A history-matching analysis of the Antarctic Ice Sheet since the last interglacial – Part 1: Ice sheet evolution

Supplement Figures

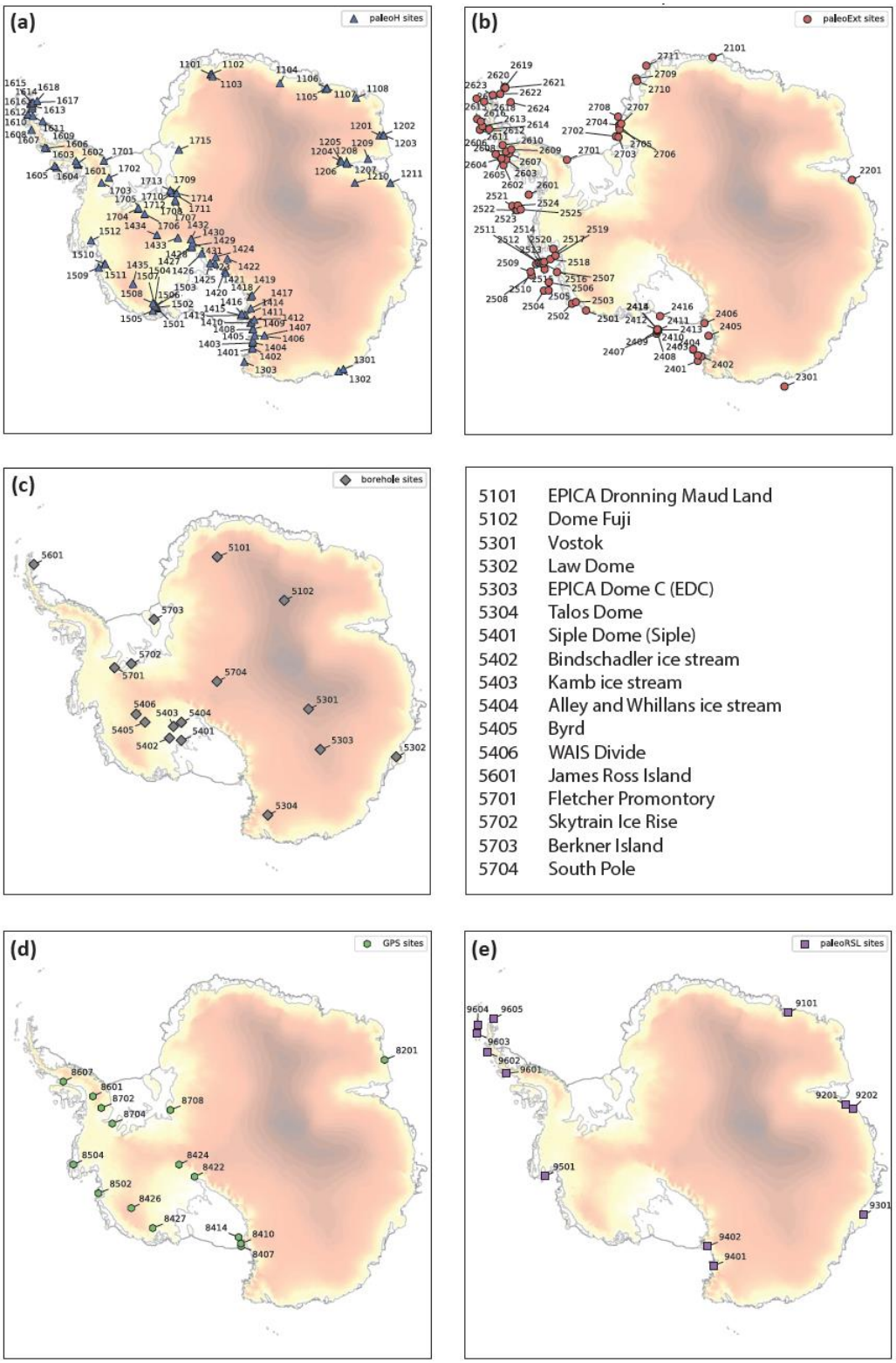

Figure S1: AntICE2 observational constraint database used to history match the Glacial Systems Model. a - f) are the site locations and identification numbers for past ice thickness data (paleoH), past ice extent data (paleoExt), ice core borehole temperature profiles (ICbore) and names, present-day uplift rates (rdotGPS), and past relative sea level data (paleoRSL) respectively.

