Supplementary Info for "What can radar-based measures of subglacial hydrology tell us about basal shear stress? A case study at Thwaites Glacier, West Antarctica"

Rohaiz HARIS,[1] Winnie CHU,[1] Alexander ROBEL[1]

[1]*School of Earth and Atmospheric Sciences, Georgia Institute of Technology*

Correspondence: Rohaiz Haris <rharis3@gatech.edu>

Table S1. Pearson Correlation Coefficients between various basal shear stress inversions and relative reflectivity, and between basal shear stress inversions and specularity

Basal Shear Stress Inversion	Relative Reflectivity	Specularity Content
Sergienko & Hindmarsh	0.0751	−0.1777
AWI PISM1	0.2999	−0.1820
DOE MALI	−0.1111	−0.1576
JPL1 ISSM	0.1804	−0.3269
NCAR CISM	0.1296	−0.3135
PIK PISM1	0.2726	−0.2596
UCIJPL ISSM	0.2380	−0.2786
UTAS ElmerIce	0.2238	−0.3206
VUB AISMPALEO	0.3132	−0.2694

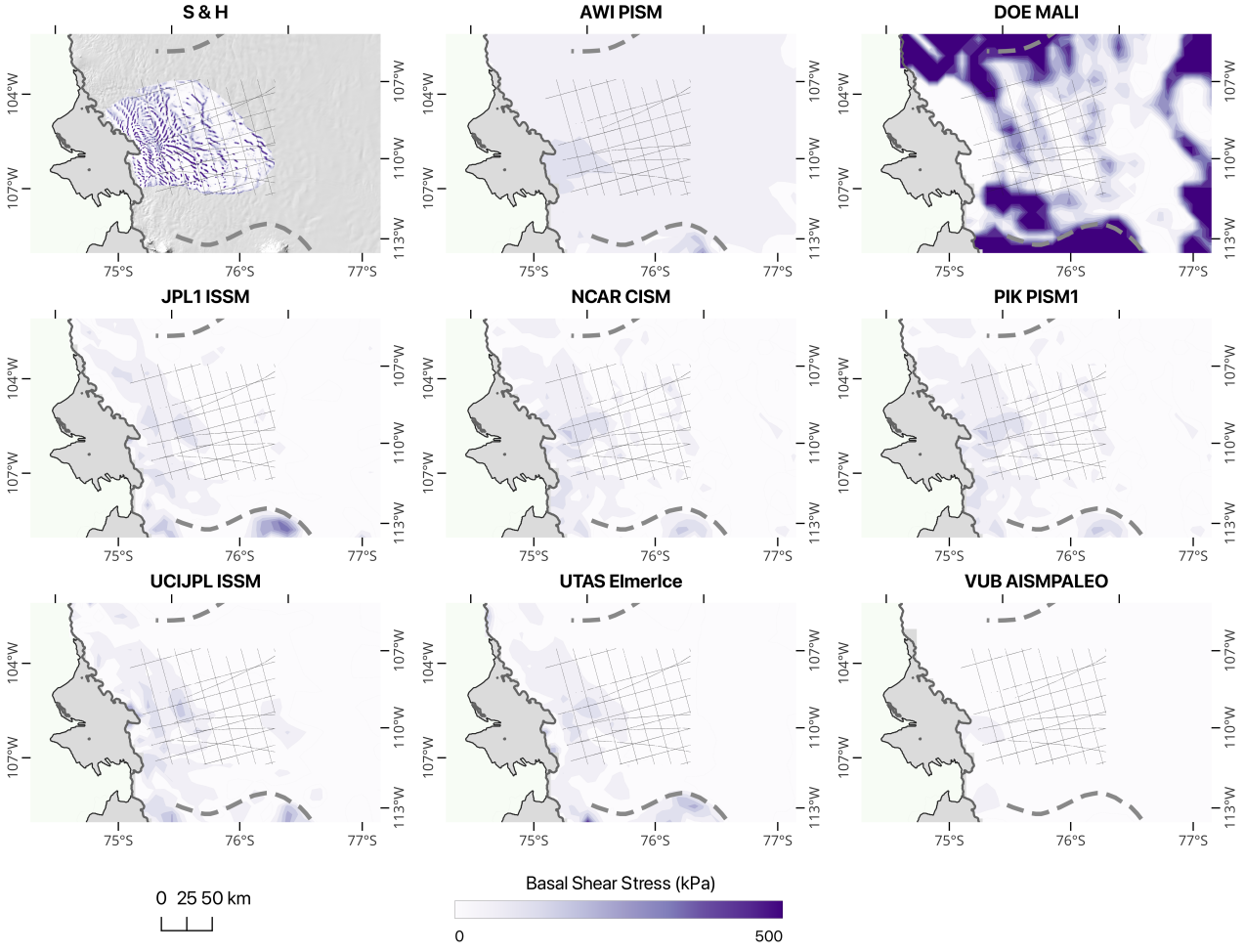

Fig. S1. Basal Shear Stress colormap for all inversions considered in this study. The inversion from Sergienko & Hindmarsh (2013) is henceforth referred to as S & H

