Summary

The authors would like to thank the editor for the suggested corrections we had missed in the last revision. The technical corrections below have been corrected, along with some minor changes to the following figures: Figure 3, Figure 4, Figure 5, Figure 9, Figure S1, Figure S2, and Figure S4 for readability in response to the validation check.

Technical Corrections

line 105: shift parenthesis around (Smith et al.,)

Corrected.

line 106: "have had permafrost records since the 1990s" = have records of permafrost temperatures since...

Corrected.

line 106: shift parenthesis around (CEN)

Corrected.

line 107: same as line 105

Corrected.

line 505: shift parenthesis to Li et al. (2021)

Corrected.

Regarding figures 3, 4(b, c), 9: please ensure that the colour schemes used in your maps and charts allow readers with colour vision deficiencies to correctly interpret your findings. Please check your figures using the Coblis – Color Blindness Simulator (https://www.color-blindness.com/coblis-color-blindness-simulator/) and revise the colour schemes accordingly.

In Figure 3, we changed the line for MERRA2 to be a dashdot style. We also changed the ylim in the 2nd y-axis from 0 – 32000, to 0 – 26000.
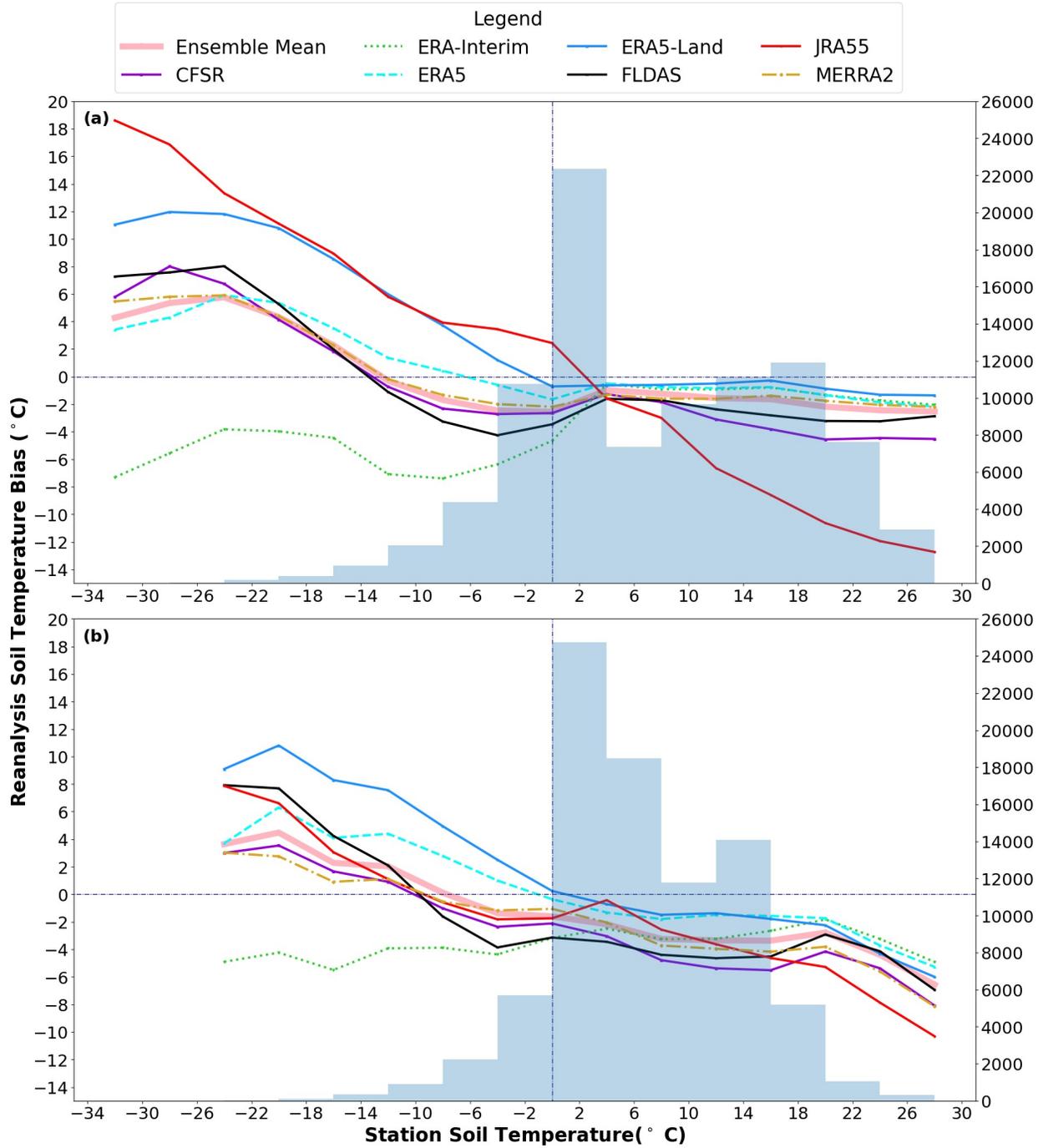
In Figure 4, Figure S1 and Figure S2, MERRA2 is now shown as a right-facing triangle.
