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Supporting Information for

High basal melt rates and high strain rates lead to more fractured ice

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Introduction

This document includes six supplementary figures providing additional support. Figure S1 illustrates the comparison between BedMachine-derived ice base measurements and Operation IceBridge measurements, highlighting the quantified error. Figure S2 depicts the error in BedMachine data relative to ice feature wavelength. Figure S3 displays the 2D gridded roughness across the entire Pine Island Ice Shelf, calculated from BedMachine. In Figure S4, the distribution of roughness values is presented, spanning both the Pine Island Ice Shelf and all Antarctic ice shelves. Figure S5 illustrates bin sizes corresponding to Figure 7 in the main text for a) the Pine Island Ice Shelf and b) all Antarctic Ice Shelves. Finally, Figure S6 showcases the trend in Figure 7 from the main text, with an emphasis on ensuring all bin sizes have a minimum of 50 measurements, for a) the Pine Island Ice Shelf and b) all Antarctic Ice Shelves.

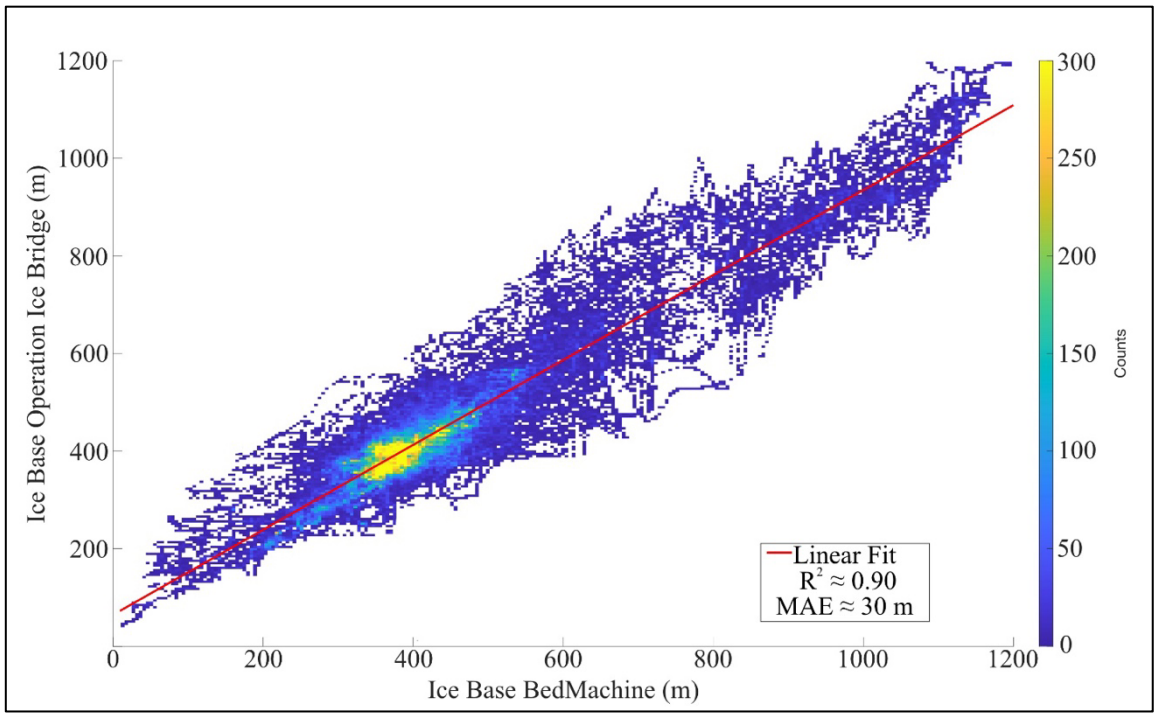


Figure S1: Comparison of OIB ice base measurements to BedMachine measurements. The MAE of BedMachine to OIB is 30 m over the Pine Island Ice Shelf

