

Measuring the impact of a new snow model using surface energy budget process relationships

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Introduction

Figures are all referenced in the main document and need no additional explanation.

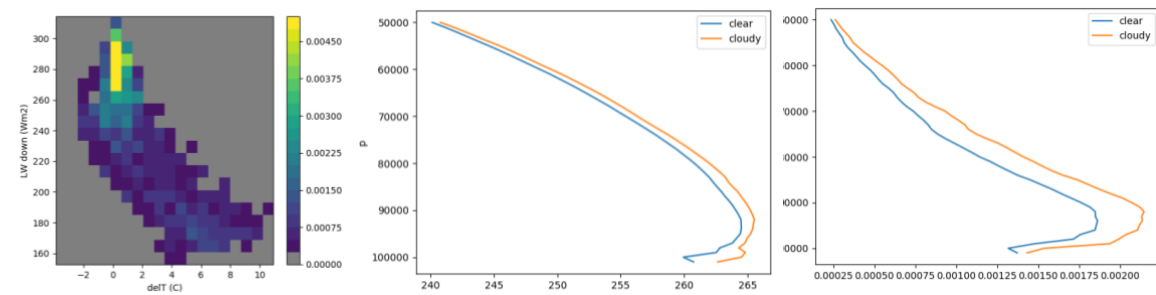


Figure S1. 2d histogram of downwelling longwave radiation and static stability (10m temp – skin temp) (left). Mean radiosonde temperature profiles for the radiatively clear-stably stratified state ($LW\downarrow < 210$) and cloudy-well mixed state ($LW\downarrow > 210$) states (middle). (right) as (middle) but for specific humidity. All data are from Sodankylä, Finland (DJF2017/18).

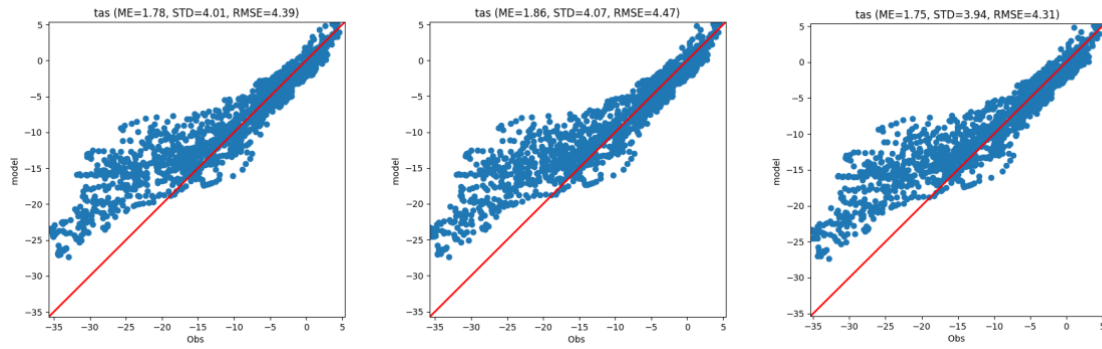


Figure S2. Verification of day-2 2m-temperature from SL forecasts at various locations at Sodankylä: Automatic weather station (left), Intensive Observing Area (Open), Intensive Observing Area (Forest).

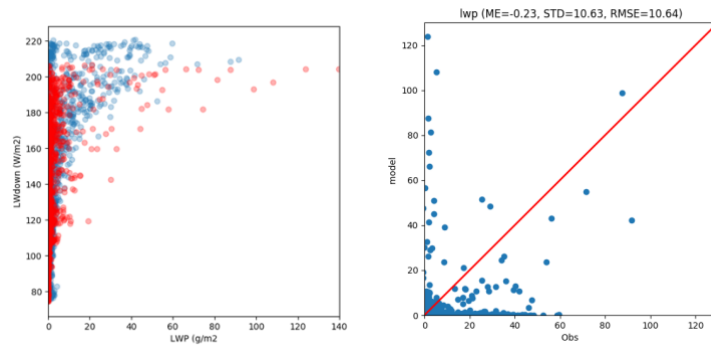


Figure S3. $LW\downarrow$ as a function of LWP (left) in SL forecasts at day-2 (red) and observations (blue). Scatter plot of observed vs CTRL LWP (right).