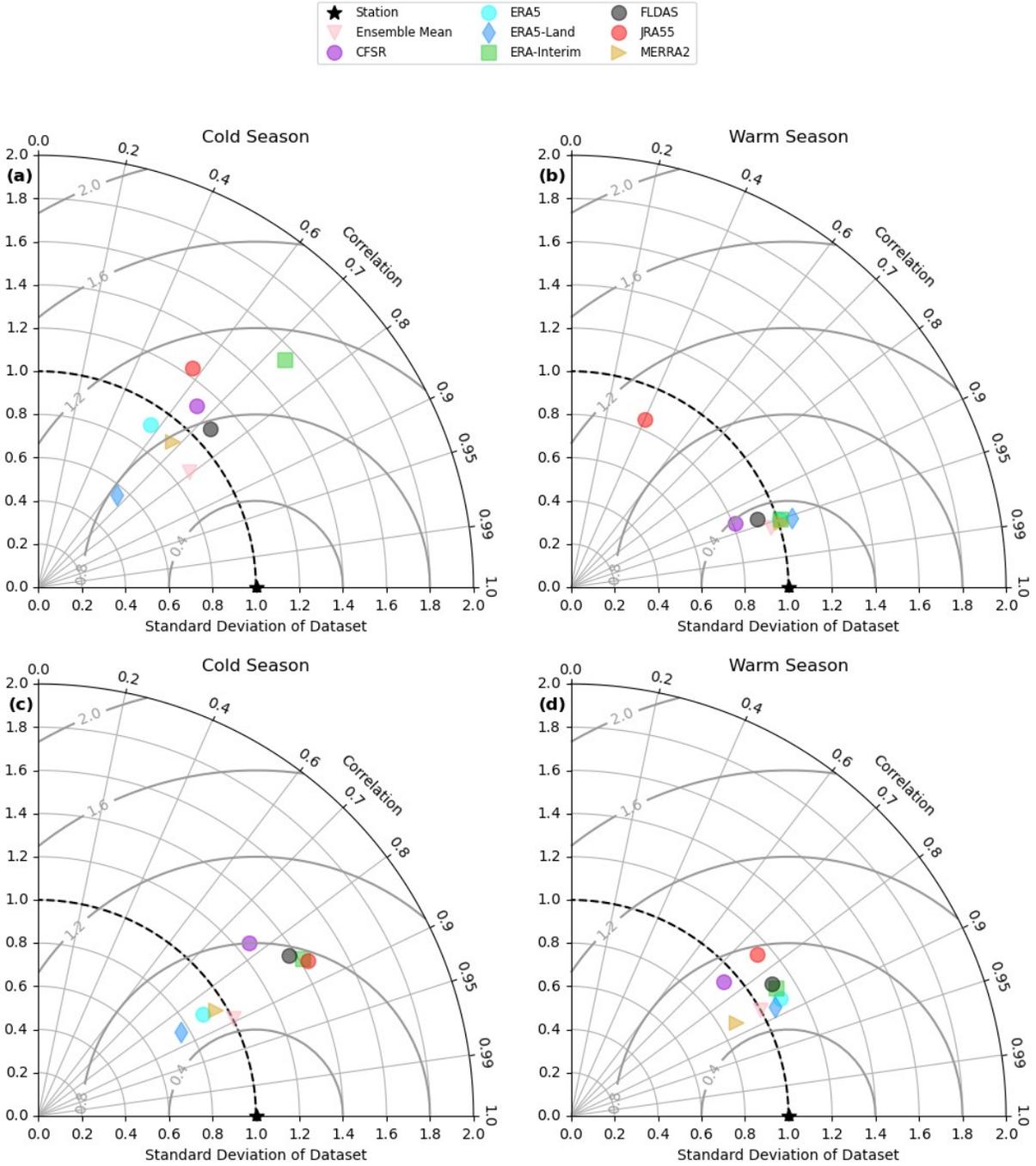
Figure 4. Taylor Diagram of the cold season and the warm season performance of reanalysis products. Panels A and B refer to the cold season, while panels C and D refer to the warm season. The top panels, (a) and (c) are for the near surface while the bottom panels, (b) and (d) refer to soil temperatures at depth. The concentric rings (solid grey lines) refer to the centralized root mean square error (CRMSE), and a product would have a CRMSE of zero if the timeseries of the reanalysis matched the station data perfectly; with a normalized standard deviation of one, and a correlation of one.
