Supplement of

Spatial characterization of near-surface structure and meltwater runoff conditions across Devon Ice Cap from dual-frequency radar reflectivity

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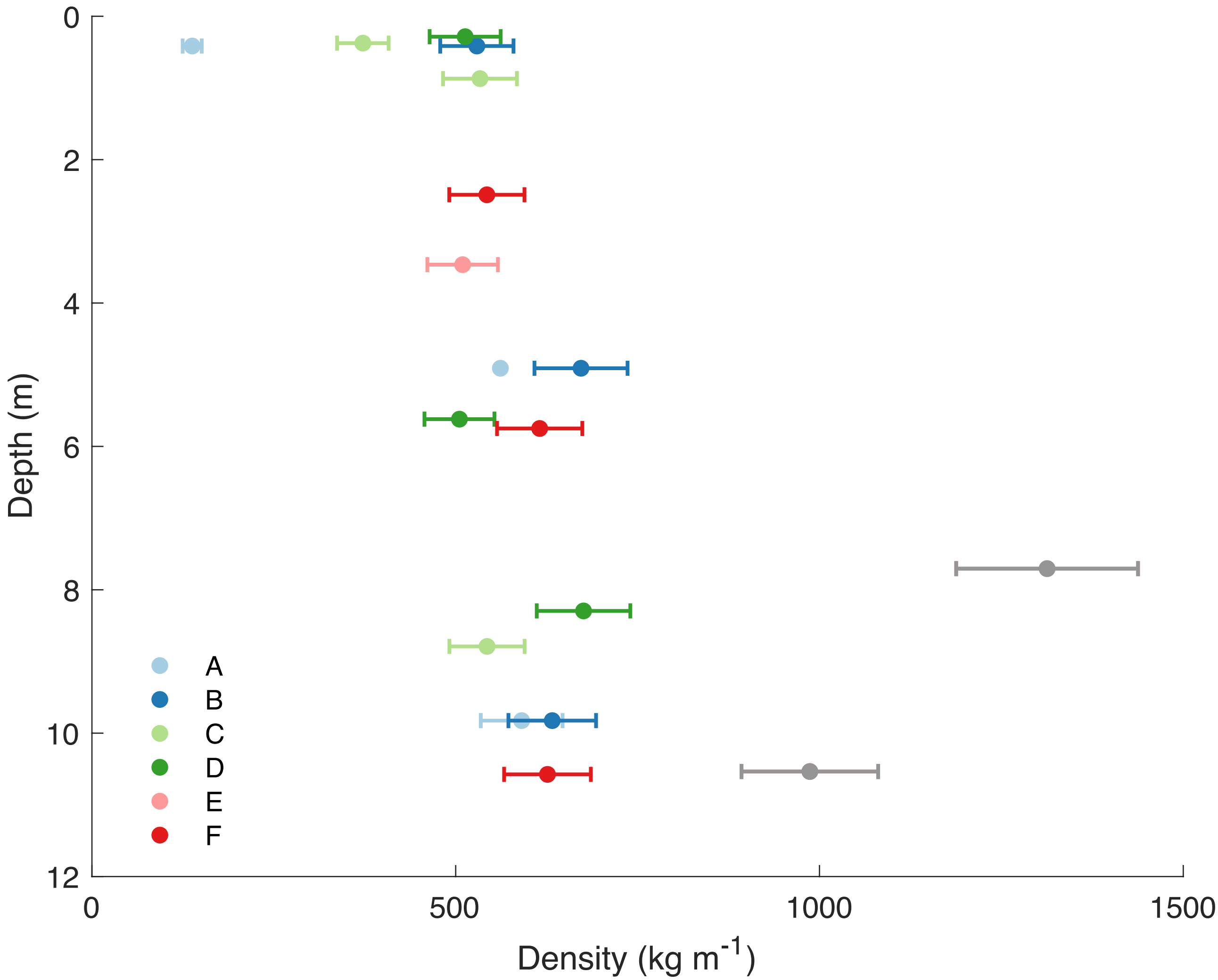

Figure S1: Depth-density firn measurements taken at corresponding firn core locations of Figure 1. Outlier density measurements (gray) were obtained from firn core E. Density measurement at about 5 m depth from firn core A (light blue) was obtained without a segment length; thus, no firn density uncertainty was assigned to it.