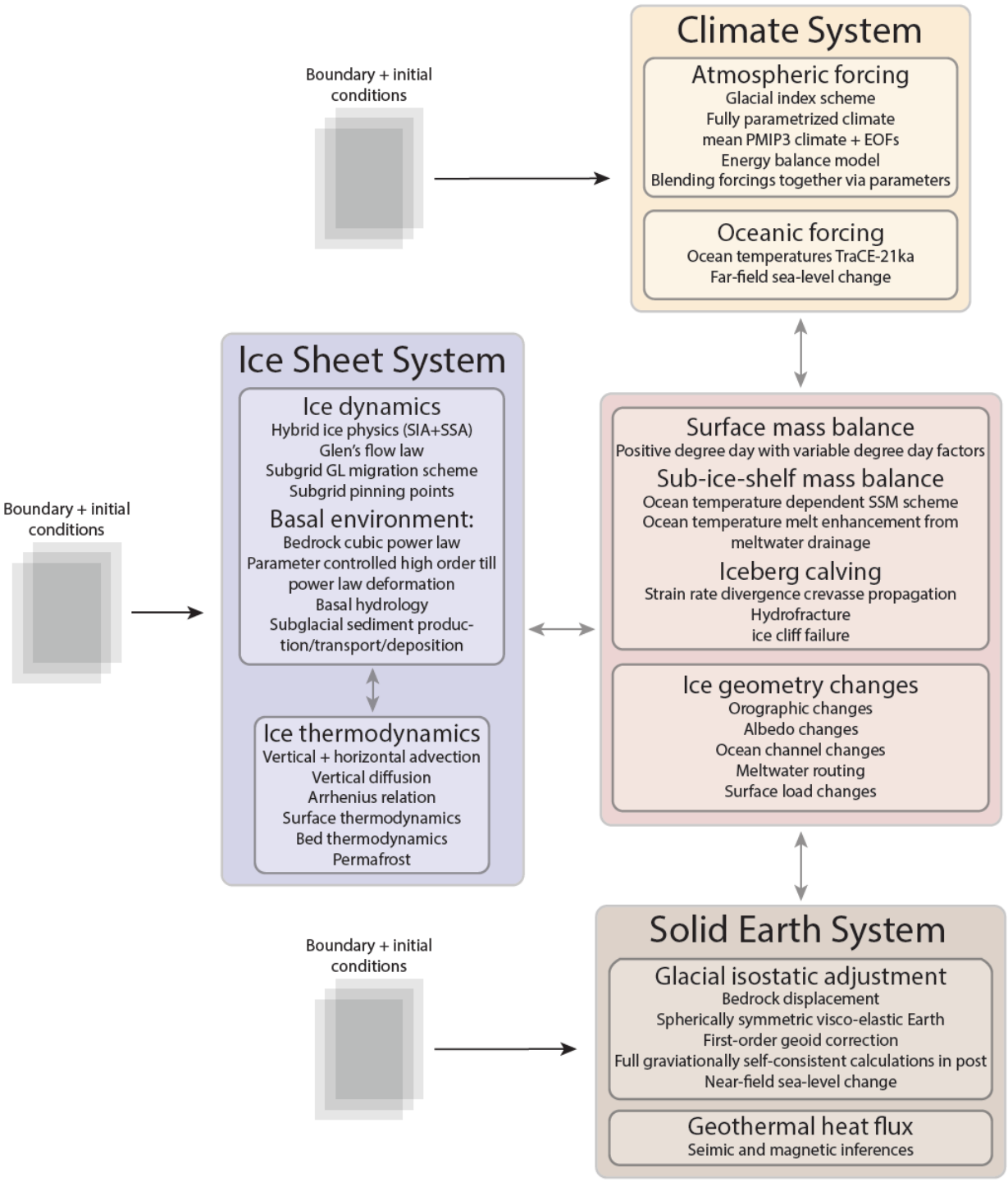

Figure S2: Diagram summarizing major components of the Glacial Systems Model (GSM).

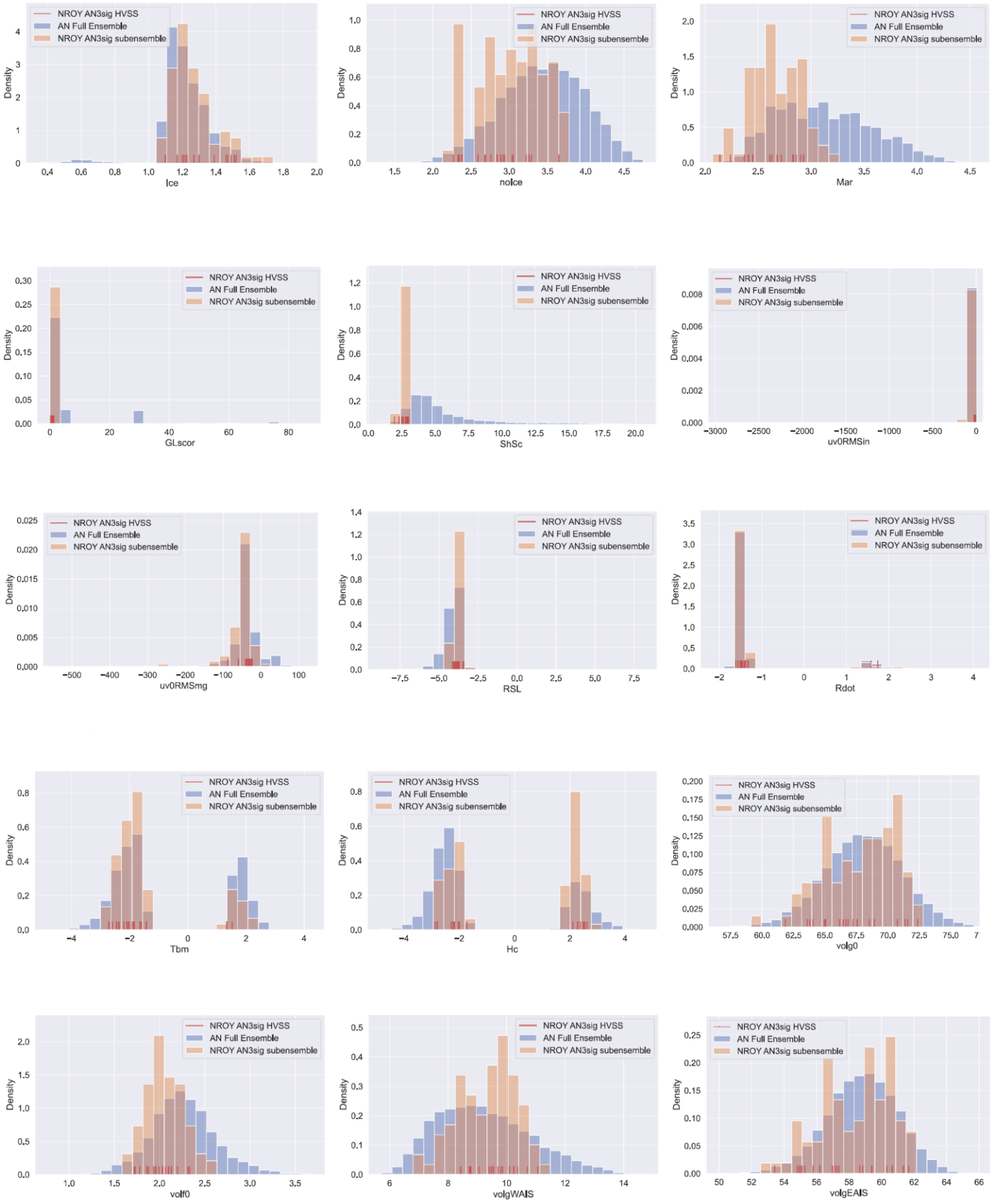

Figure S3: Distribution of output metrics and scores for the full ensemble (blue), not-ruled-out-yet (NROY) AN3sig sub-ensemble (orange), and NROY sub-ensemble high variance subset (red).

