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Modelling cold firn evolution at Colle Gnifetti, Swiss/Italian Alps

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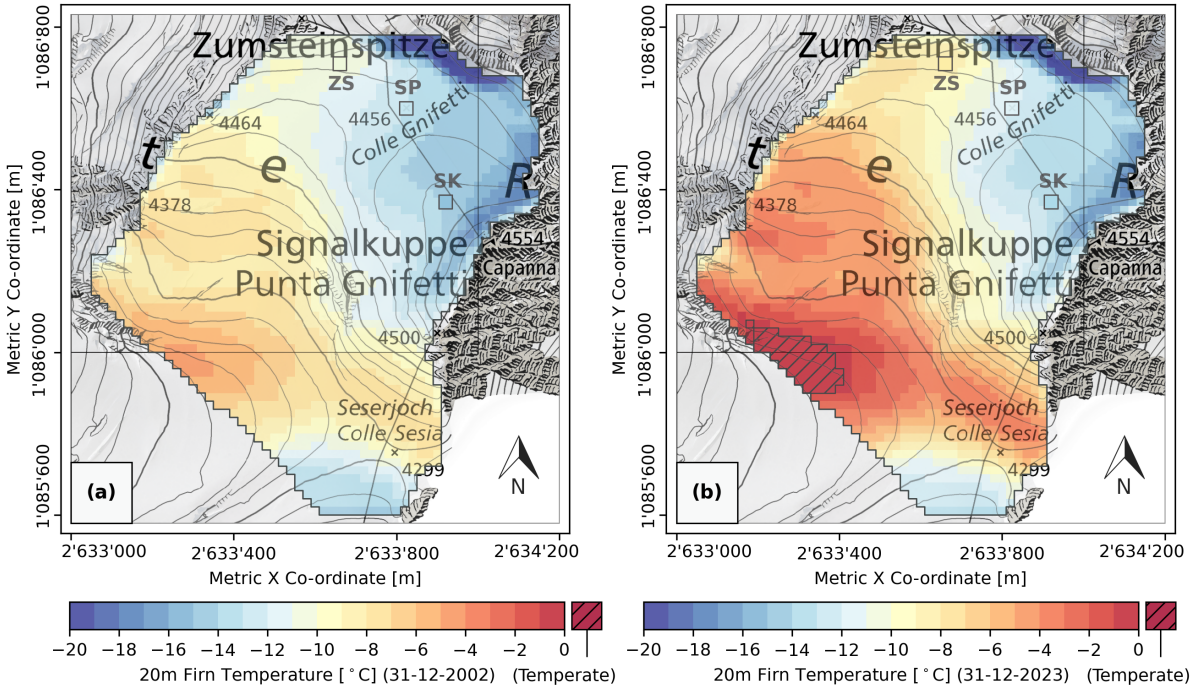

Figure S 1. (a) Modelled 20 m depth firn temperatures at the simulation start date of the 1st January 2003 (following the model spin-up) and **(b)** at the simulation end date of the 31st December 2023 (20 m spatial & 1 hour temporal resolution). Spatial co-ordinates are defined by EPSG 2056 (Metric Swiss CH1903+/LV95). Topographic map source & ortho-image sources: Swisstopo (2017, 2023)

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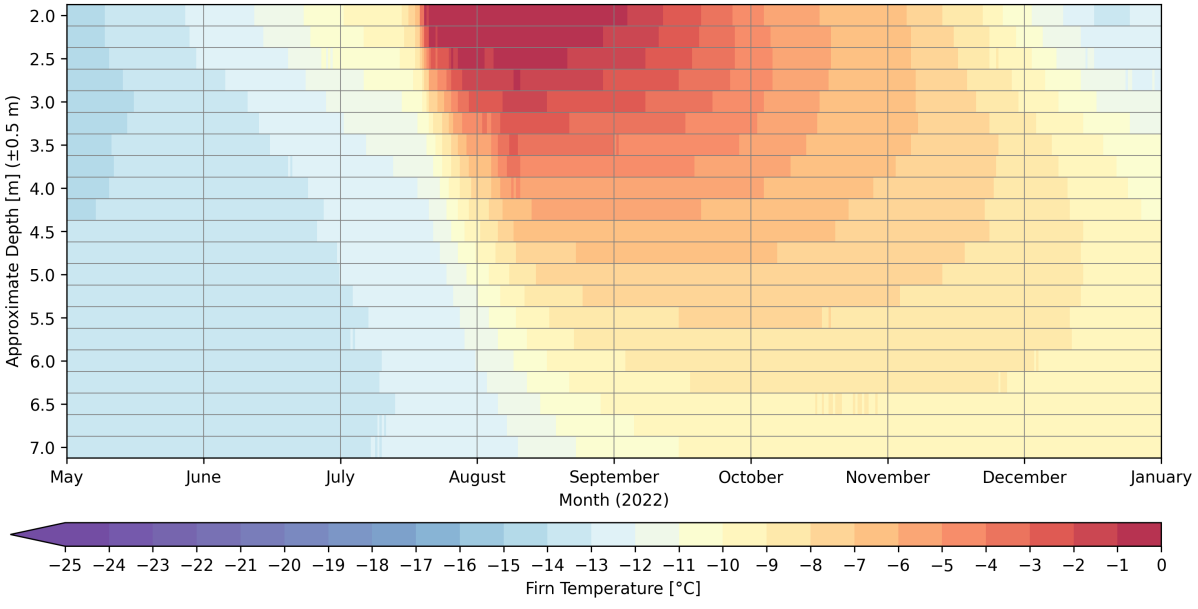