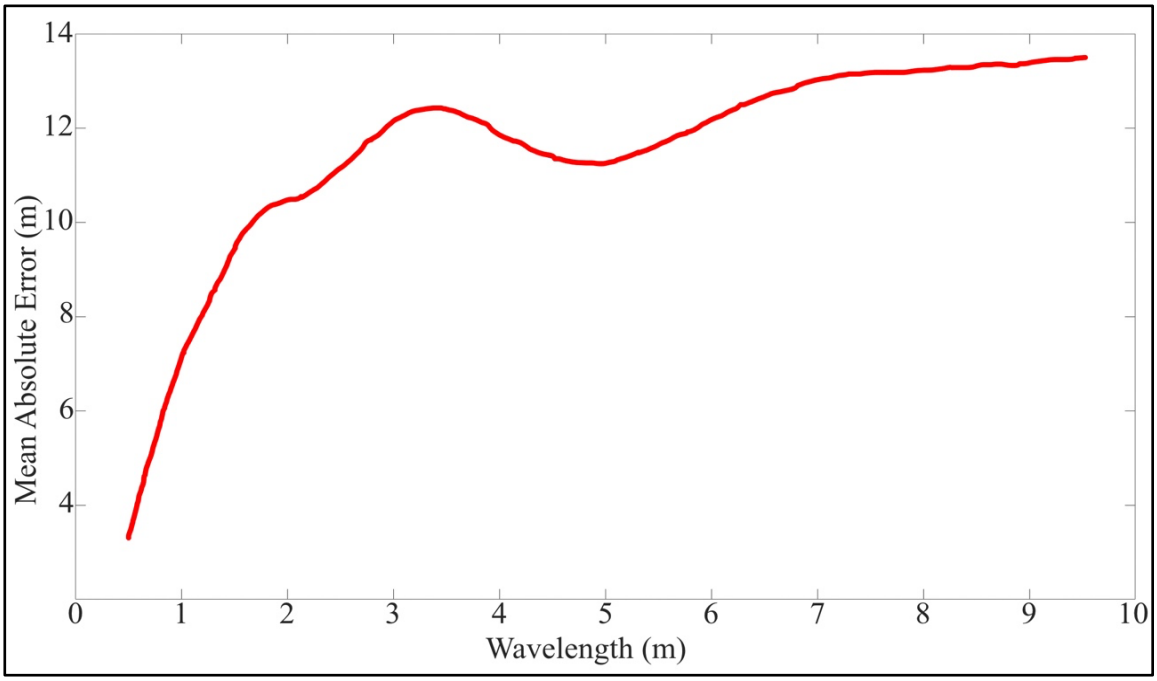


Figure S2: Comparison of Mean Absolute Error of BedMachine measurements as function of wavelength for the Pine Island Ice Shelf. The decrease in error as a function of wavelength shows a pronounced decrease in error for the wavelengths considered in our study.