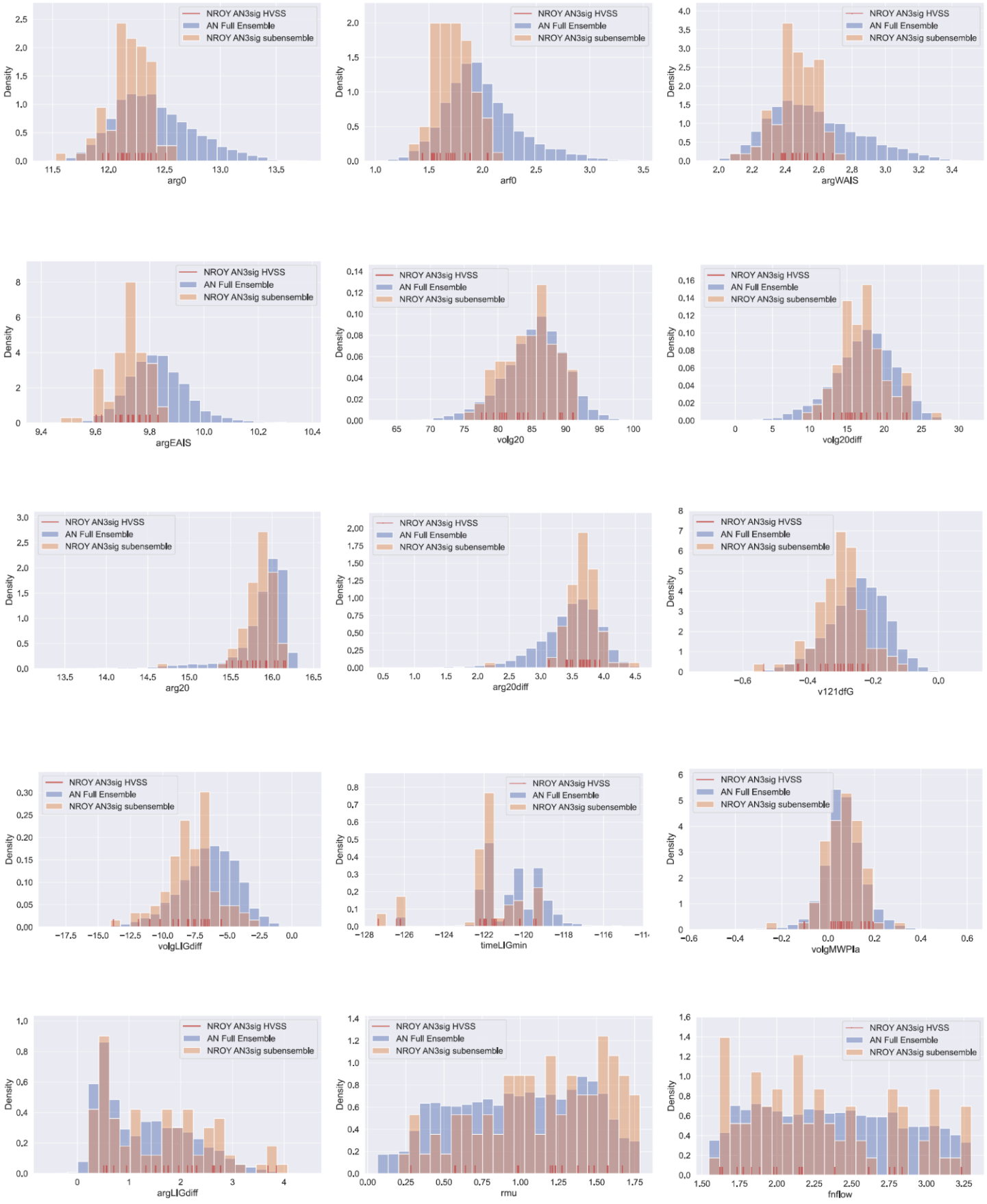

Figure S4: Distribution of output metrics, scores, and ensemble parameters (detailed in Table 1) for the full ensemble (blue), not-ruled-out-yet (NROY) AN3sig sub-ensemble (orange), and NROY sub-ensemble high variance subset (red).