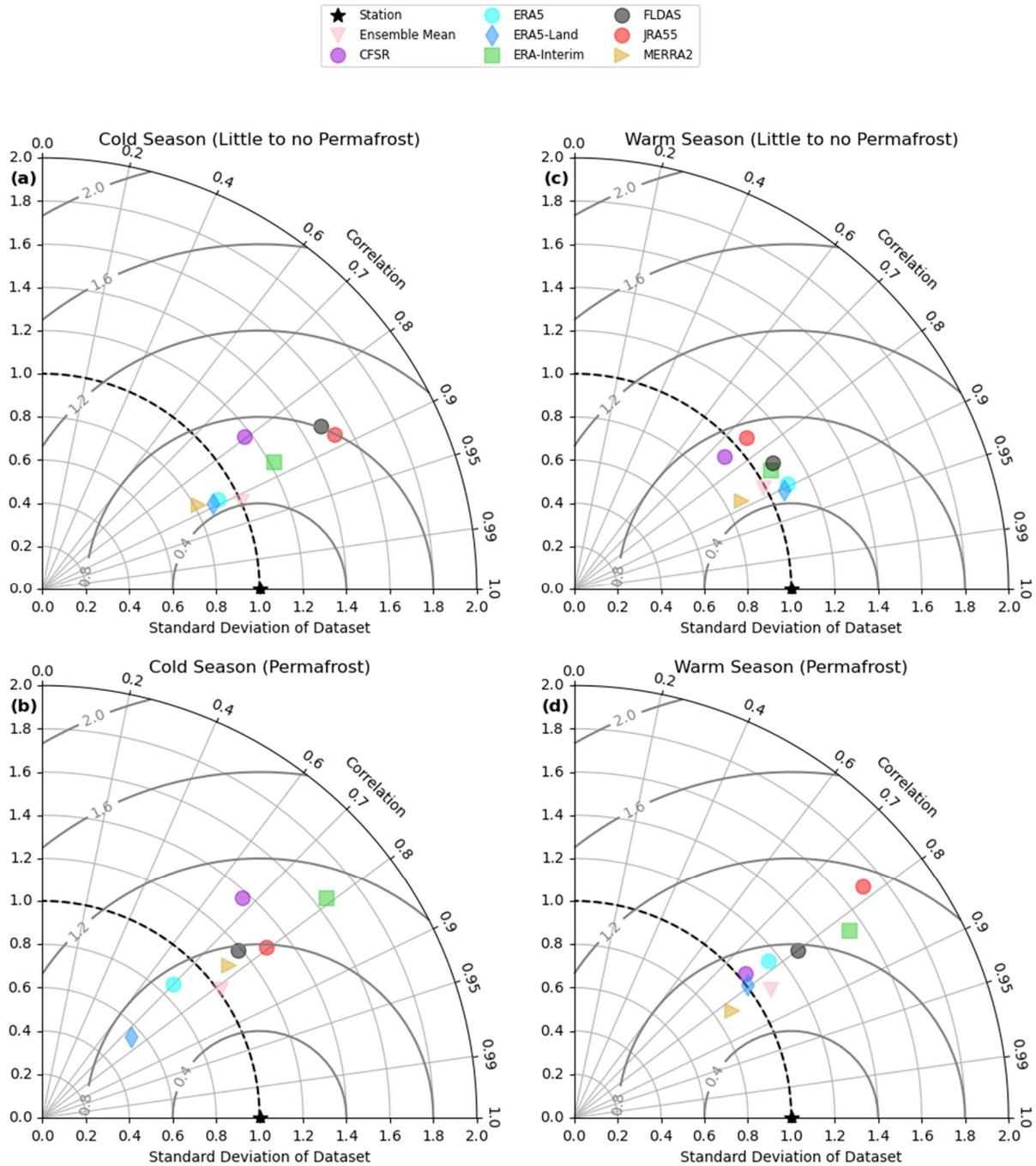
Figure S 1. Taylor Diagram of the cold season and the warm season performance of reanalysis products at depth. (a) and (c) refer to the zone with little to no permafrost, while (b) and (d) refer to the permafrost zone. The left panels, (a) and (b) are for the cold season while the right panels (c) and (d) refer to the warm season. The concentric rings (solid grey lines) refer to the centralized root mean square error (CRMSE), and a product would have a CRMSE of zero if the timeseries of the reanalysis matched the station data perfectly; with a normalized standard deviation of one, and a correlation of one.