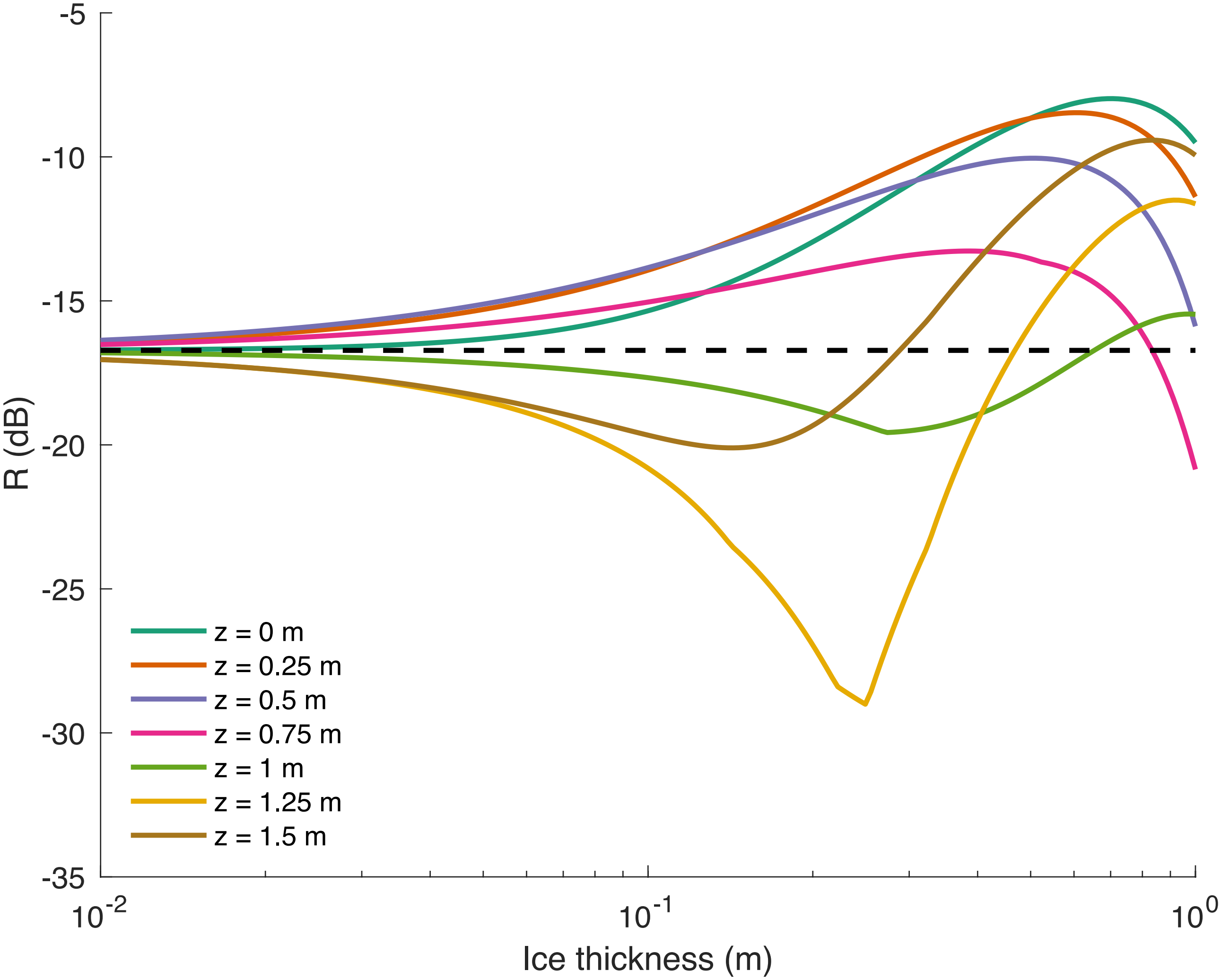

Figure S2: Reflectivity from an ice layer embedded in firn for HiCARS/MARFA (60 MHz), as a function of ice layer thickness. Ice layers are located at various depths (z) from the surface. The firn column is homogeneous, with a permittivity of $\varepsilon = 1.8$. The black-dotted line is the surface reflectivity of this firn column without the influence of any ice layers.