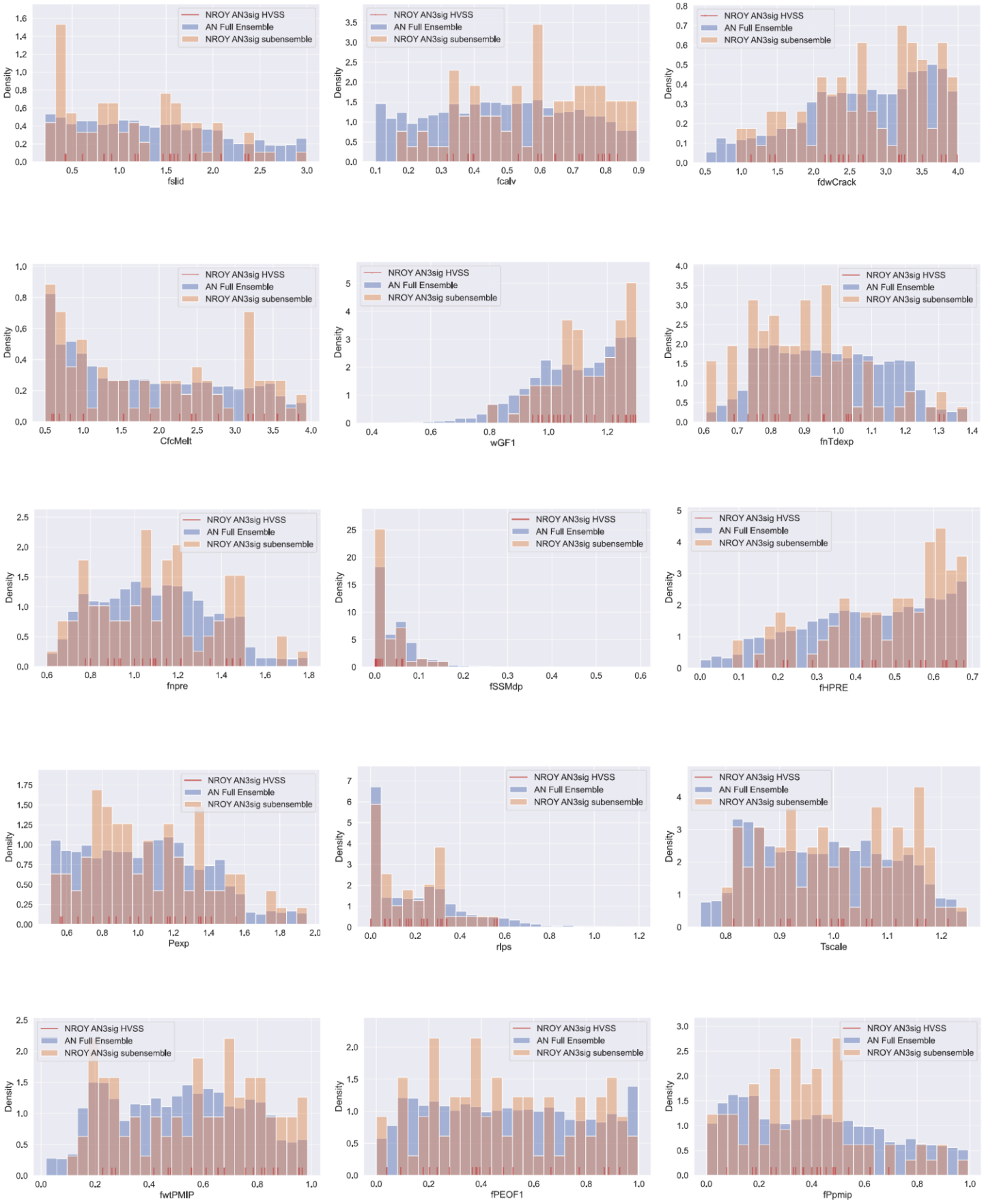

Figure S5: Distribution of ensemble parameters (detailed in Table 1) for the full ensemble (blue), not-ruled-out-yet (NROY) AN3sig sub-ensemble (orange), and NROY sub-ensemble high variance subset (red).

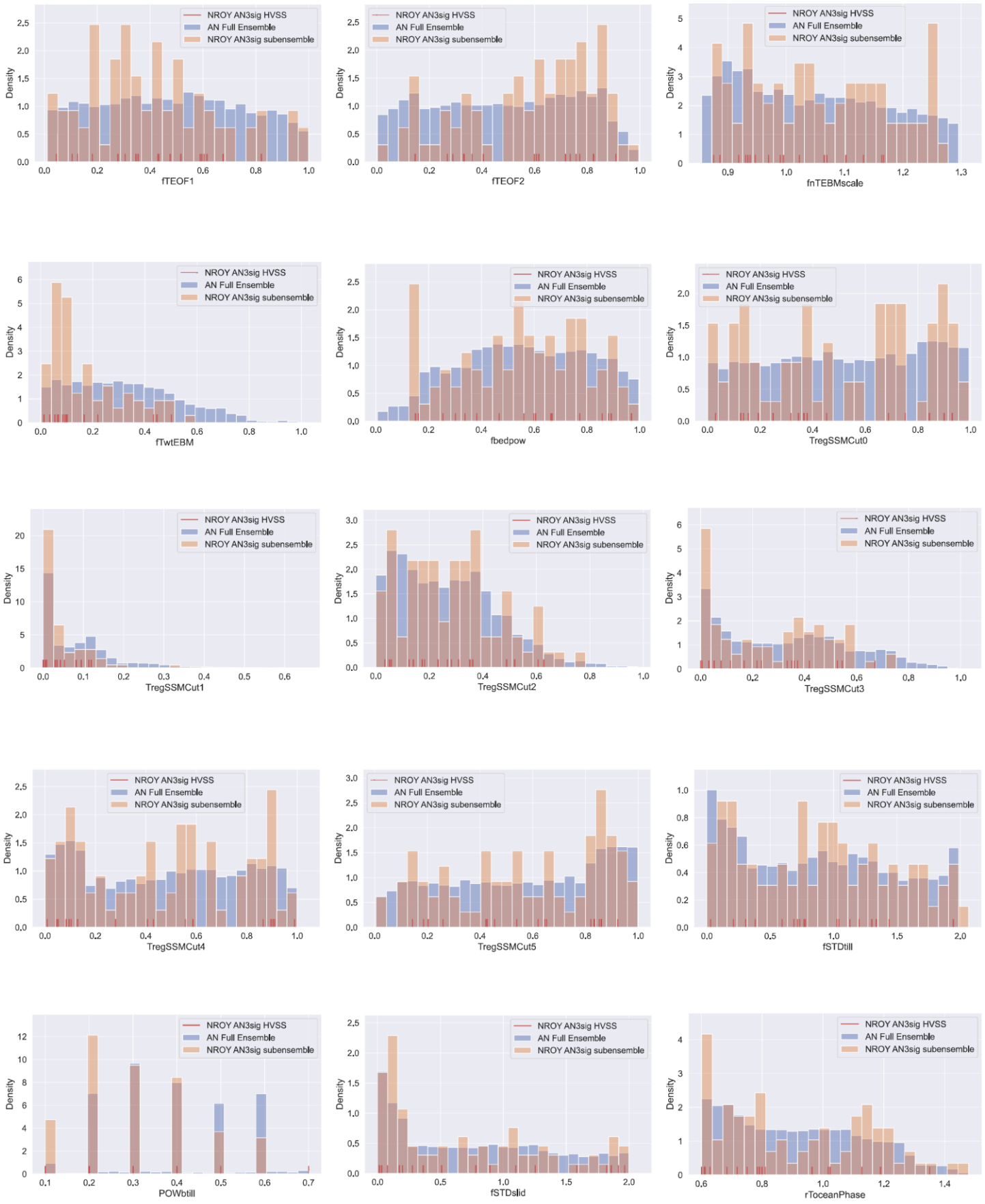

Figure S6: Distribution of ensemble parameters (detailed in Table 1) for the full ensemble (blue), not-ruled-out-yet (NROY) AN3sig sub-ensemble (orange), and NROY sub-ensemble high variance subset (red).