Figure S 2. Measured firn temperatures at the SP recovered during the 2022 season with a thermistor chain with 25 cm spacing. Due to a malfunction with the on-site ultrasound depth sensor, the exact displacement between the thermistors and the surface is subject to a high degree of uncertainty (±0.5 m).

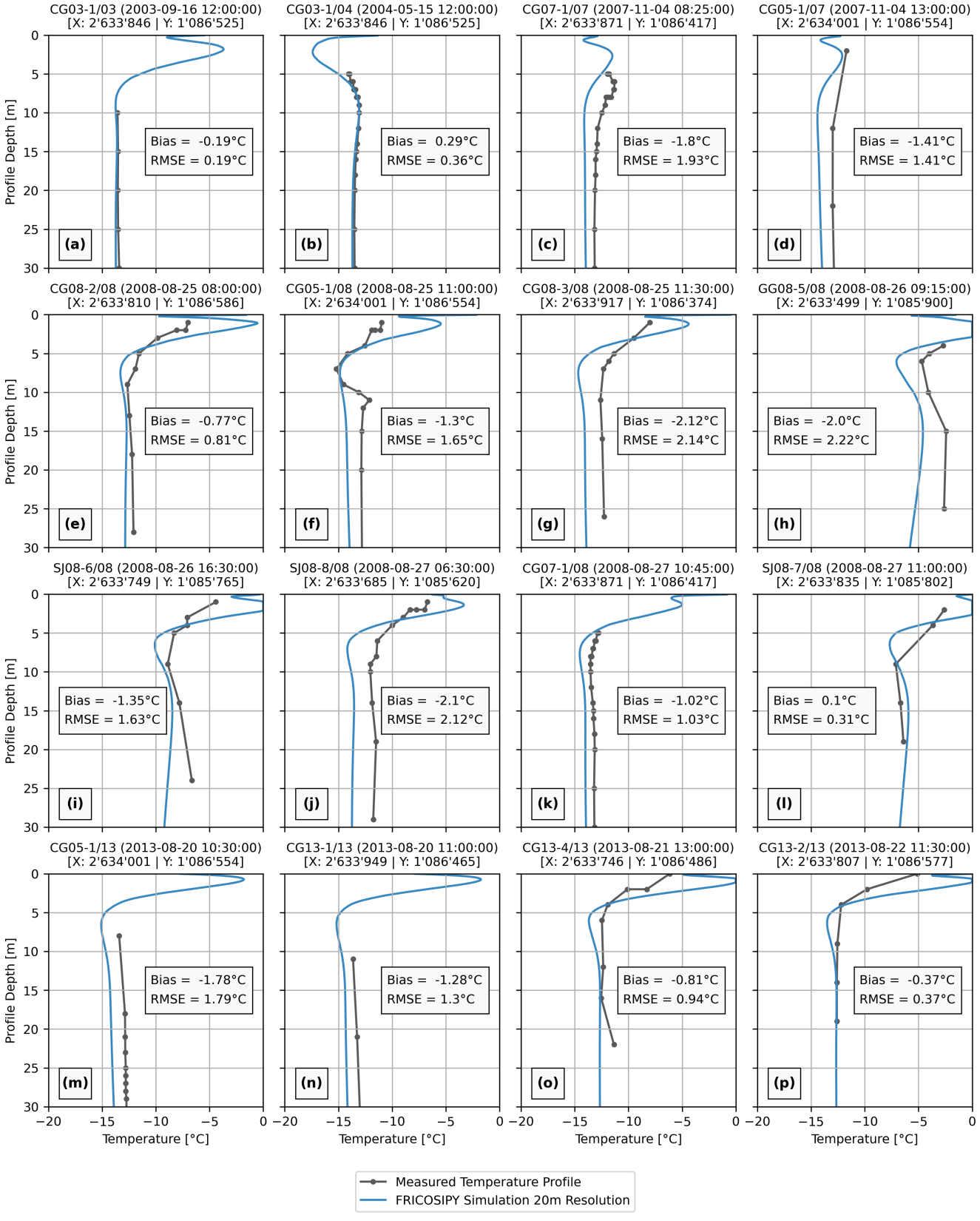

Figure S 3. Model validation showing a comparison between measured and simulated temperature profiles. Profile