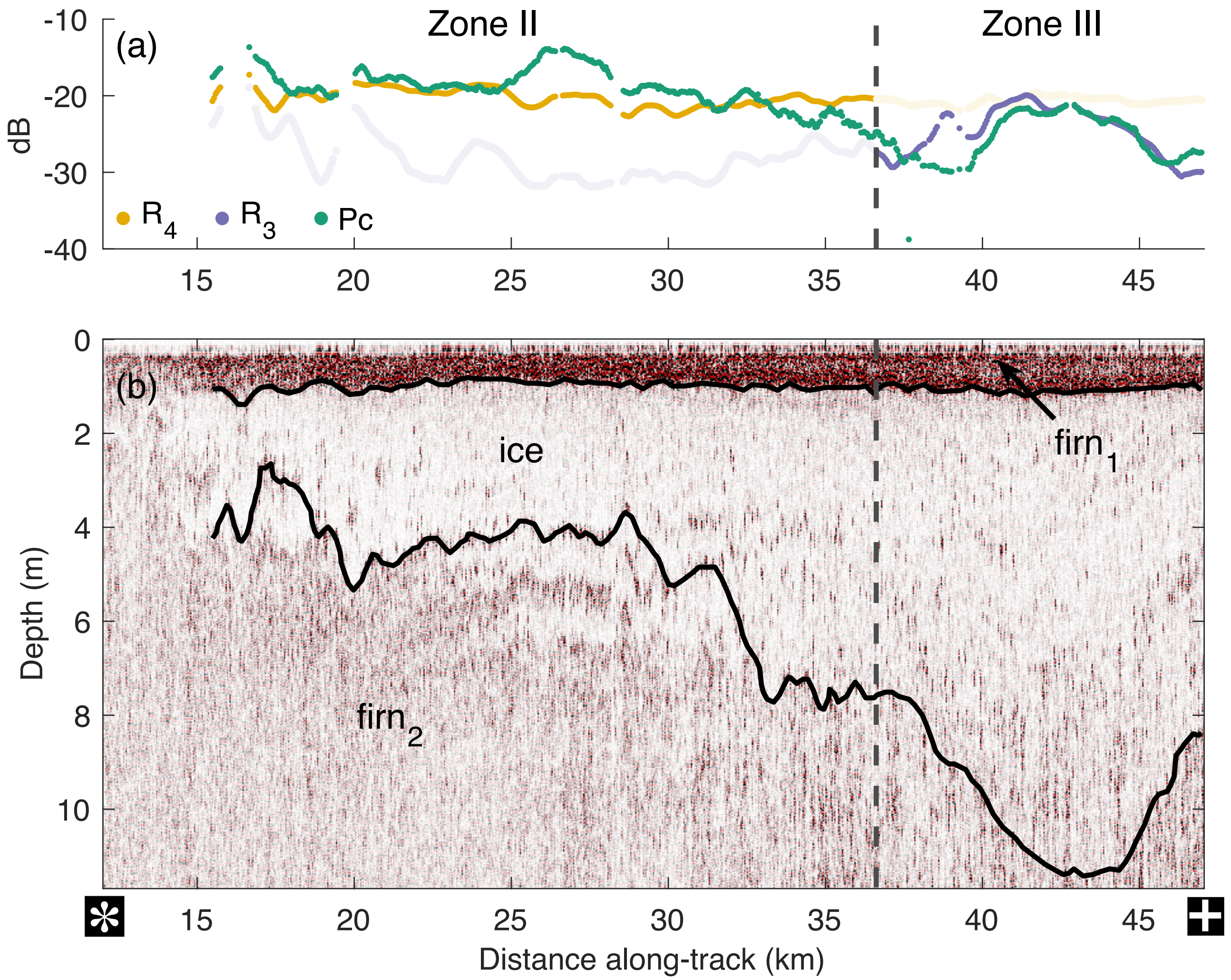

Figure S3: Same as Figure 2a and 2b, except picking the bottom of the ice slab to exclude more interstitial firn from the ice slab in Zone II. Consequently, the firn$_2$ layer contains more compact ice, particularly near this interface.