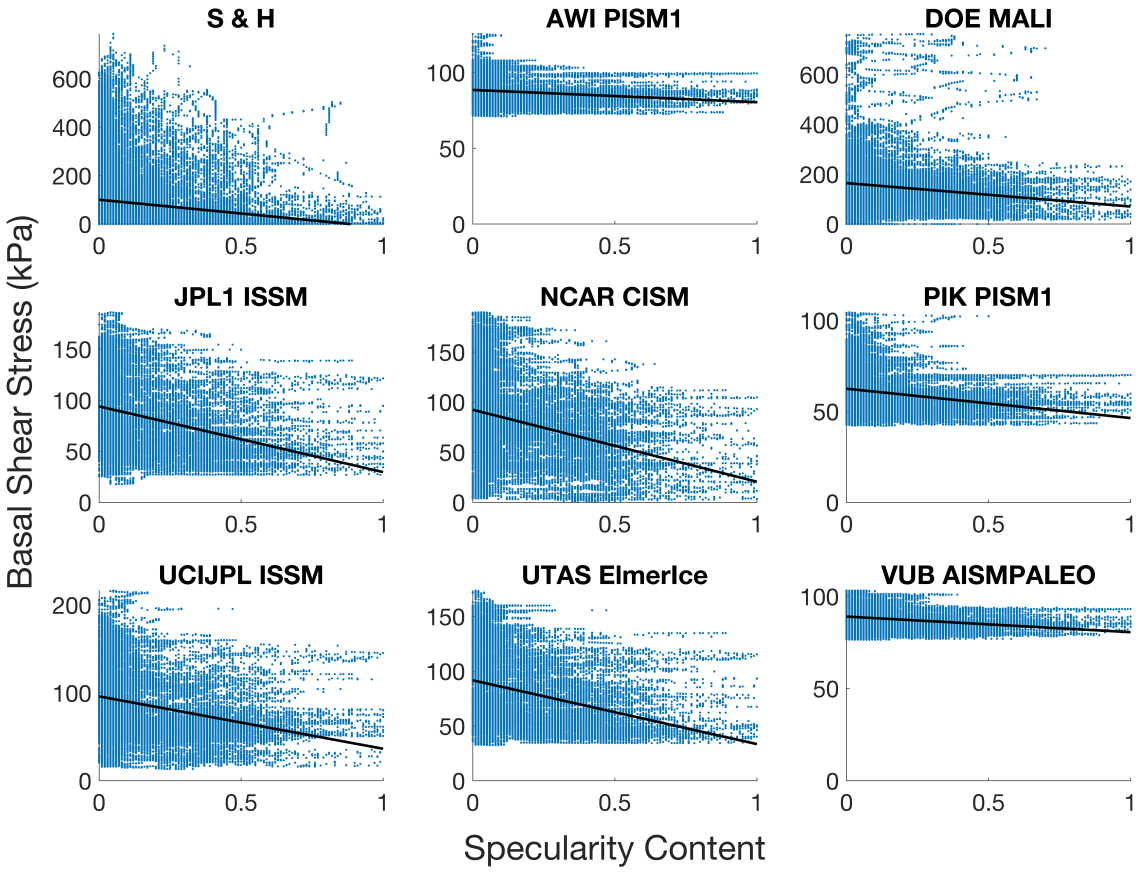

Fig. S2. Scatter plot between specularity content and basal shear stress for all inversions considered in this study. The linear regression is also plotted.

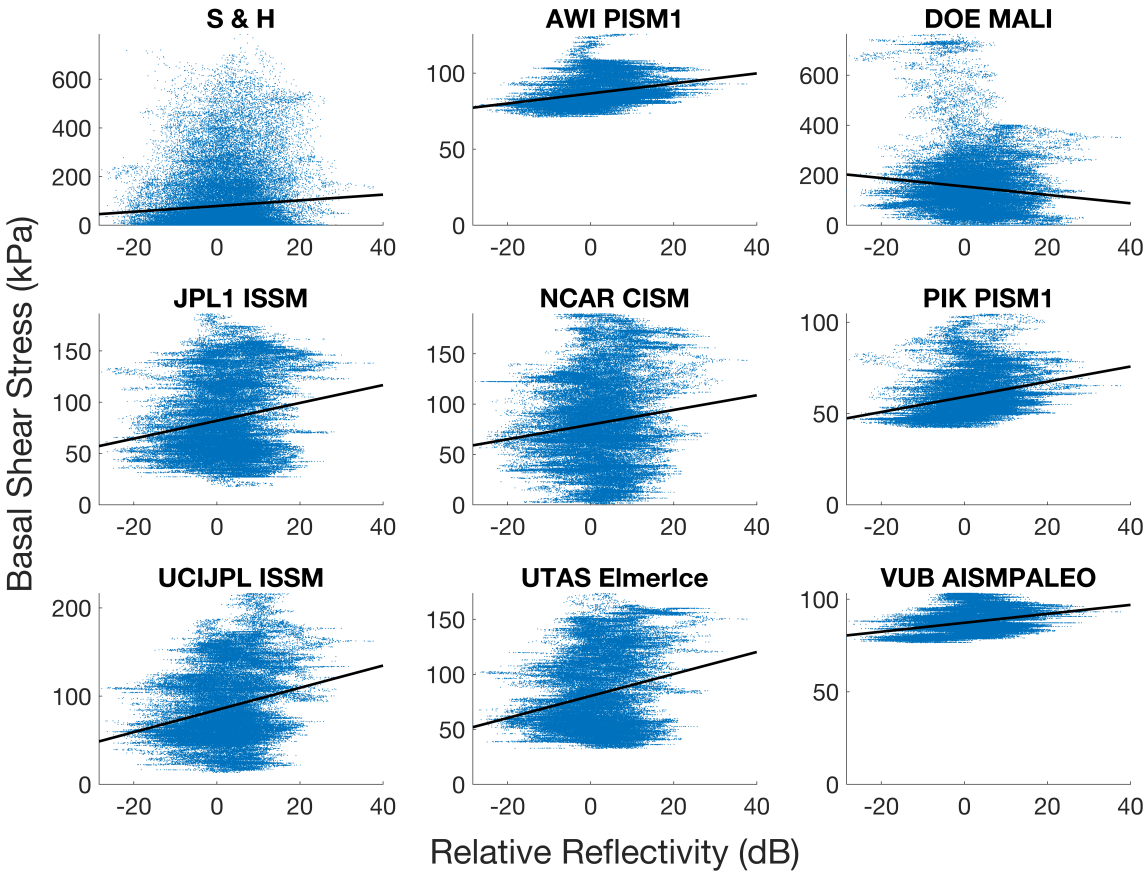

Fig. S3. Scatter plot between relative reflectivity and basal shear stress for all inversions considered in this study. The linear regression is also plotted.

