

This supplement provides the complete month-by-month pan-Arctic maps of emulated snow density (Fig. S1) and snow depth (Fig. S2) for each year, 2014–2021.

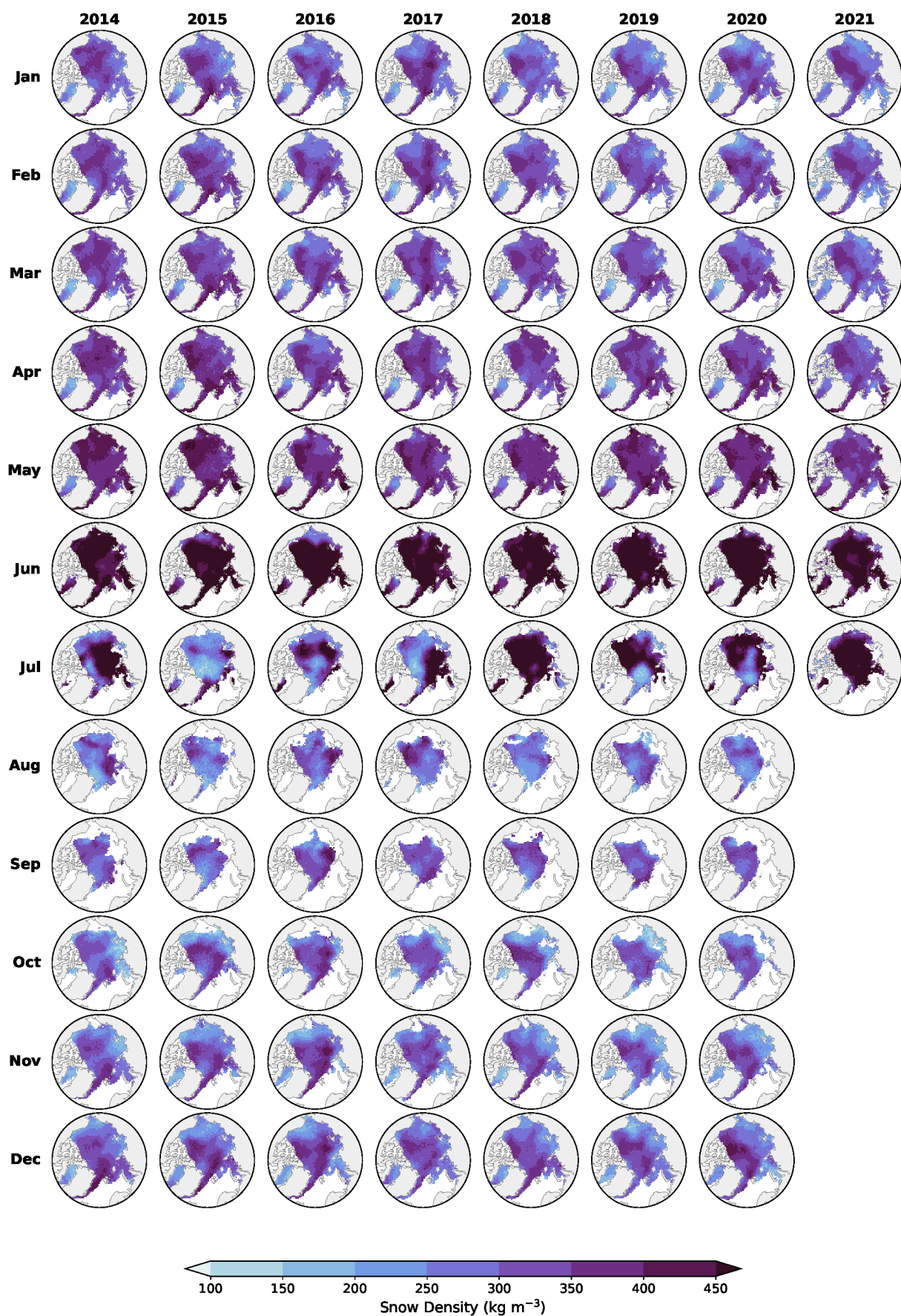


Figure S1: Monthly mean snow density (kg m^{-3}) from the emulator for each month (rows, January–December) and year (columns, 2014–2021). Each panel shows the pan-Arctic domain in North Polar Stereographic projection. The simulation ends in July 2021, so the August–December 2021 panels are absent.