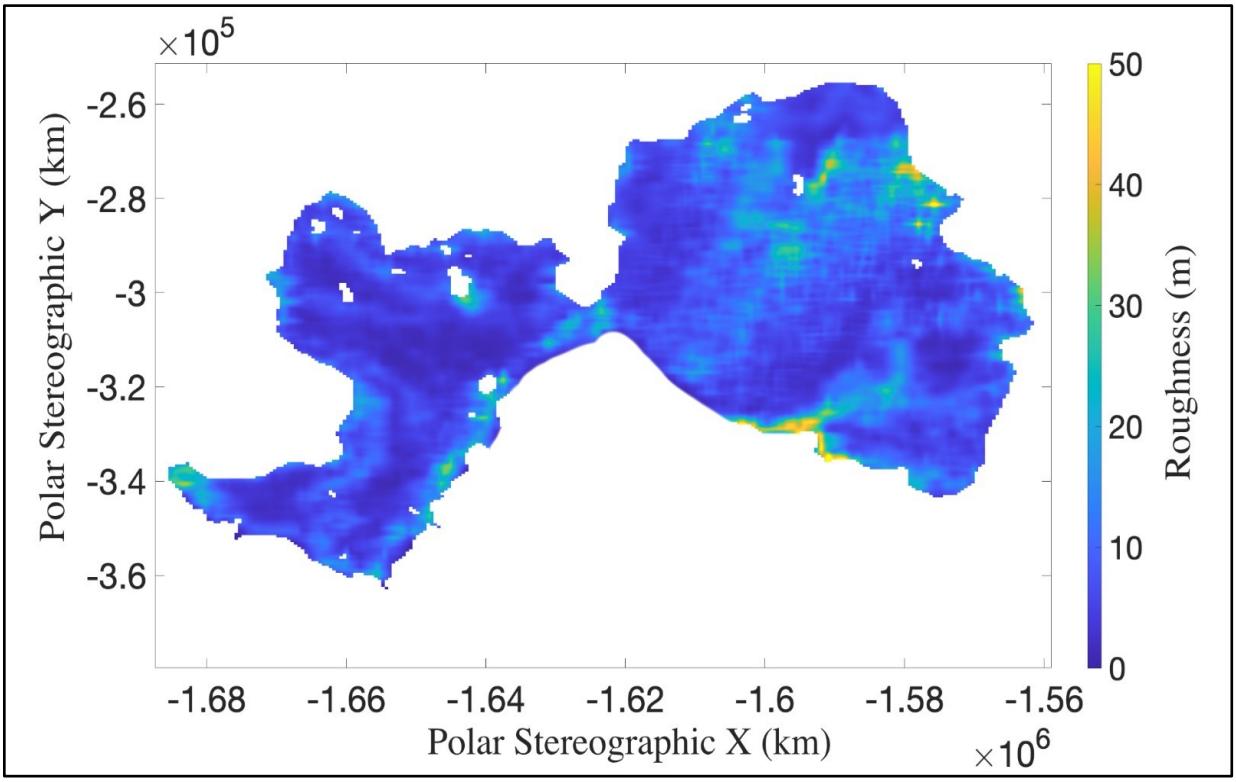


Figure S3: A 2D map of roughness across the Pine Island Ice Shelf.