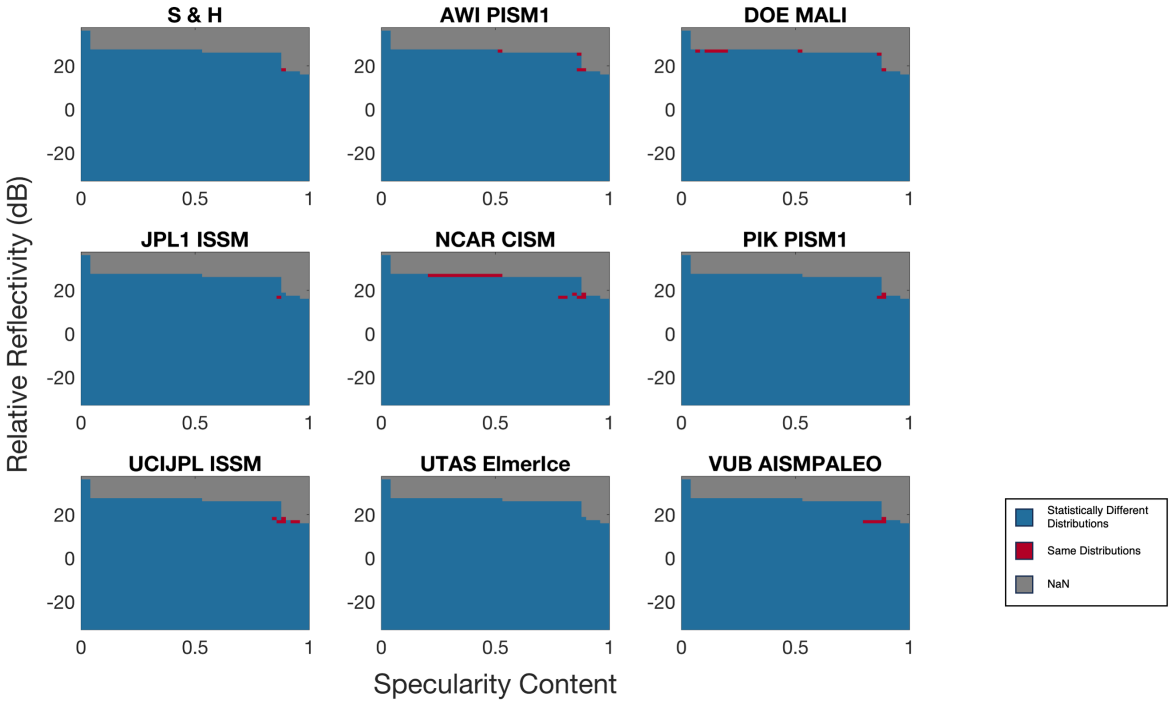

Fig. S4. 2-Sample Kolmogorov-Smirnov Test (henceforth referred to as KS test) for the high-high plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content greater than X and relative reflectivity greater than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The KS test is performed with the complete dataset instead of a random sample of equal size to the data sampled on the basis of radar metrics.

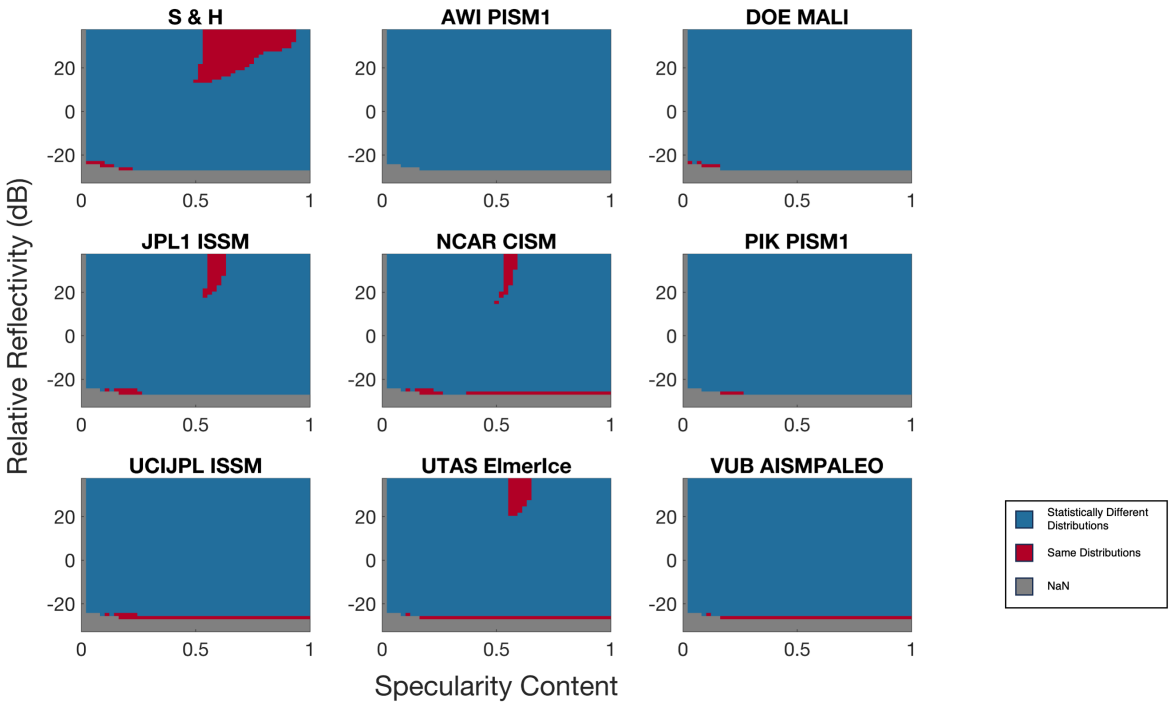

Fig. S5. 2-Sample Kolmogorov-Smirnov Test (henceforth referred to as KS test) for the low-low plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content lower than X and relative reflectivity lower than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The KS test is performed with the complete dataset instead of a random sample of equal size to the data sampled on the basis of radar metrics.