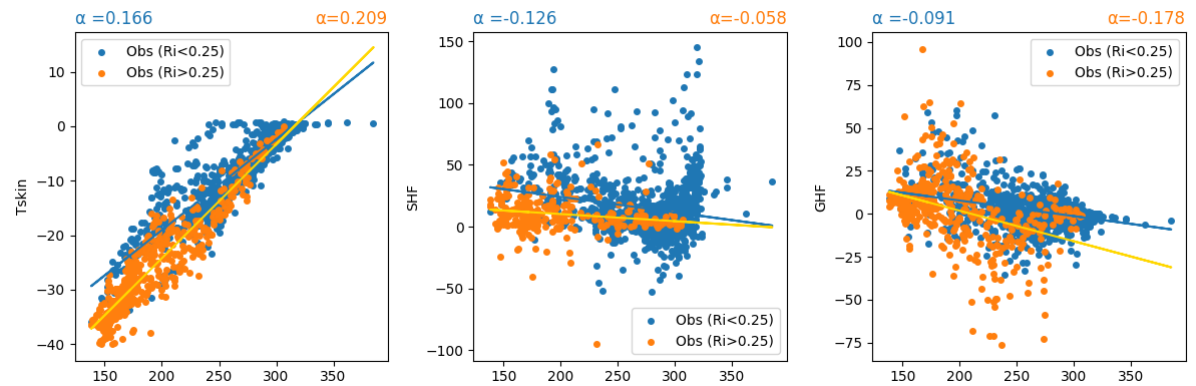


Figure S4. Process relationship diagrams and sensitivity parameters for skin temperature (Tskin; left), sensible heat flux (SHF; middle) and ground heat flux (GHF; right) for Sodankylä, Finland.

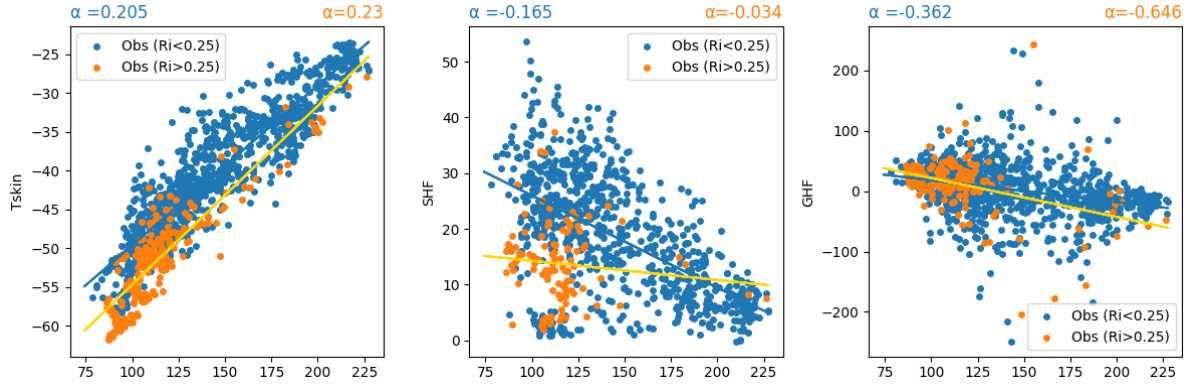


Figure S5. Process relationship diagrams and sensitivity parameters for skin temperature (Tskin; left), sensible heat flux (SHF; middle) and ground heat flux (GHF; right) for Summit, Greenland.