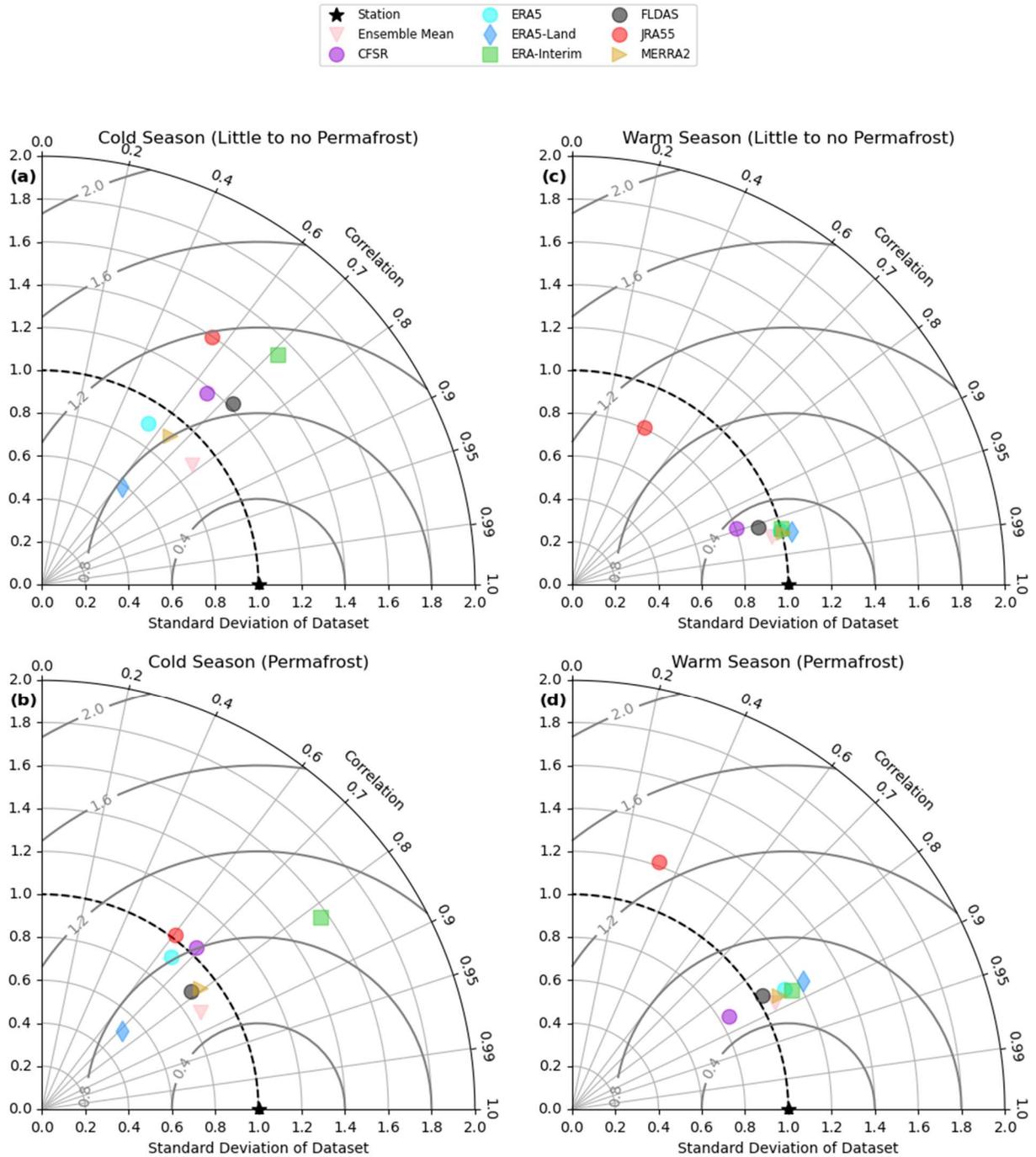
Figure S 2. Taylor Diagram of the near surface cold season and the warm season performance of reanalysis products. (a) and (c) refer to the zone with little to no permafrost, while (b) and (d) refer to the permafrost zone. The left panels, (a) and (b) are for the cold season while the right panels, (c) and (d) refer to the warm season. The concentric rings (solid grey lines) refer to the centralized root mean square error (CRMSE), and a product would have a CRMSE of zero if the timeseries of the reanalysis matched the station data perfectly; with a normalized standard deviation of one, and a correlation of one.