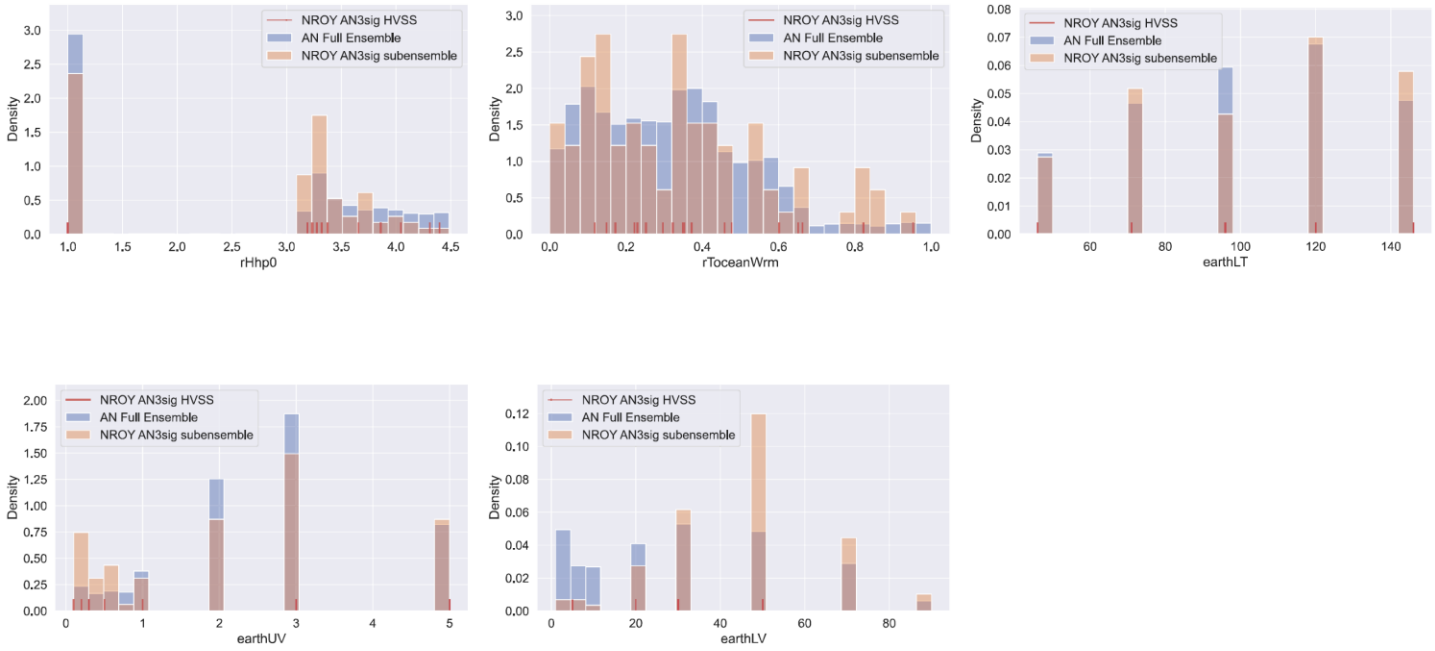

Figure S7: Distribution of ensemble parameters (detailed in Table 1) for the full ensemble (blue), not-ruled-out-yet (NROY) AN3sig sub-ensemble (orange), and NROY sub-ensemble high variance subset (red).