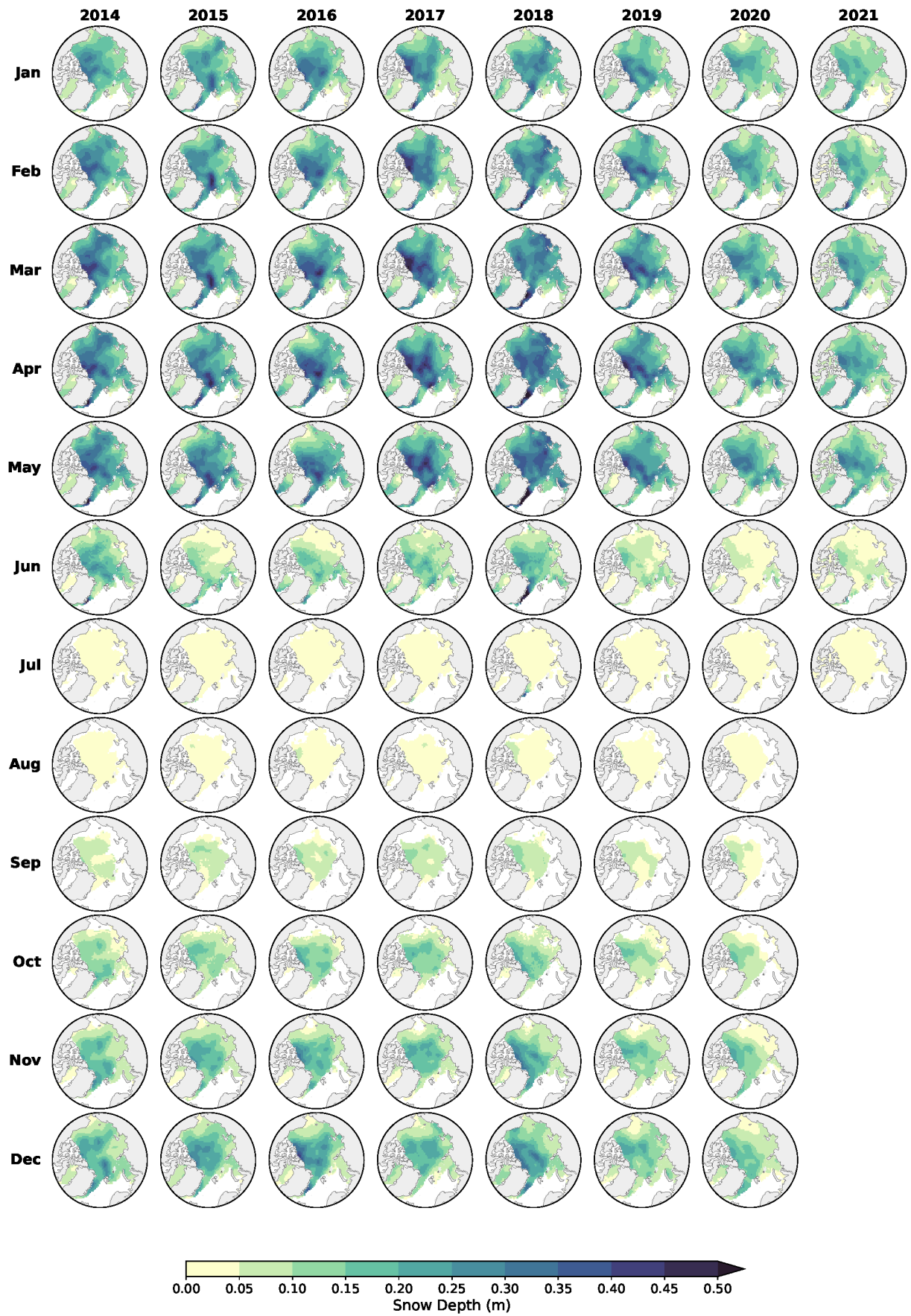


Figure S2: Monthly mean snow depth (m) from the emulator for each month (rows, January–December) and year (columns, 2014–2021). Each panel shows the pan-Arctic domain in North Polar Stereographic projection. The simulation ends in July 2021, so the August–December 2021 panels are absent.