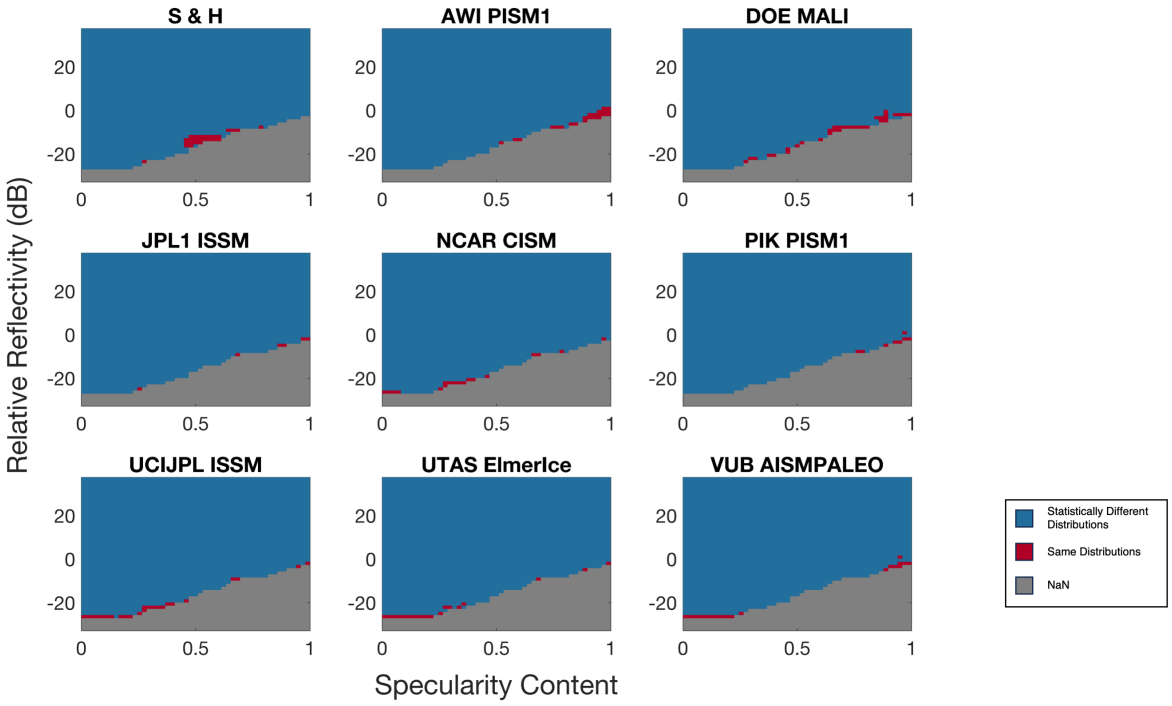

Fig. S6. 2-Sample Kolmogorov-Smirnov Test (henceforth referred to as KS test) for the high-low plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content greater than X and relative reflectivity lower than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The KS test is performed with the complete dataset instead of a random sample of equal size to the data sampled on the basis of radar metrics. We do not analyze the high-low plots and have included them here for reference.

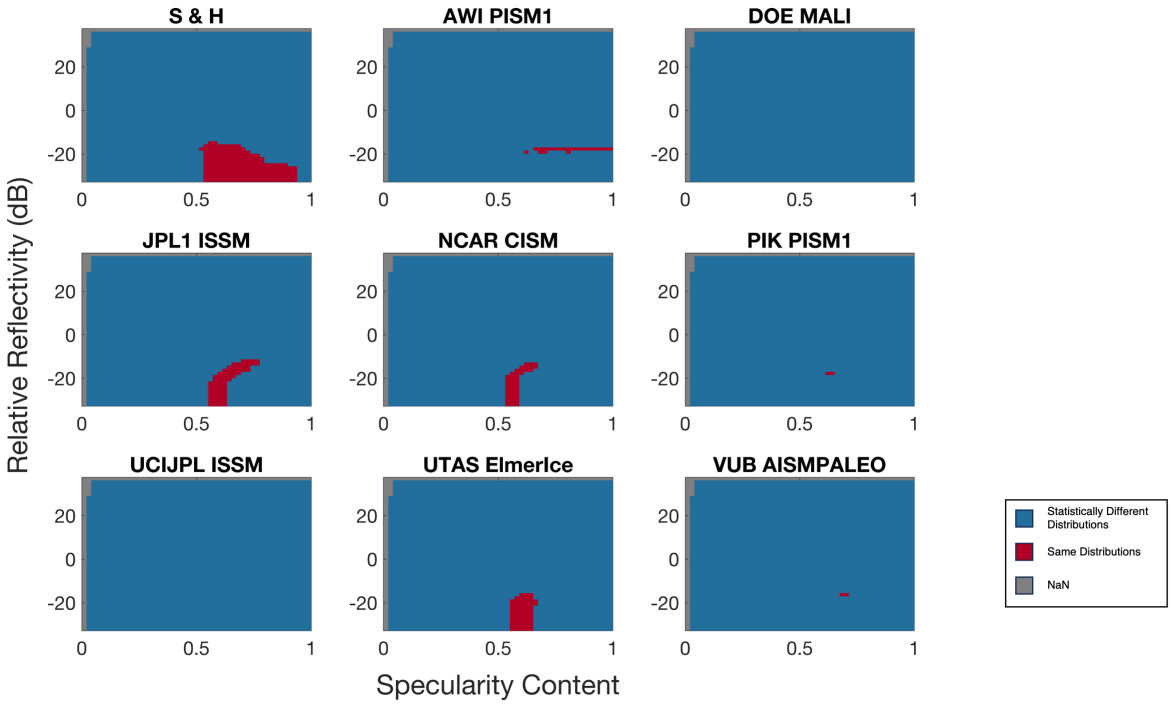

Fig. S7. 2-Sample Kolmogorov-Smirnov Test (henceforth referred to as KS test) for the low-high plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content lower than X and relative reflectivity greater than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The KS test is performed with the complete dataset instead of a random sample of equal size to the data sampled on the basis of radar metrics. We do not analyze the low-high plots and have included them here for reference.