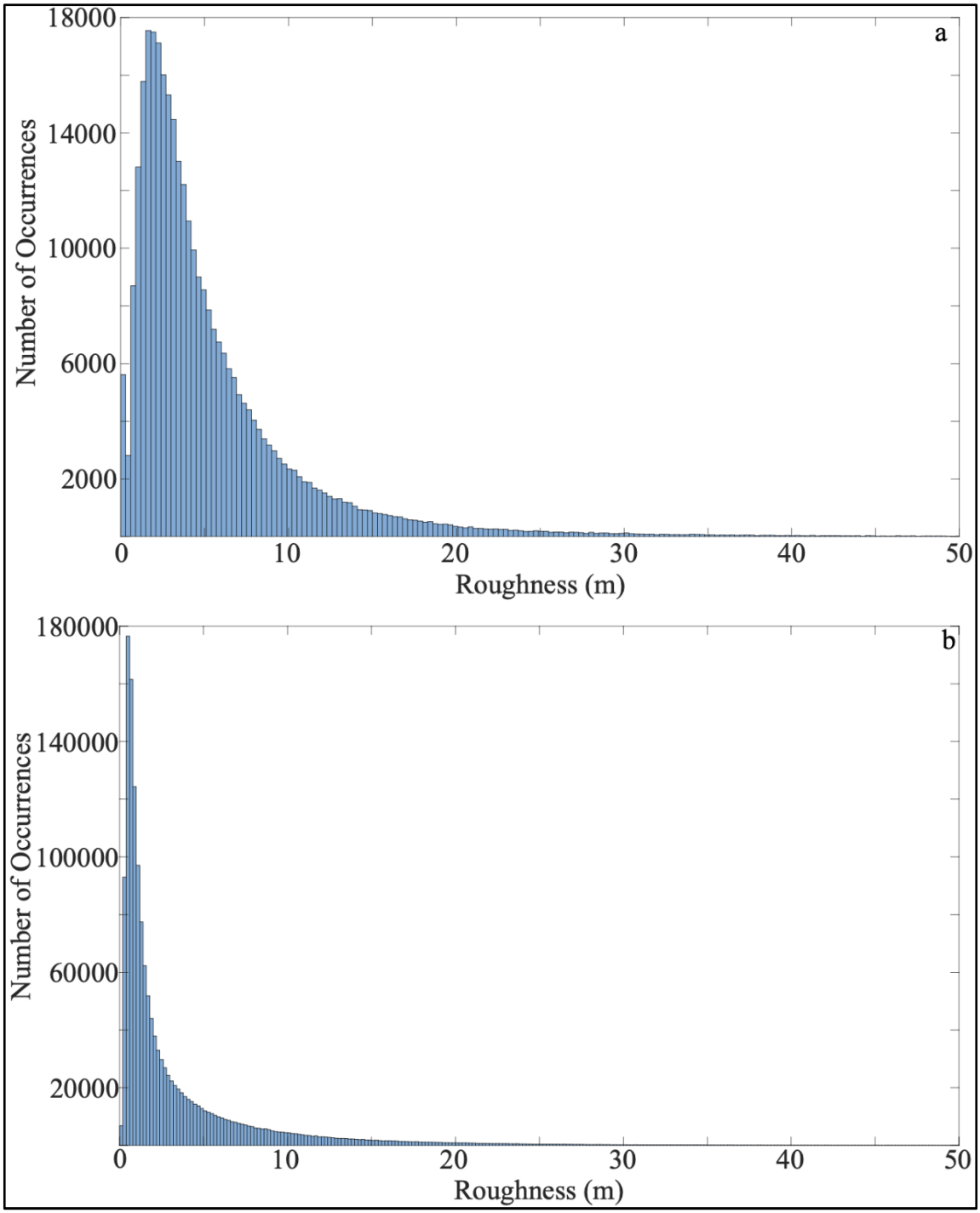


Figure S4: a) Distribution of roughness values across the Pine Island Ice Shelf b) Distribution of roughness values across all Antarctic ice shelves

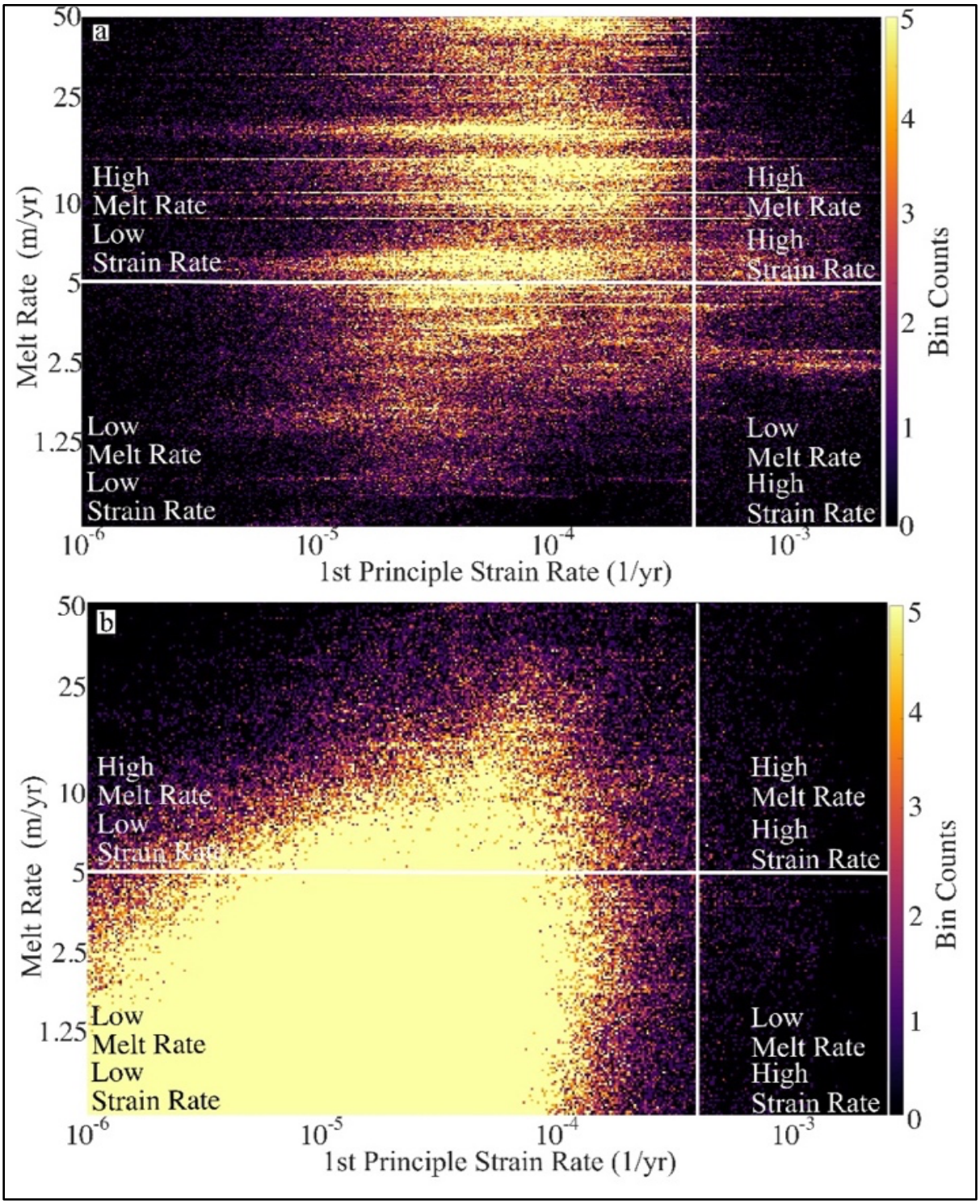


Figure S5: a) Bin counts for each of the roughness measurements for the Pine Island Ice Shelf. b) Bin counts for each of the roughness measurements for all Antarctic ice shelves. These panels correspond to each of the panels in Figure 7