Annual Mean Snow Density: Emulator vs SnowModel-LG (2014-2021)

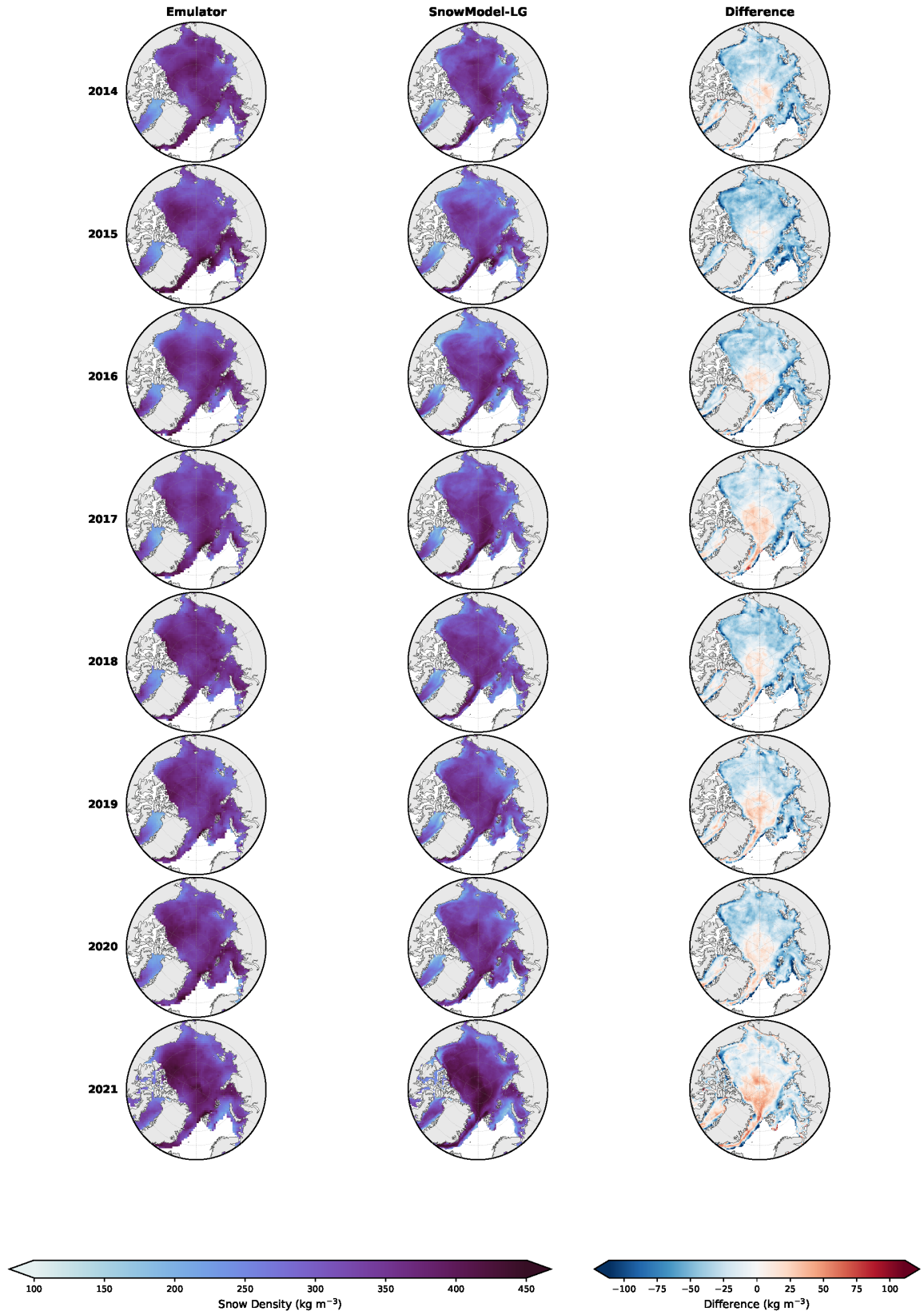


Figure S3: Multi-year comparison of mean snow density distributions across the pan-Arctic domain. Left column shows emulator snow density predictions, middle column shows SnowModel-LG simulations, and right column shows the difference between the two models, computed as SnowModel-LG minus emulator.