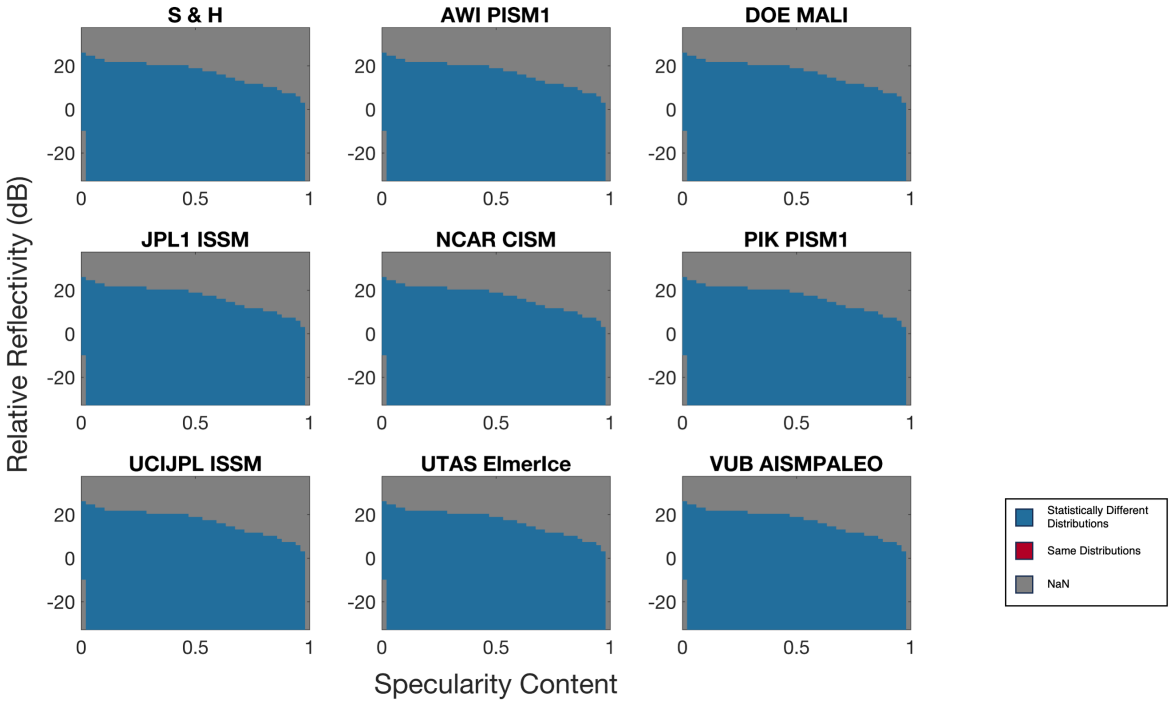

Fig. S8. 2-Sample Kolmogorov-Smirnov Test for the high-high plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content greater than X and relative reflectivity greater than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The KS test is performed with a random sample of equal size to the data sampled on the basis of radar metrics to avoid a Type I error which occurs when the null hypothesis is rejected incorrectly. Samples greater than 70% of the complete dataset and with less than 100 numeric values are not considered. These are the high-high KS test results used in our study.

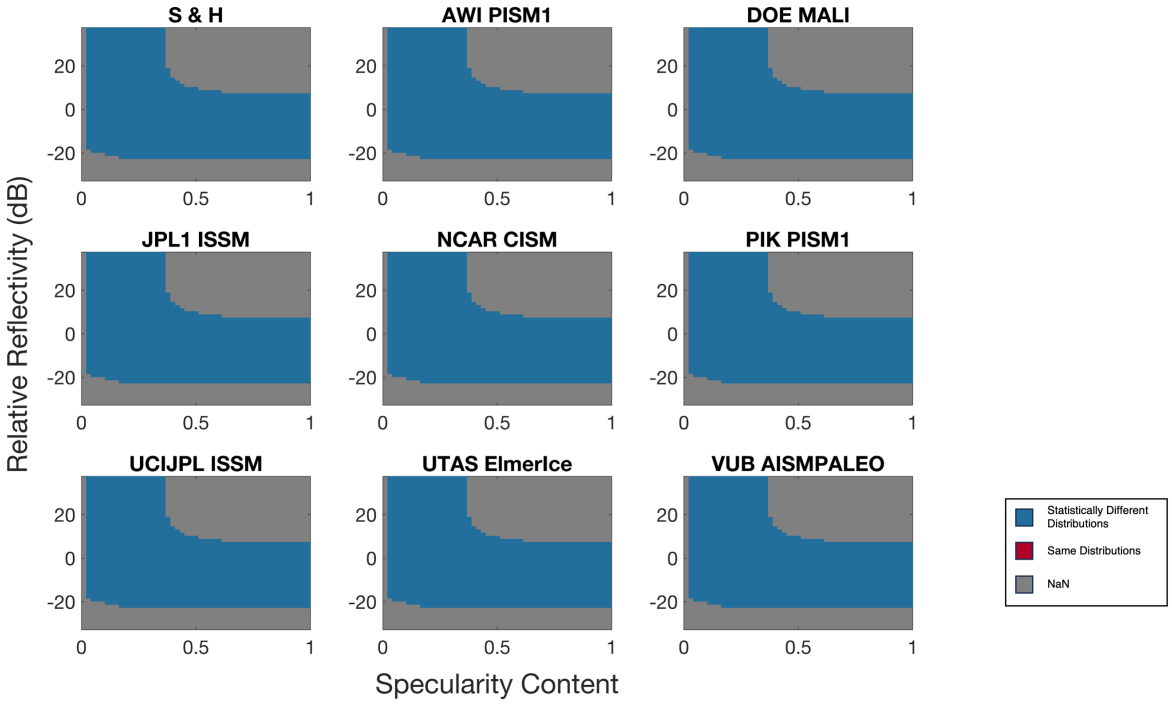

Fig. S9. 2-Sample Kolmogorov-Smirnov Test for the low-low plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content lower than X and relative reflectivity lower than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The KS test is performed with a random sample of equal size to the data sampled on the basis of radar metrics to avoid a Type I error which occurs when the null hypothesis is rejected incorrectly. Samples greater than 70% of the complete dataset and with less than 100 numeric values are not considered. These are the low-low KS test results used in our study.