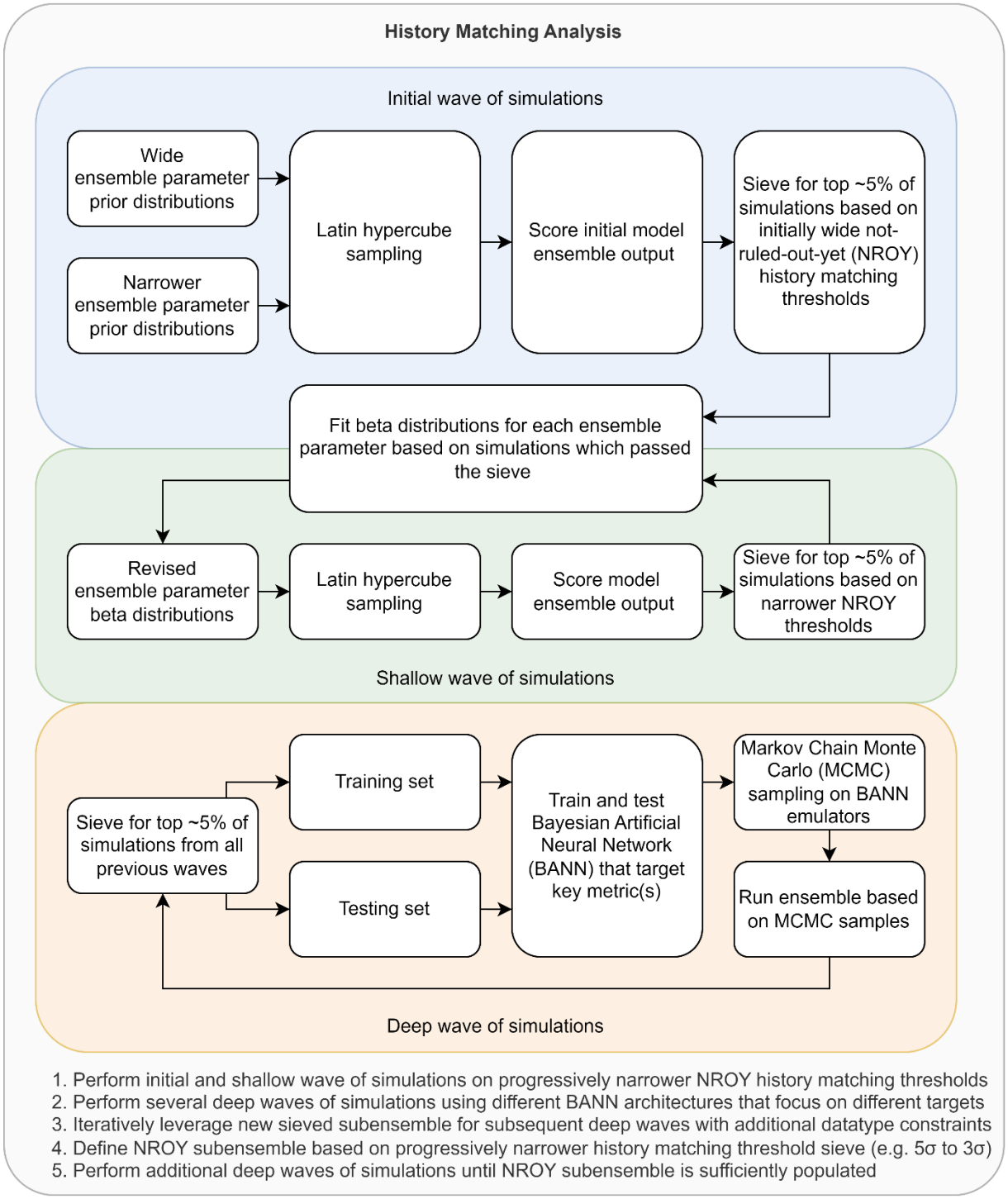

Figure S8: Diagram illustrating the history matching analysis methodology.

Table S1: The thresholds imposed on the AntICE2 data-model scores in the history matching analysis. The thresholds to define the AN4sig and AN3sig sub-ensembles are based on internal/external discrepancy bias corrections plus 4 or 3 multiples of the standard deviations, respectively.

Constraint datatype	Score	Bias	Standard deviation
Present-day	WAIS H RMS (waisRMS)	0	161
Present-day	EAIS H RMS (eaisRMS)	16	135
Present-day	Floating ice H RMS (fltRMS)	34	65
Present-day	Ice shelf score (ShSc)	0	1
Present-day	PD grounding line score (GLscor)	0	1
Borehole temp	Borehole ice temp score (Tbm)	0	1
Borehole temp	Ice core site H diff score (Hc)	0	1
Paleo extent	Marine extent score (Mar)	0.14	1.04
Paleo ice thickness	Deglaciated no ice score (noIce)	0.22	1.02
Paleo ice thickness	Glaciation ice score (Ice)	0.15	1
Paleo RSL	RSL score (RSL)	-0.1	1.01
GPS	Uplift rate score (Rdot)	-0.02/0.06	1.06

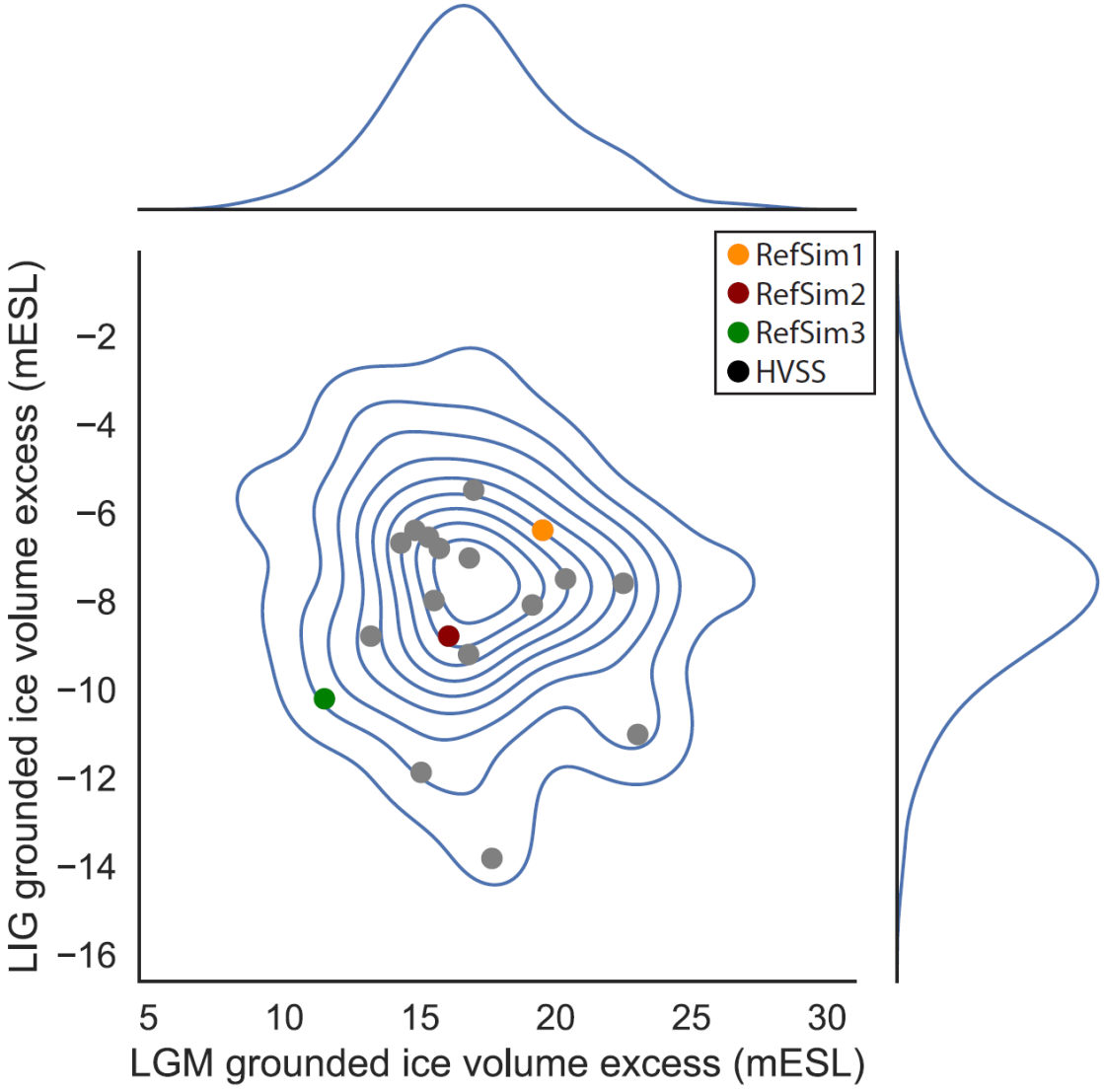

Figure S9: High variance subset (HVSS; N=18) of simulations in the not-ruled-out-yet (NROY) AN3sig sub-ensemble.