ID letters correspond with the model validation summary shown in Figure 8. Spatial co-ordinates are defined by EPSG 2056 (Metric Swiss CH1903+/LV95).

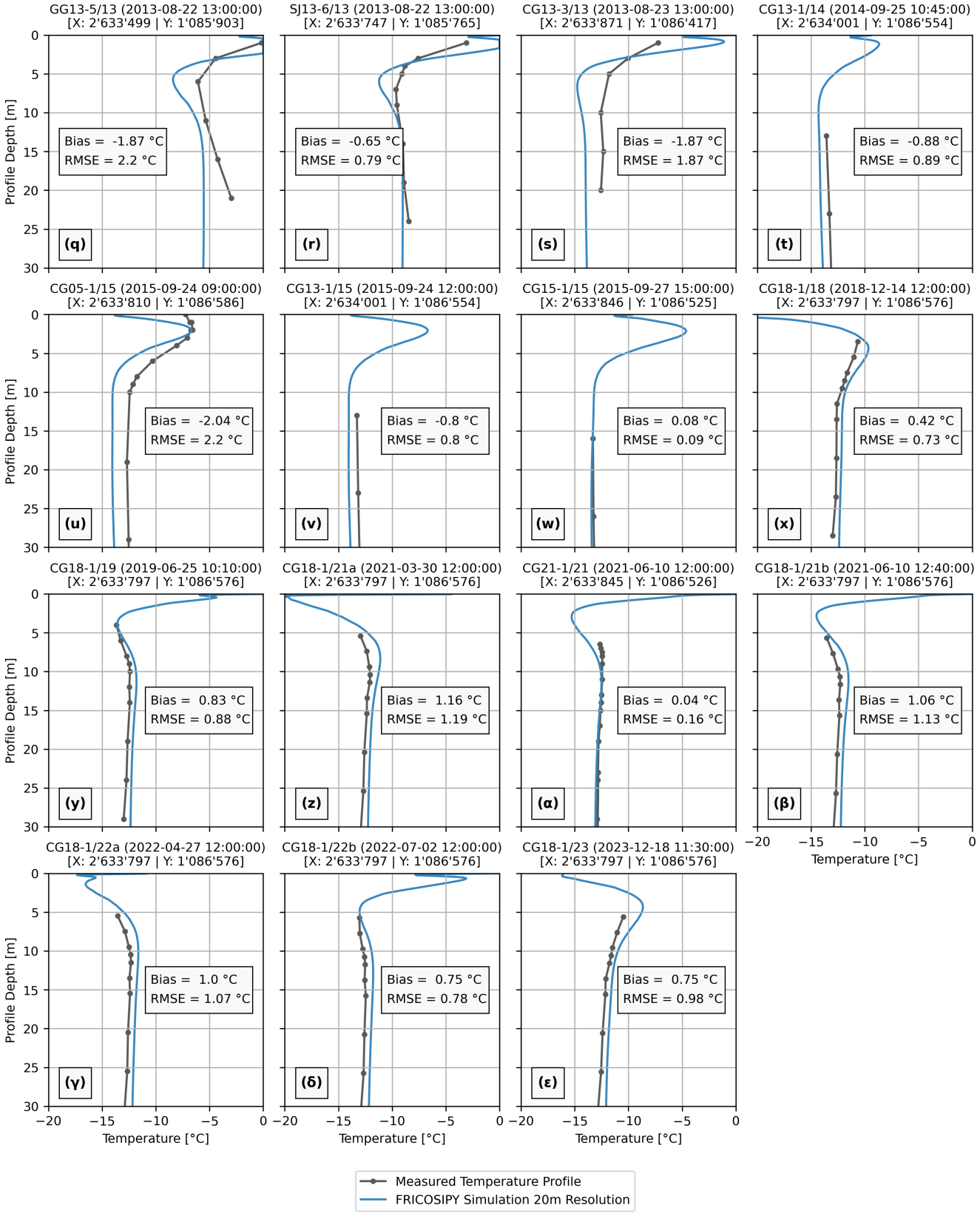

Figure S 4. Model validation showing a comparison between measured and simulated temperature profiles. Profile ID letters correspond with the model validation summary shown in Figure 8. Spatial co-ordinates are defined by EPSG 2056 (Metric Swiss CH1903+/LV95).