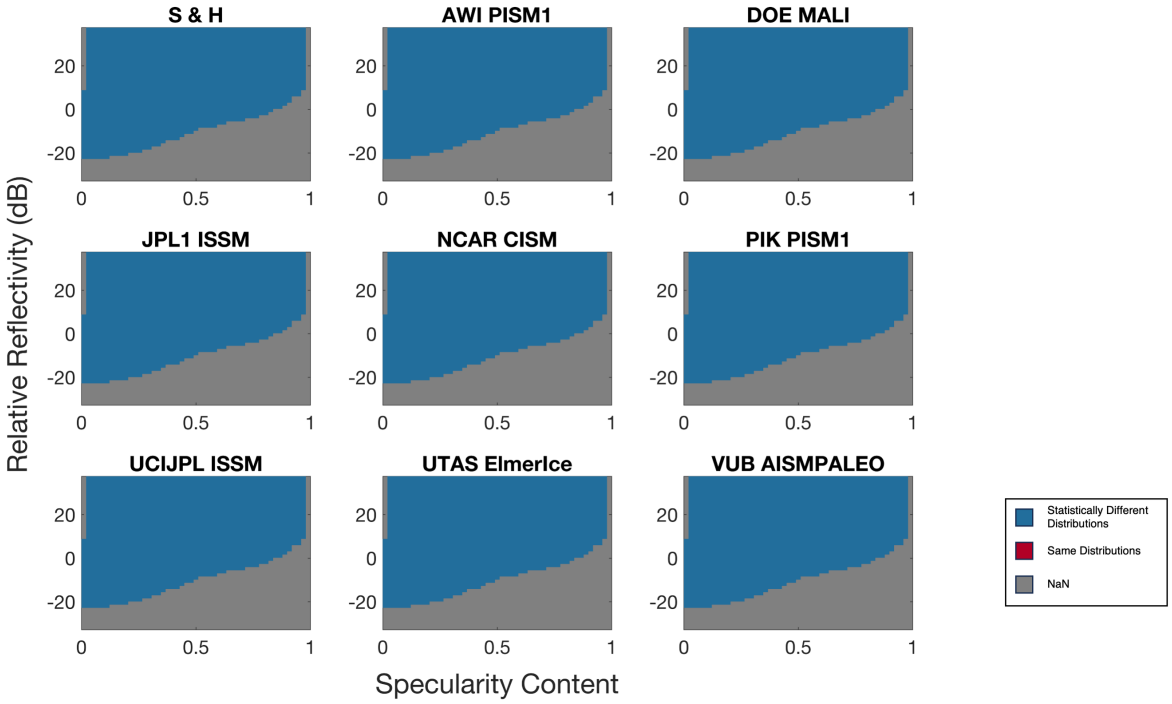

Fig. S10. 2-Sample Kolmogorov-Smirnov Test for the high-low plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content greater than X and relative reflectivity lower than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The KS test is performed with a random sample of equal size to the data sampled on the basis of radar metrics to avoid a Type I error which occurs when the null hypothesis is rejected incorrectly. Samples greater than 70% of the complete dataset and with less than 100 numeric values are not considered. While this is the methodology that we use in our study, we do not analyze the high-low plots and have included them here for reference.

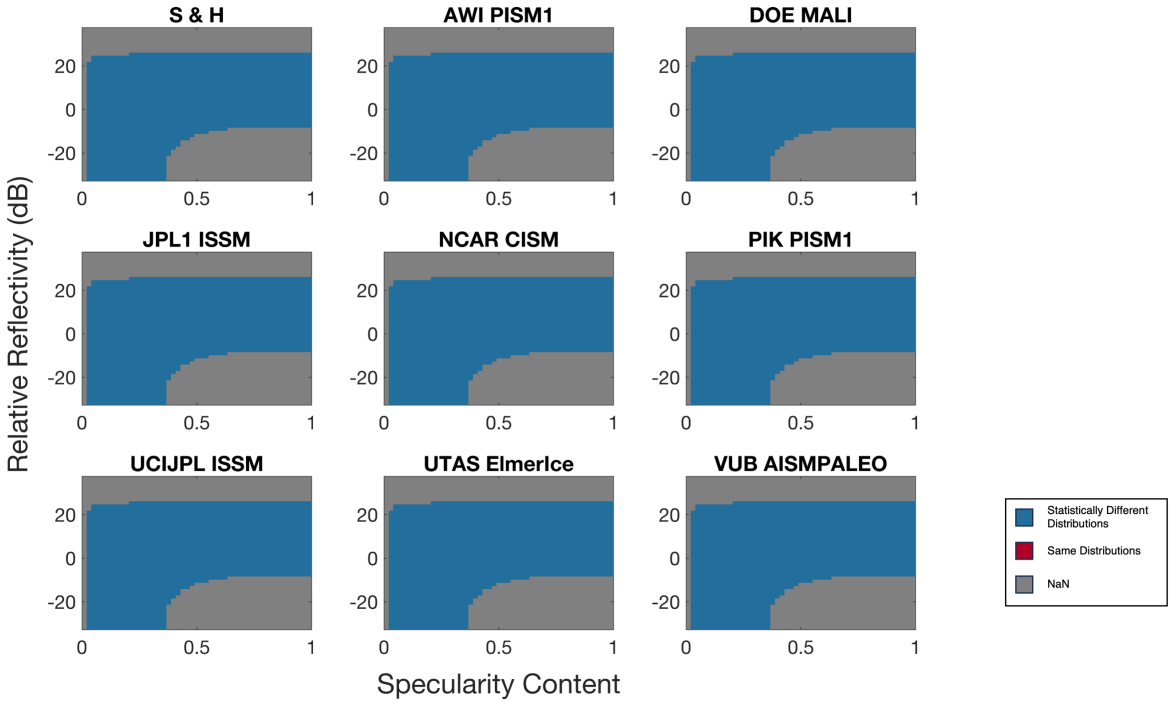

Fig. S11. 2-Sample Kolmogorov-Smirnov Test for the low-high plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content lower than X and relative reflectivity greater than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The KS test is performed with a random sample of equal size to the data sampled on the basis of radar metrics to avoid a Type I error which occurs when the null hypothesis is rejected incorrectly. Samples greater than 70% of the complete dataset and with less than 100 numeric values are not considered. While this is the methodology that we use in our study, we do not analyze the low-high plots and have included them here for reference.