In Figure 5, we changed the MERRA2 linestyle to be dashdot, and adjusted the ylim for better readability. The ylim is now between 0 and 10, rather than 0 and 13. The ylim on the 2nd yaxis has also been adjusted to between 0 to 26000 to match Figure 3.
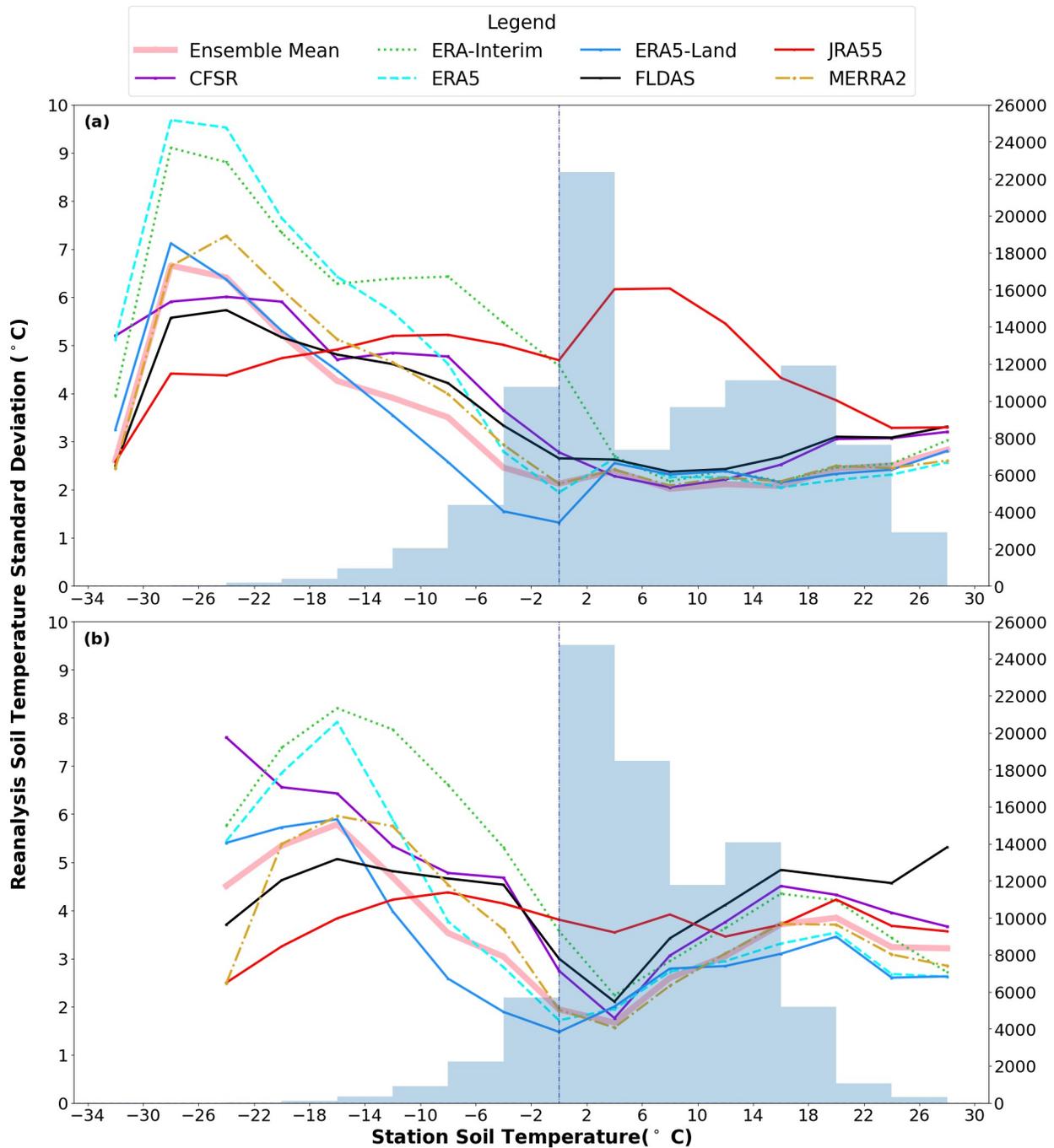