Annual Mean Snow Depth: Emulator vs SnowModel-LG (2014-2021)

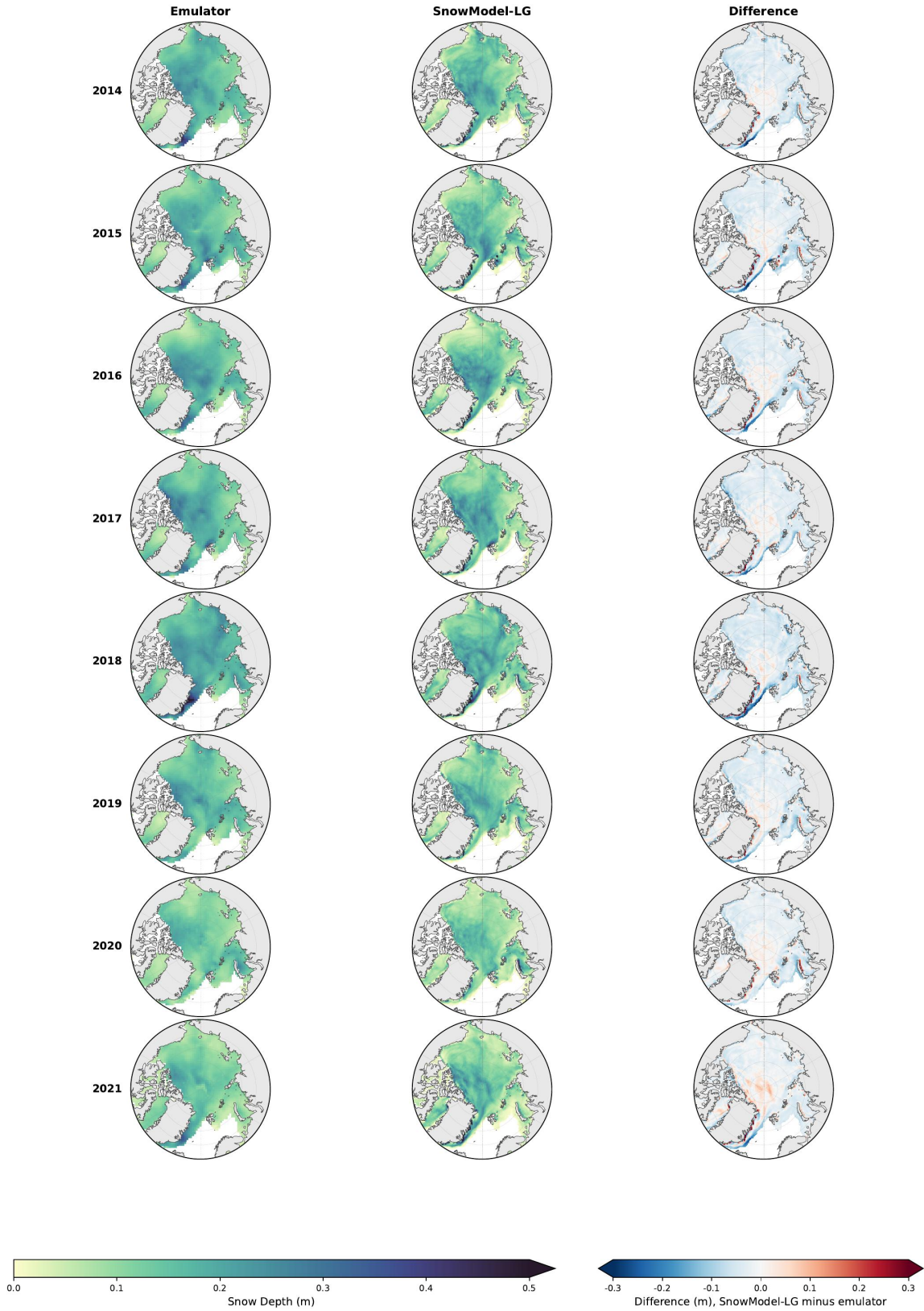


Figure S4: Multi-year comparison of mean snow depth distributions across the pan-Arctic domain. Left column shows emulator predictions, middle column shows SnowModel-LG simulations, and right column shows the difference between the two models, computed as SnowModel-LG minus emulator.