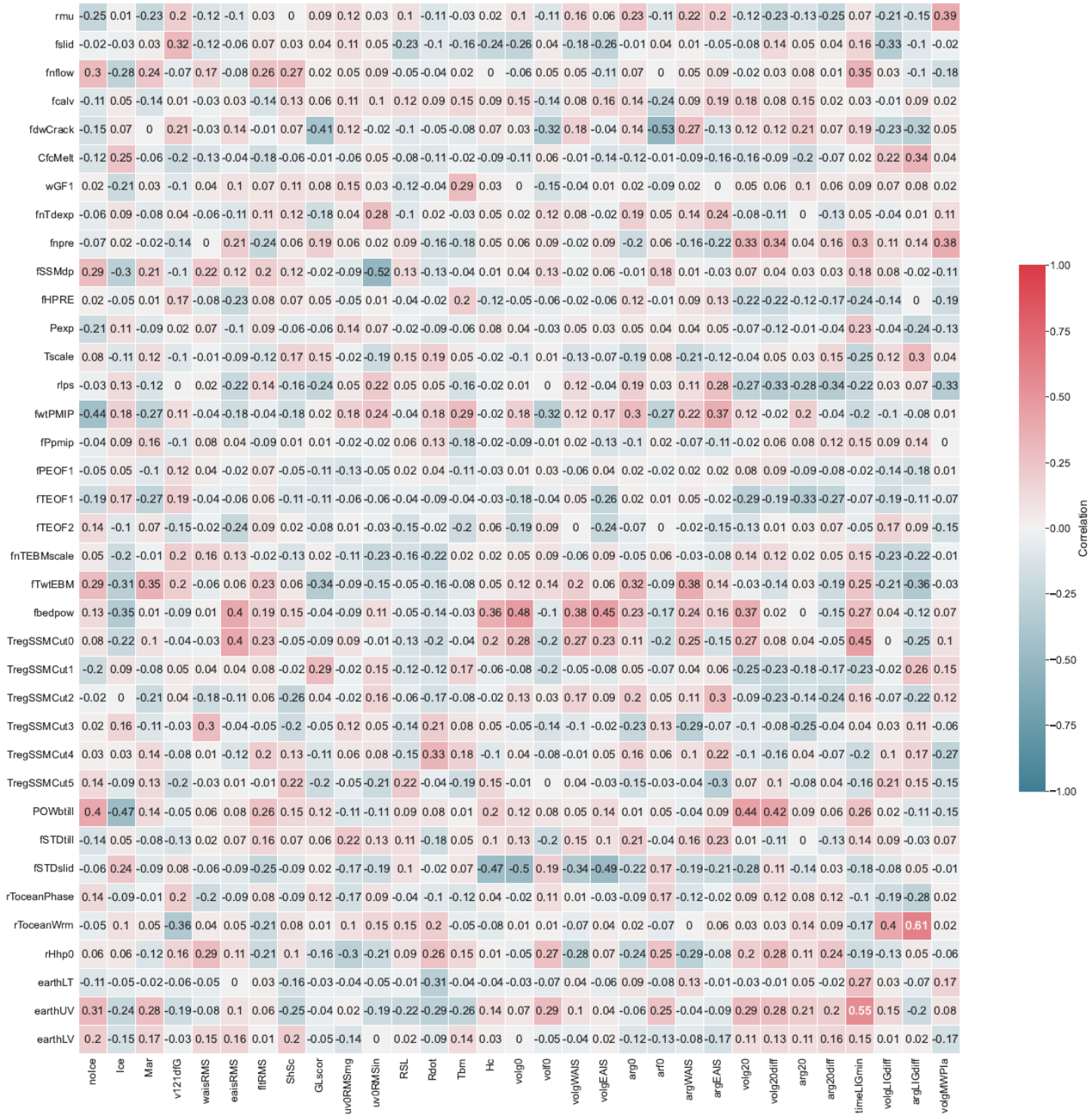

Figure S10: Metric/score-parameter correlation heat map of not-ruled-out-yet (NROY) AN3sig sub-ensemble.