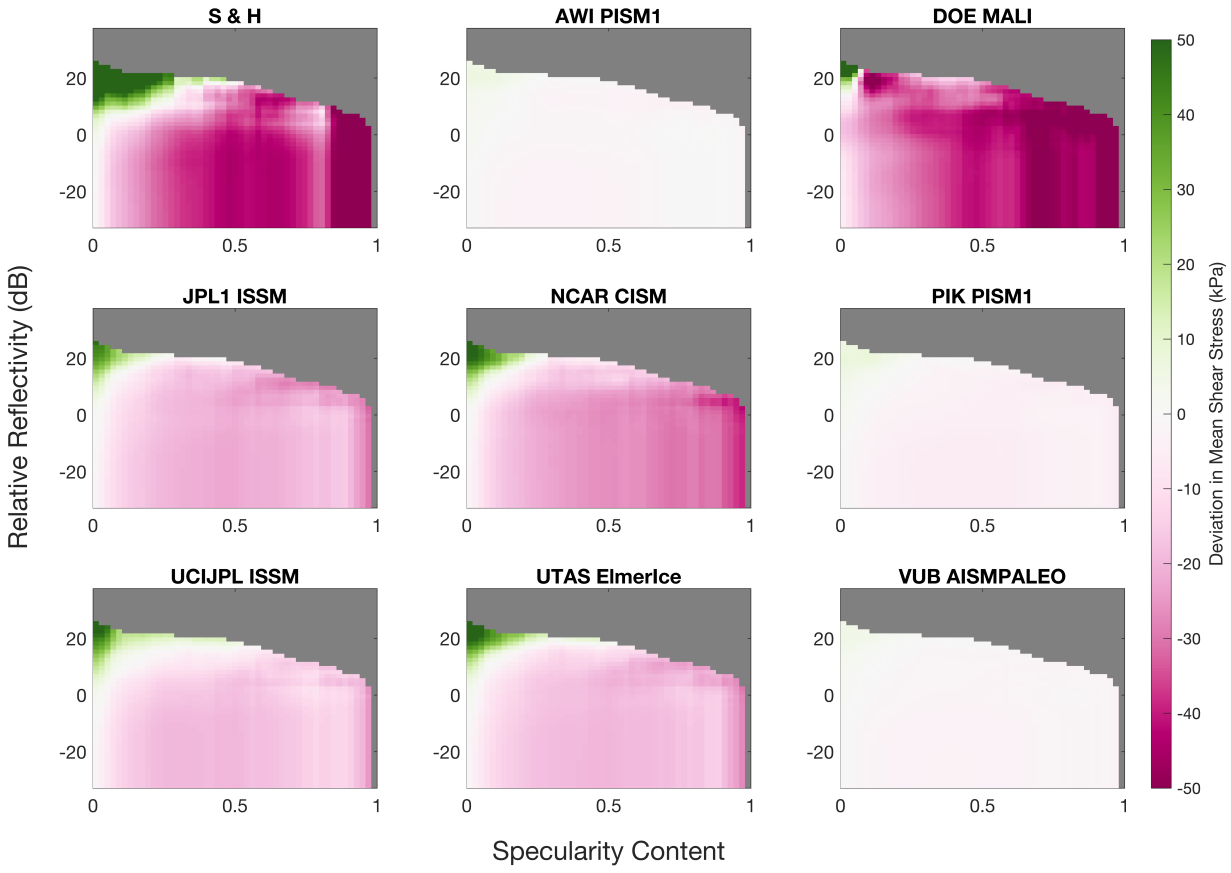

Fig. S12. High-High plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content greater than X and relative reflectivity greater than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The colormap represents the deviation in mean basal shear stress of the sample from the overall basal shear stress distribution

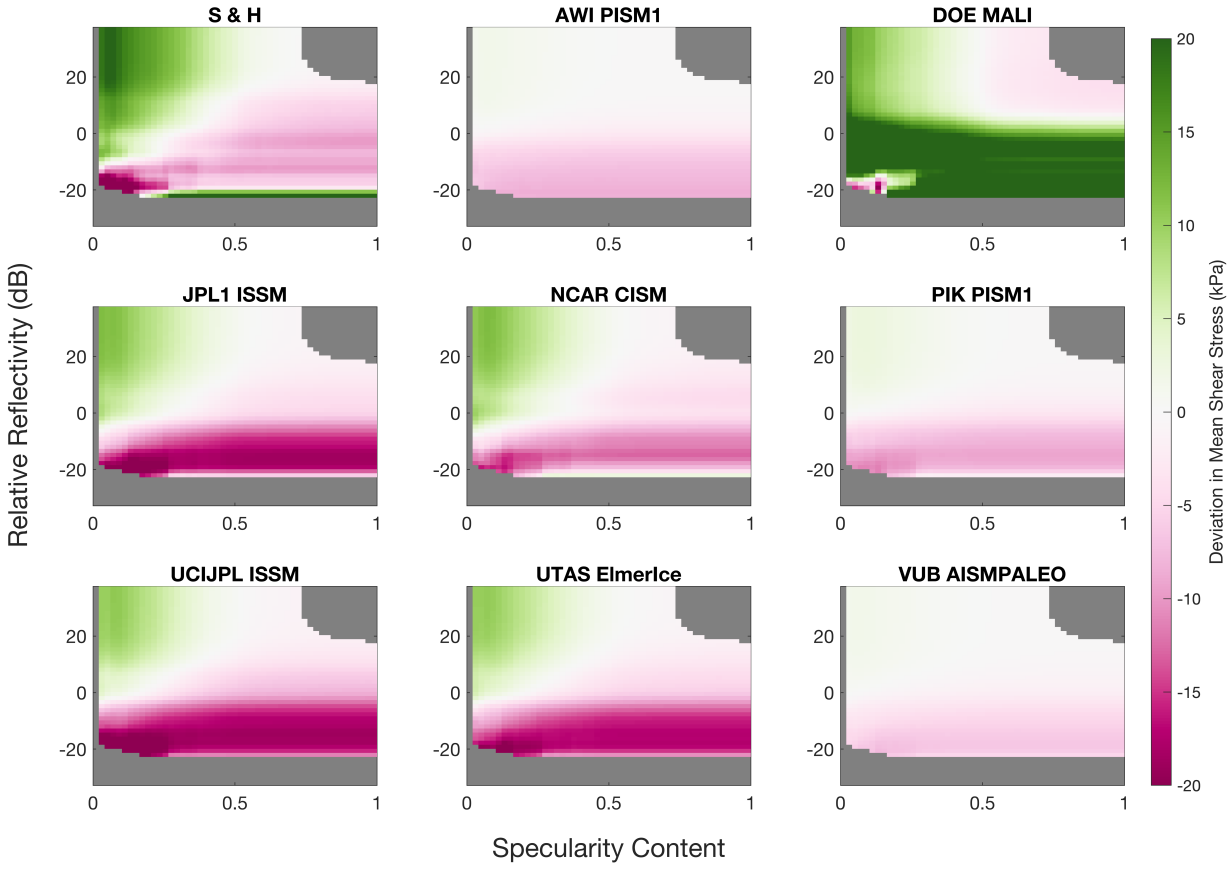

Fig. S13. Low-Low plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content lower than X and relative reflectivity lower than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The colormap represents the deviation in mean basal shear stress of the sample from the overall basal shear stress distribution

