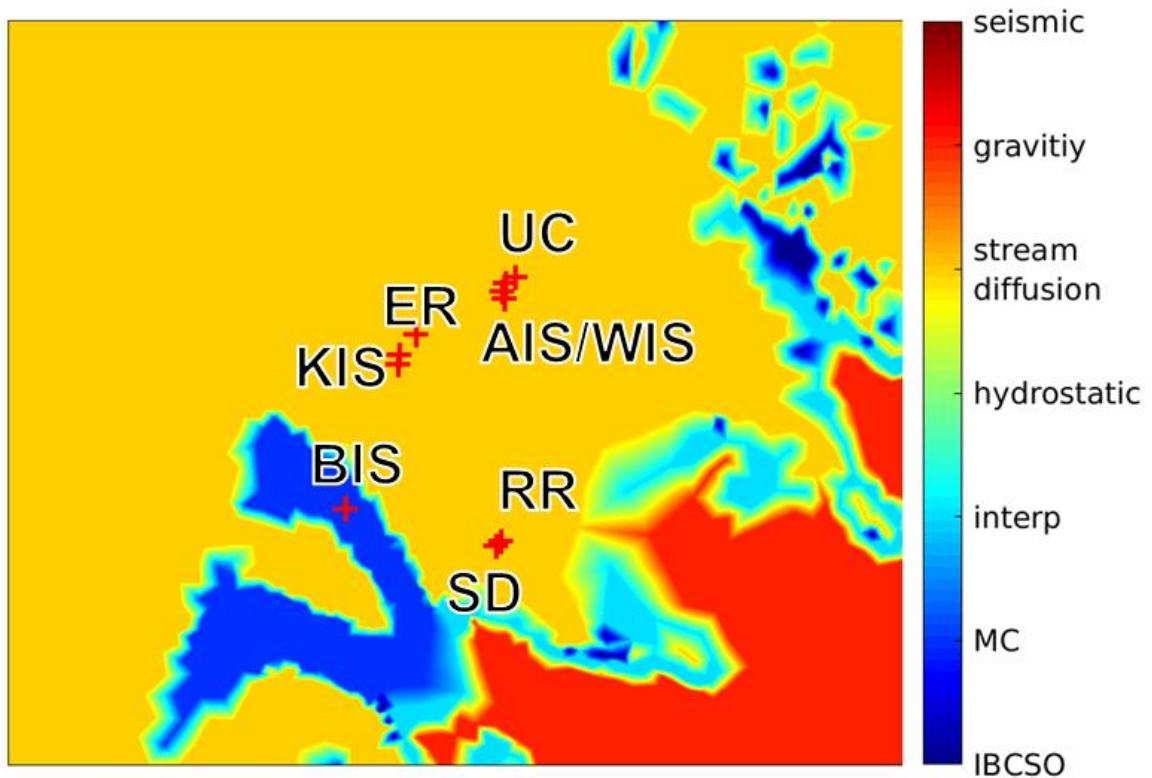
Figure S4. Methods for generating bed geometry of BedMachine at the West Antarctic Ice Sheet (WAIS) discharged to Ross Ice Shelf (Morlighem et al., 2020). Except for the geometry near Bindschadler Ice Stream (BIS) borehole, the geometry of other boreholes is generated using stream diffusion method, whereas, BIS region is generated using mass conservation method.

References

Morlighem, M., Rignot, E., Binder, T., Blankenship, D., Drews, R., Eagles, G., Eisen, O., Ferraccioli, F., Forsberg, R., Fretwell, P., Goel, V., Greenbaum, J. S., Gudmundsson, H., Guo, J., Helm, V., Hofstede, C., Howat, I., Humbert, A., Jokat, W., Karlsson, N. B., Lee, W. S., Matsuoka, K., Millan, R., Mouginot, J., Paden, J., Pattyn, F., Roberts, J., Rosier, S., Ruppel, A., Seroussi, H., Smith, E. C., Steinhage, D., Sun, B., Broeke, M. R. van den, Ommen, T. D. van, Wessem, M. van, and Young, D. A.: Deep glacial troughs and stabilizing ridges unveiled beneath the margins of the Antarctic ice sheet, Nat. Geosci., 13, 132–137, https://doi.org/10.1038/s41561-019-0510-8, 2020.