Figure 5. Taylor Diagram of the cold season and the warm season performance of reanalysis products. Panels A and B refer to the cold season, while panels C and D refer to the warm season. The top panels, (a) and (c) are for the near surface while the bottom panels, (b) and (d) refer to soil temperatures at depth. The concentric rings (solid grey lines) refer to the centralized root mean square error (CRMSE), and a product would have a CRMSE of zero if the timeseries of the reanalysis matched the station data perfectly; with a normalized standard deviation of one, and a correlation of one.

The ylim in Figure 9, Panels A and B has been adjusted to fall between -1.4°C and +1.4°C, and CFSR has been changed to a scatter with a star pattern. A small inset in Panel A is also shown with CFSR only to illustrate the strong 2009 and 2010 anomalies. The linestyle for MERRA2 has also been updated to a dashdot pattern, to match Figure 3 and Figure 5. We also make reference to the inset in Panel A in the text:

In CFSR (purple), however, the trend is near zero over North America, and tends towards negative in Eurasia, arising because of anomalously cold years in 2009 and 2010 (see inset in Figure 9, Panel A), and anomalously warm periods in the 80s and early 90s at the beginning of the timeseries (Figure 9, Panels A and B).
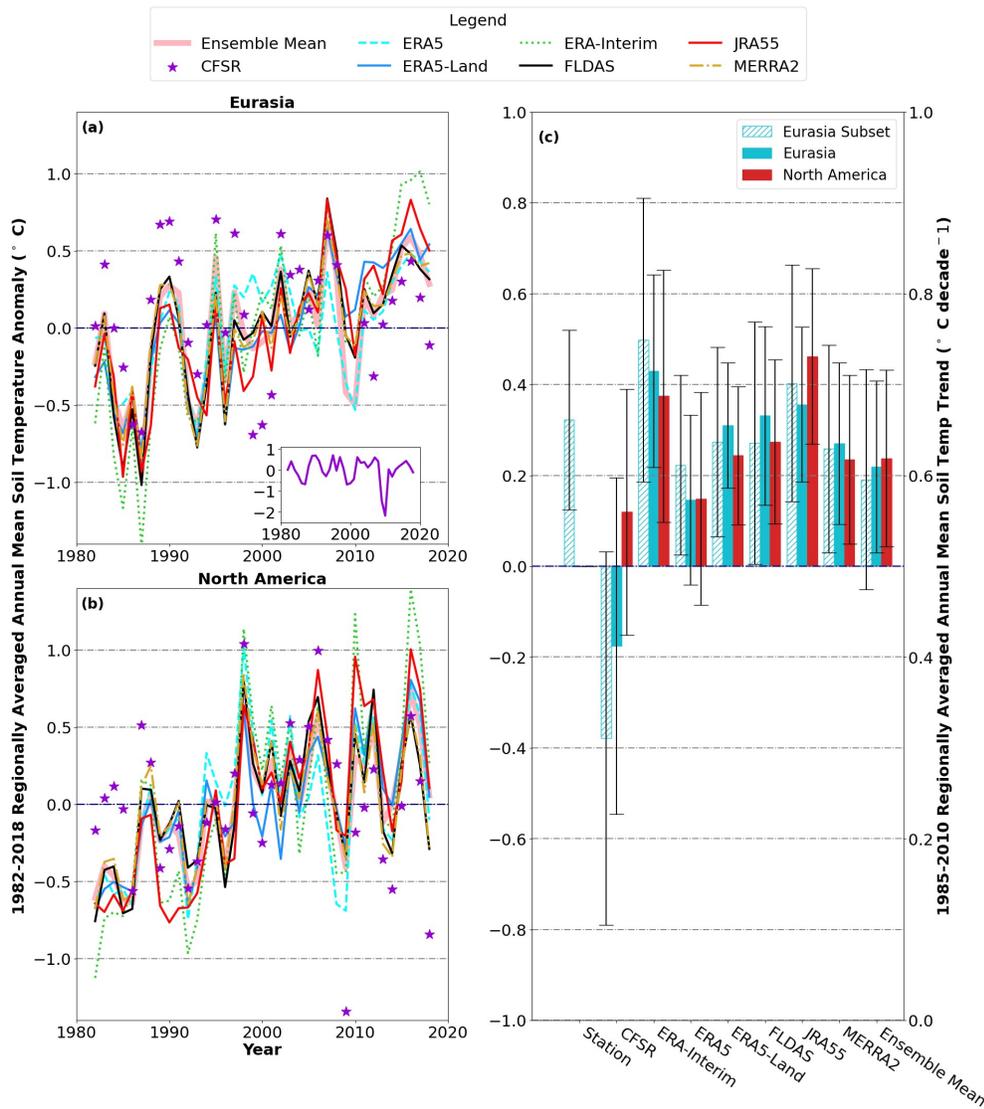