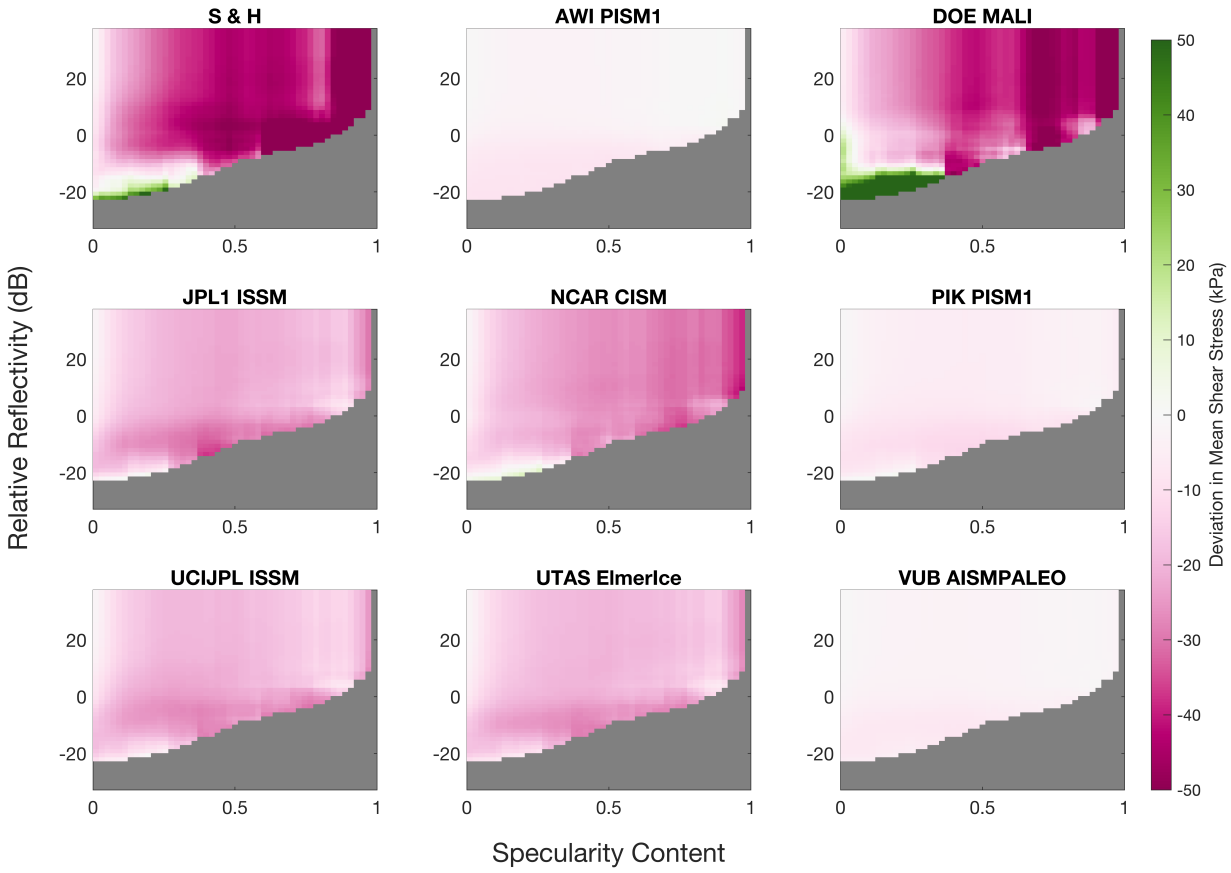

Fig. S14. High-Low plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content greater than X and relative reflectivity lower than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The colormap represents the deviation in mean basal shear stress of the sample from the overall basal shear stress distribution. We do not analyze the high-low plots and have included them here for reference.

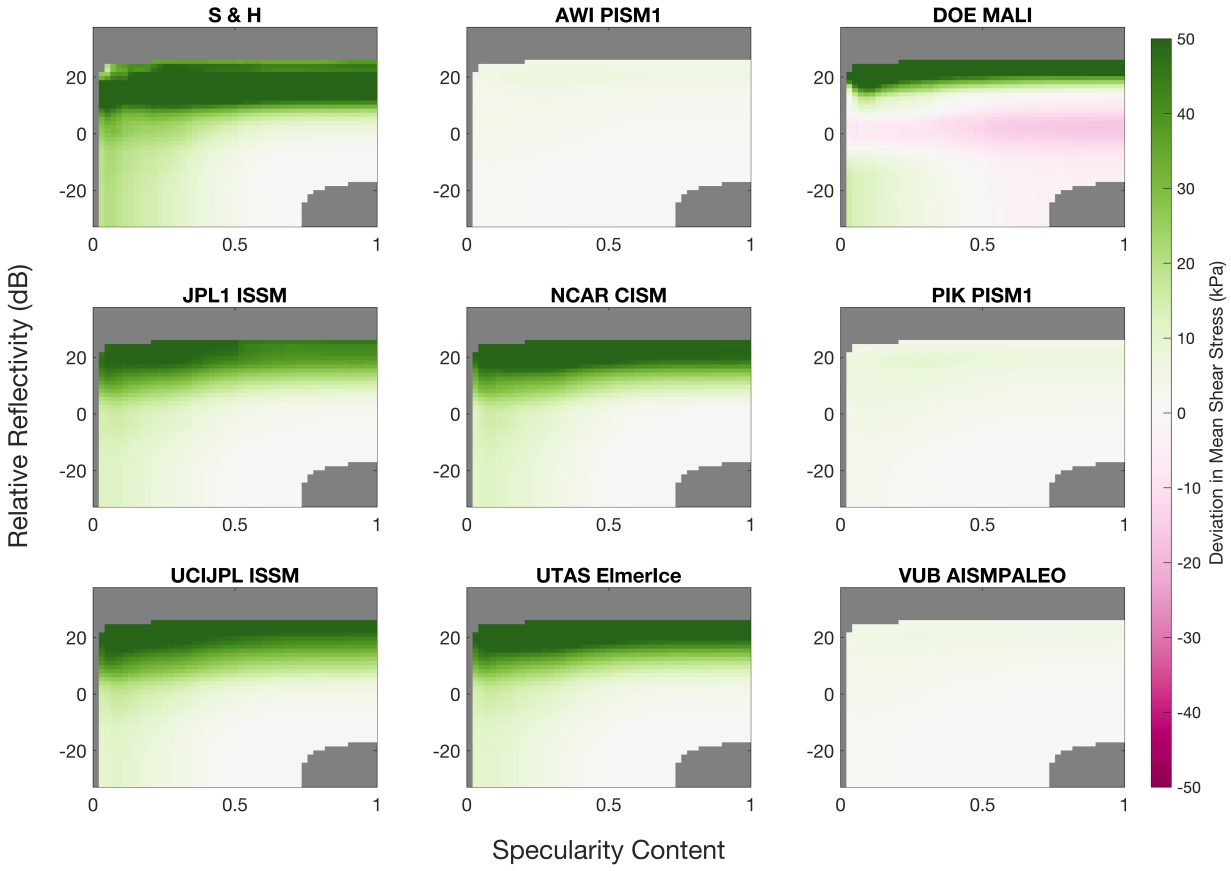

Fig. S15. Low-High plots of all 9 inversions considered in this study. We apply thresholds when subsampling on the basis of radar data such that for a given grid cell in the figure, we subsample basal shear stress values that occur in regions of specularity content lower than X and relative reflectivity greater than Y where X and Y correspond to the x-axis and y-axis values for that grid cell respectively. The colormap represents the deviation in mean basal shear stress of the sample from the overall basal shear stress distribution. We do not analyze the low-high plots and have included them here for reference.