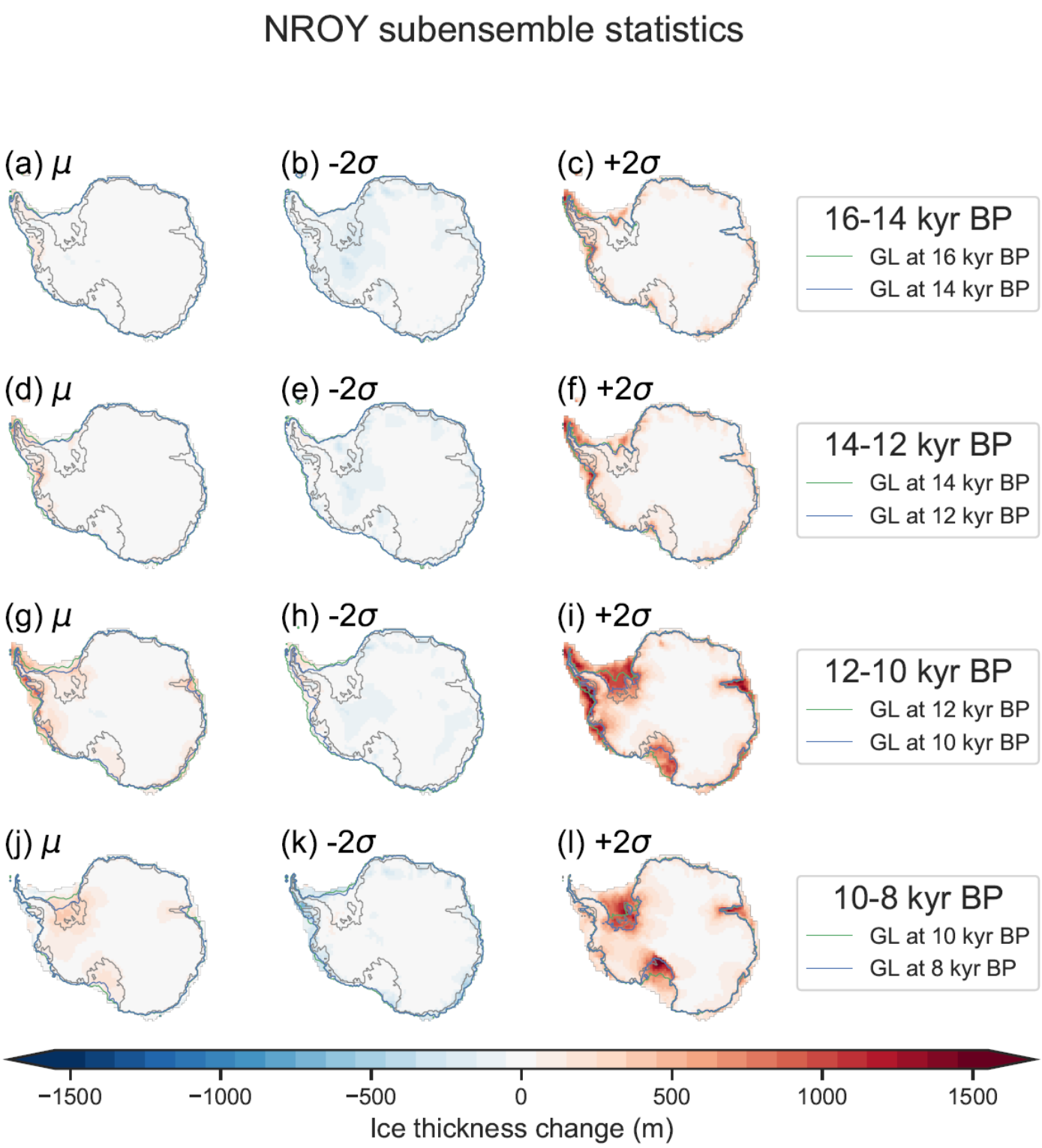

Figure S11: NROY AN3sig sub-ensemble deglacial ice thickness difference for the interval of a-c) 16-14 ka d-f) 14-12 ka g-i) 12-10 ka j-l) 10-8 ka and their respective grounding lines for the ensemble mean (leftmost column), -2σ bound (center column), and +2σ bound (rightmost column).

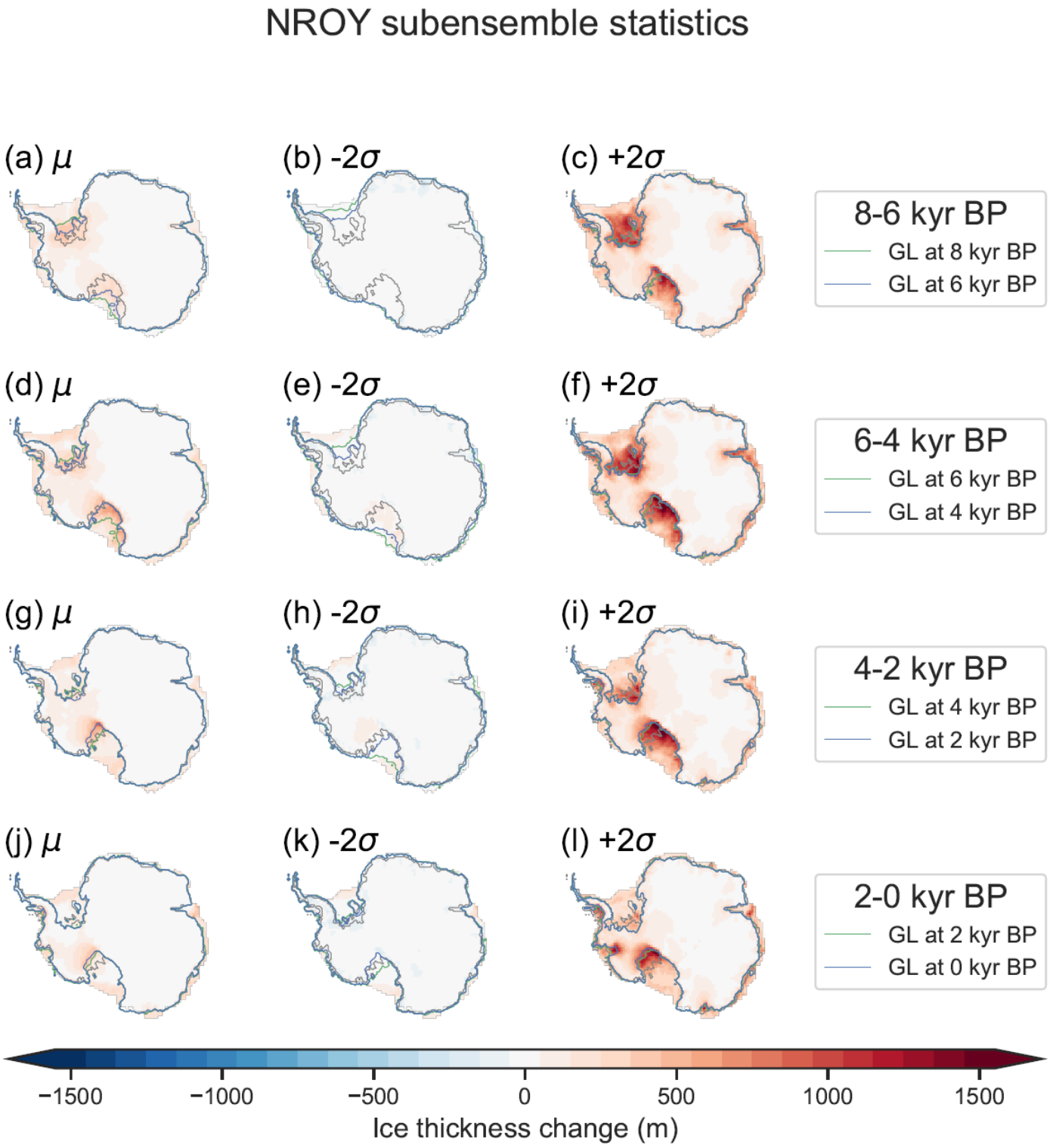

Figure S12: NROY AN3sig sub-ensemble deglacial ice thickness difference for the interval of a-c) 8-6 ka d-f) 6-4 ka g-i) 4-2 ka j-l) 2-0 ka and their respective grounding lines for the ensemble mean (leftmost column), -2σ bound (center column), and +2σ bound (rightmost column).