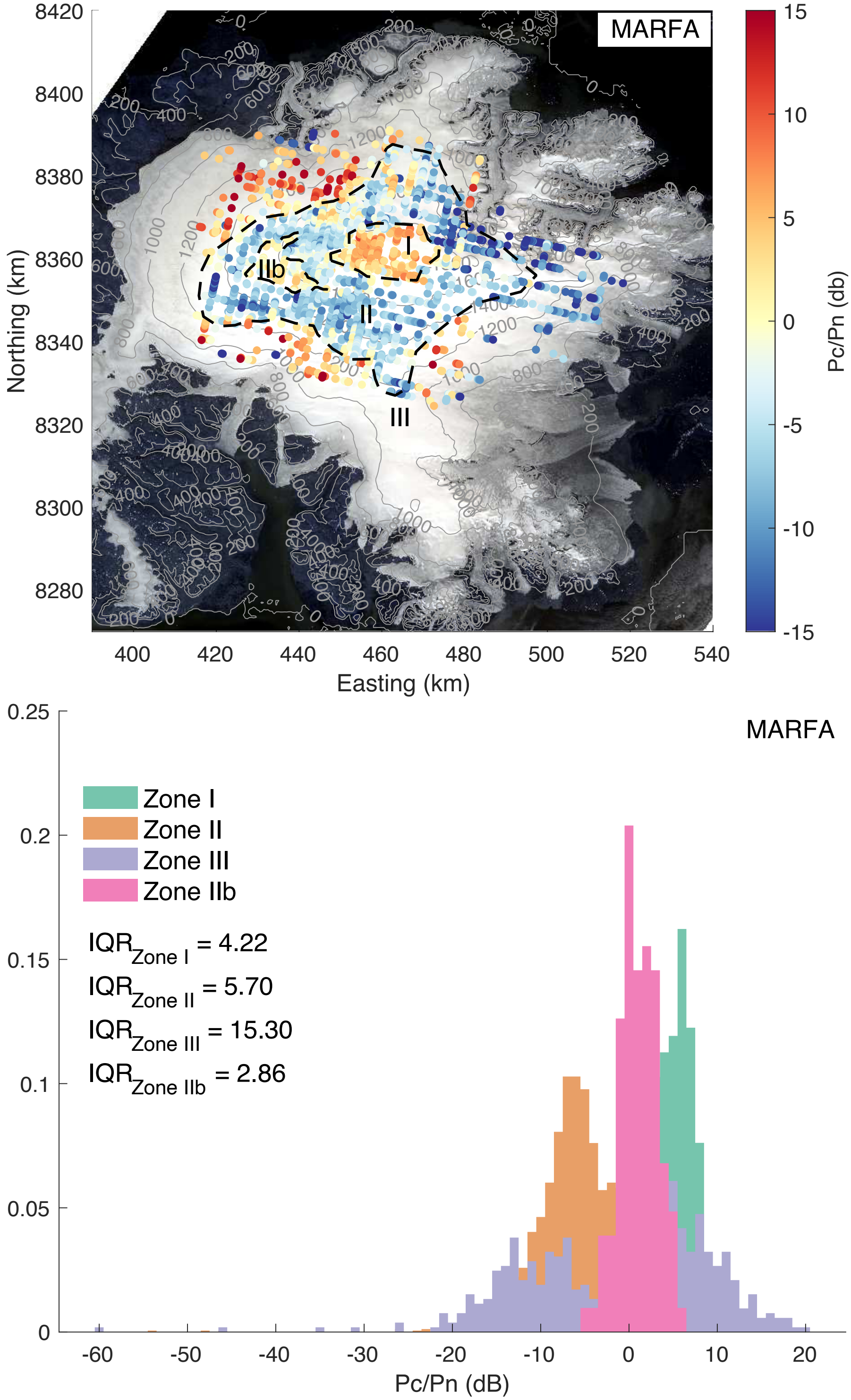

Figure S4: Map of P_c/P_n ratio from MARFA over DIC (top) with corresponding normalized histogram distributions of of P_c/P_n for each zone (bottom).