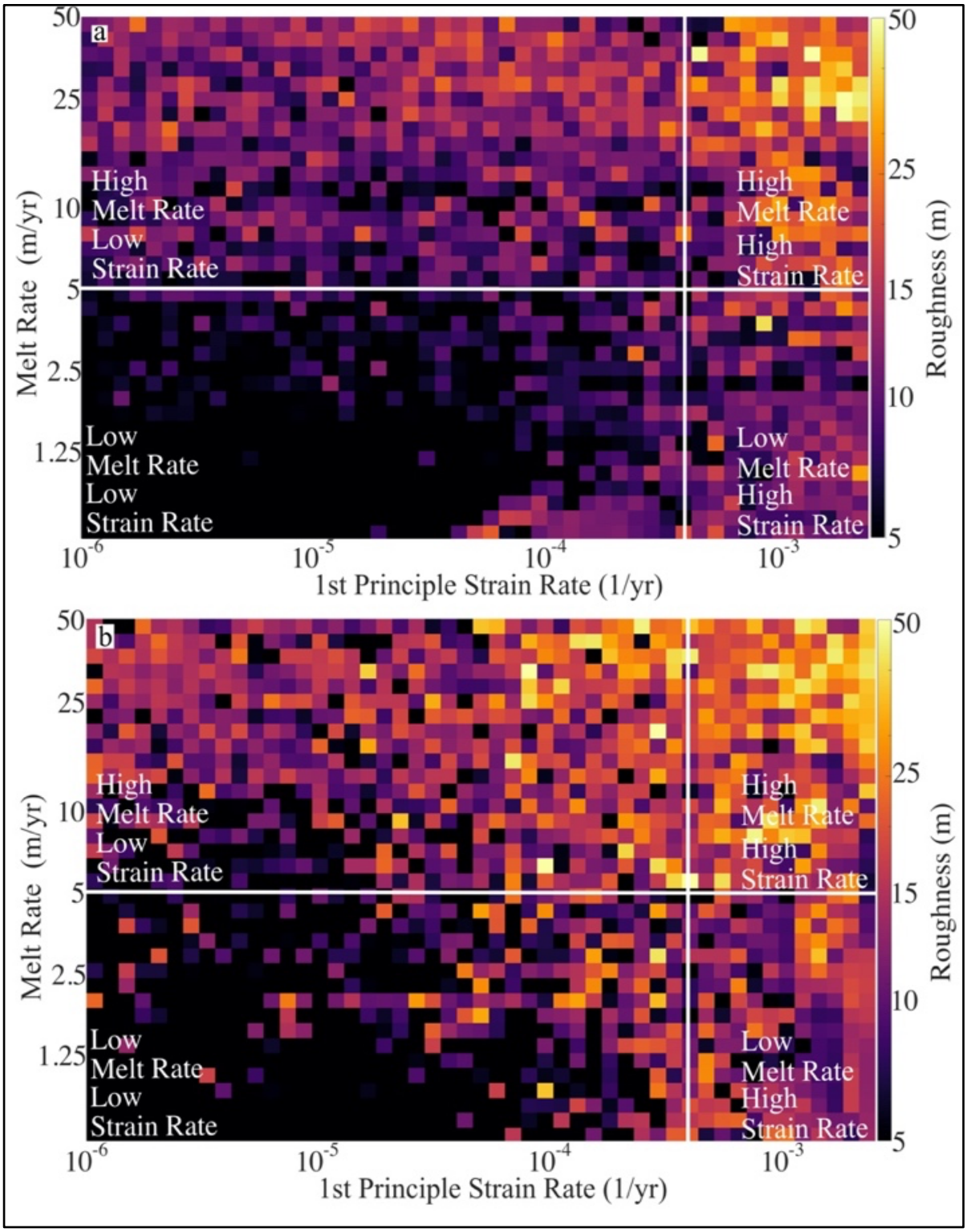


Figure S6: a) Bin counts for each of the roughness measurements for the Pine Island Ice Shelf. b) Bin counts for each of the roughness measurements for all Antarctic ice shelves. These panels correspond to each of the panels in Figure 7