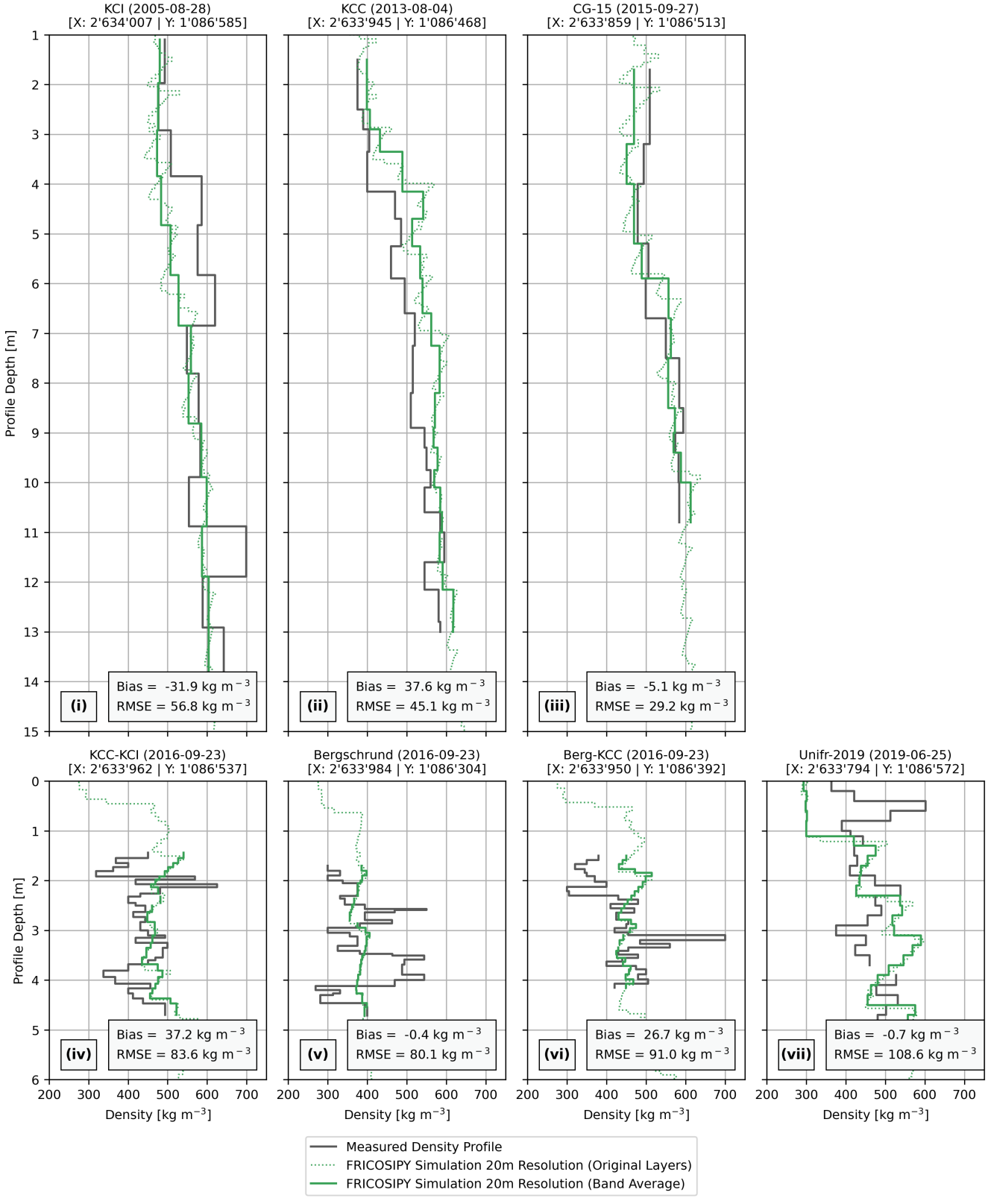

Figure S 5. Model validation showing a comparison between measured and simulated density profiles – displayed both as the density of each subsurface layer (dotted lines) and averaged into bands corresponding with the measurements (solid lines). Profile ID Roman numerals correspond with the model validation summary shown in Figure 8. Spatial co-ordinates are defined by EPSG 2056 (Metric Swiss CH1903+/LV95).