Figure 9. Near surface soil temperature anomalies and trends for each of the reanalysis products. (a) displays the regionally averaged 1982-2018 annual mean soil temperature anomalies for each reanalysis product north of 40°N over Eurasia, while (b) displays the same, but over North America. (c) exhibits an estimate of the regionally averaged 1985-2010 annual mean decadal

soil temperature trend for each of the individual products, and the ensemble mean for comparison (the error bars represent the 95% CI for the mean trend).

Finally, the linestyle in Figure S4 has been updated to match that of Figure 3, Figure 5 and Figure 9, and the ylim is now between -0.25 and +0.35m to improve readability.
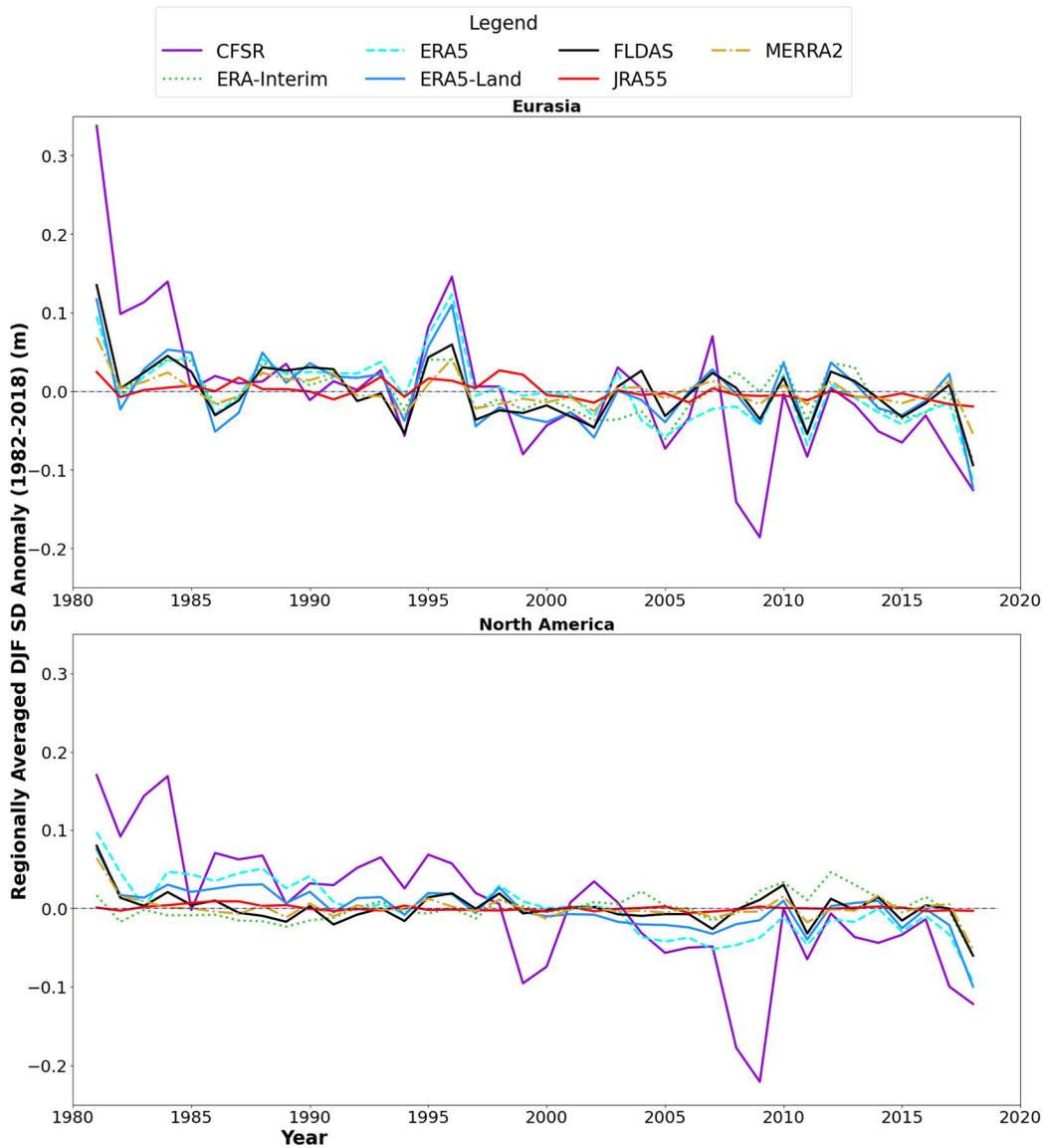

Figure S 3. DJF Snow depth anomalies for each of the reanalysis products. (a) displays the regionally averaged 1982-2018 DJF snow depth anomalies for each reanalysis product north of 40ºN over Eurasia, while (b) displays the same, but over North America.