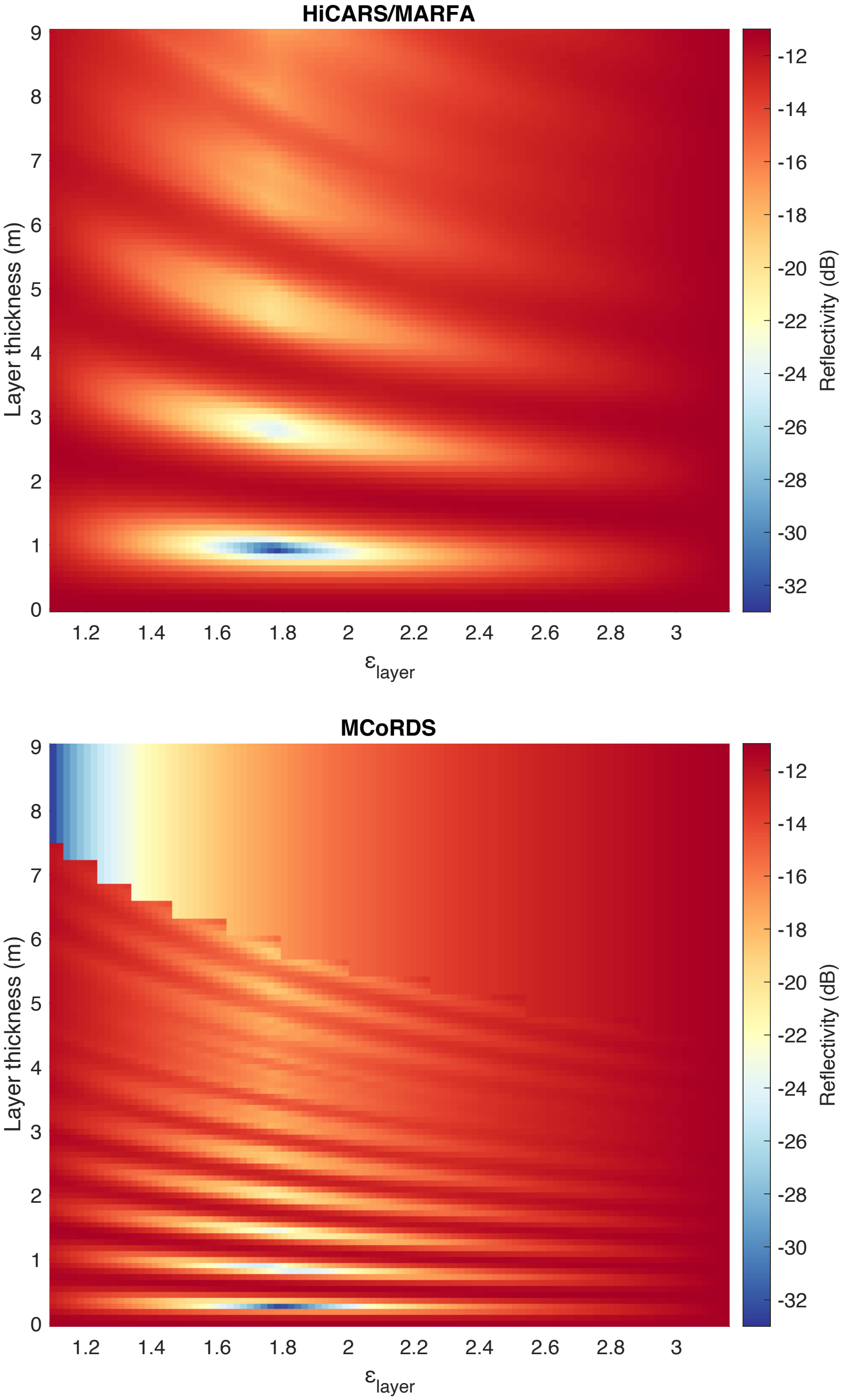

Figure S5: Reflectivity from a layer, as a function of layer thickness and permittivity, for HiCARS/MARFA (60 MHz) and MCoRDS (195 MHz). The thin layer is bounded by semi-infinite half spaces of air ($\varepsilon = 1$) above and ice (3.15) below. For a given layer thickness and permittivity, the radar range resolution is compared with the layer thickness to determine whether a 2-layer or 3-layer stack configuration is appropriate to calculate reflectivity (i.e., when the effects of thin film interference are no longer relevant).