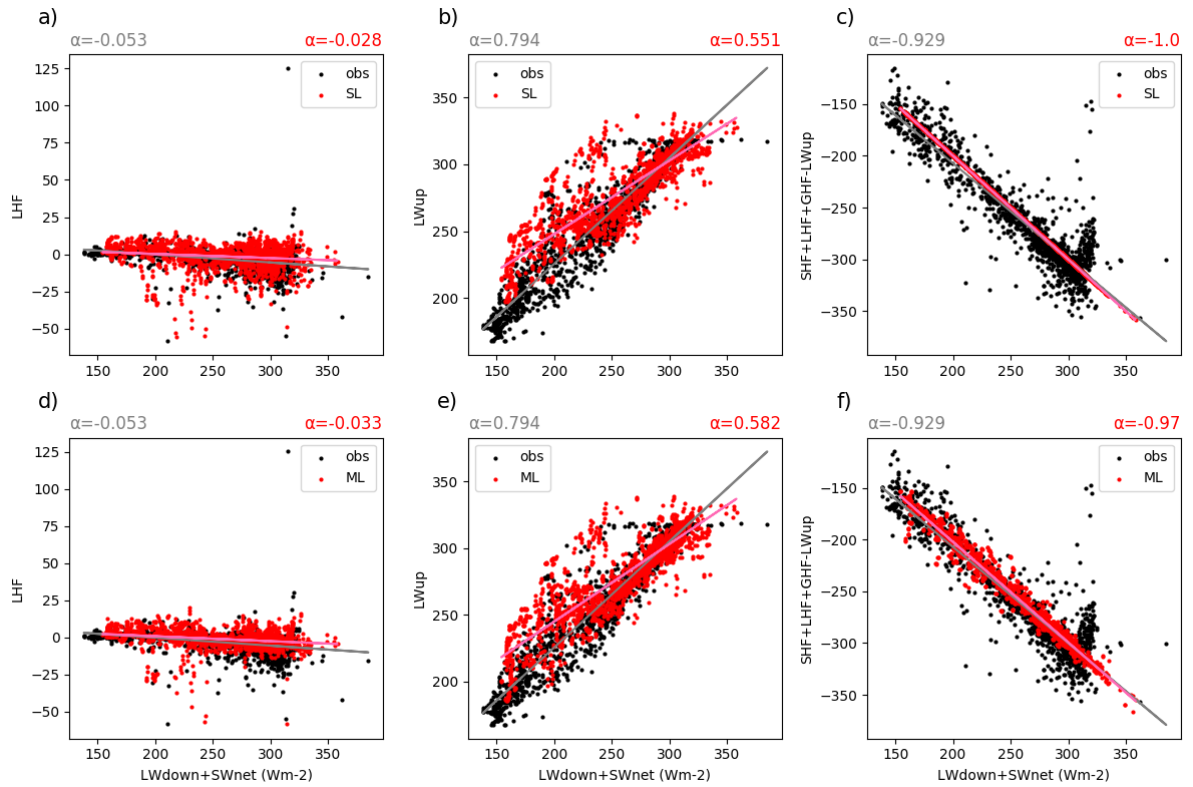


Figure S6. process relationship diagrams and sensitivity parameters for Latent Heat Flux (LHF; left), upwelling longwave radiation (LW \uparrow ; middle) and total response term (SHF+LHF+GHF-LW \uparrow ; right) for Sodankyla, Finland. Observed values are shown in grey in both rows, model values are shown in red for single layer snow (a-c) and multi-layer snow (d-e). The line of best fit is shown for observations (grey line) and each model (pink line).

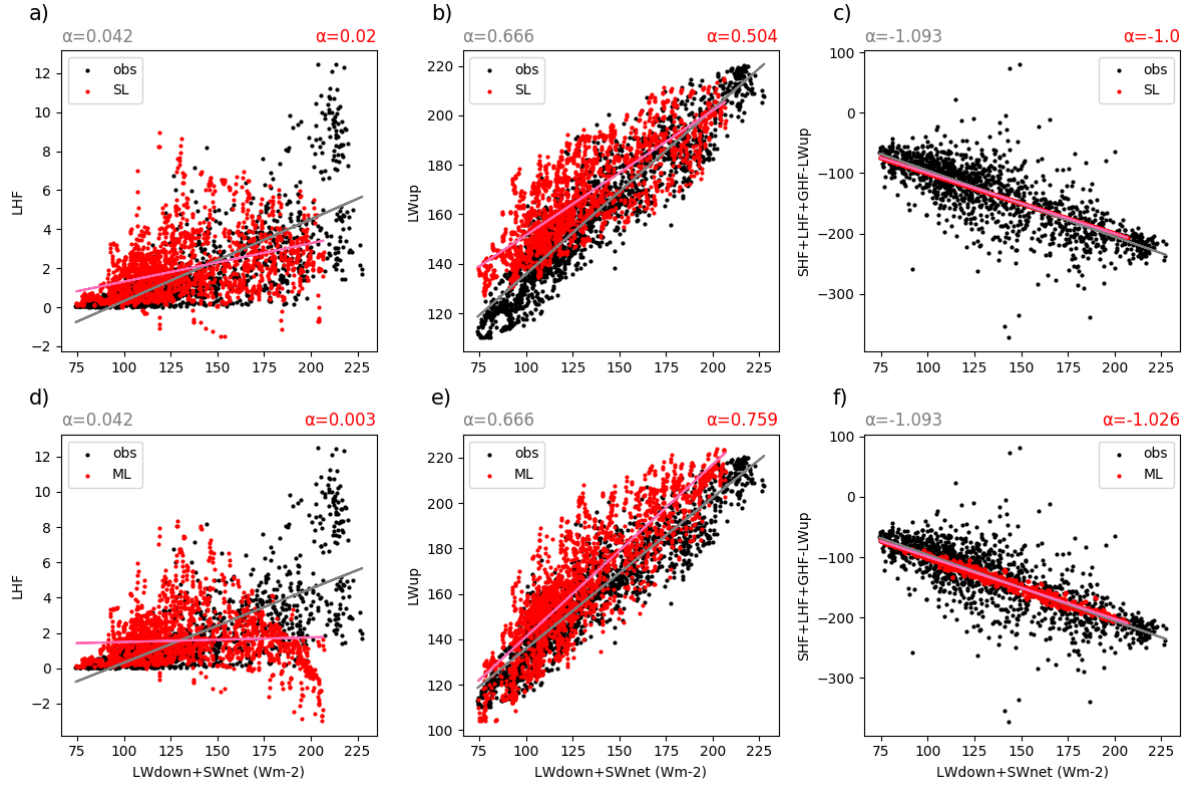


Figure S7. process relationship diagrams and sensitivity parameters for Latent Heat Flux (LHF; left), upwelling longwave radiation (LW \uparrow ; middle) and total response term (SHF+LHF+GHF-LW \uparrow ; right) for Summit, Greenland. Observed values are shown in black, model values are shown in red for single layer snow (a-c) and multi-layer snow (d-f). The line of best fit is shown for observations (grey line) and each model (pink line).

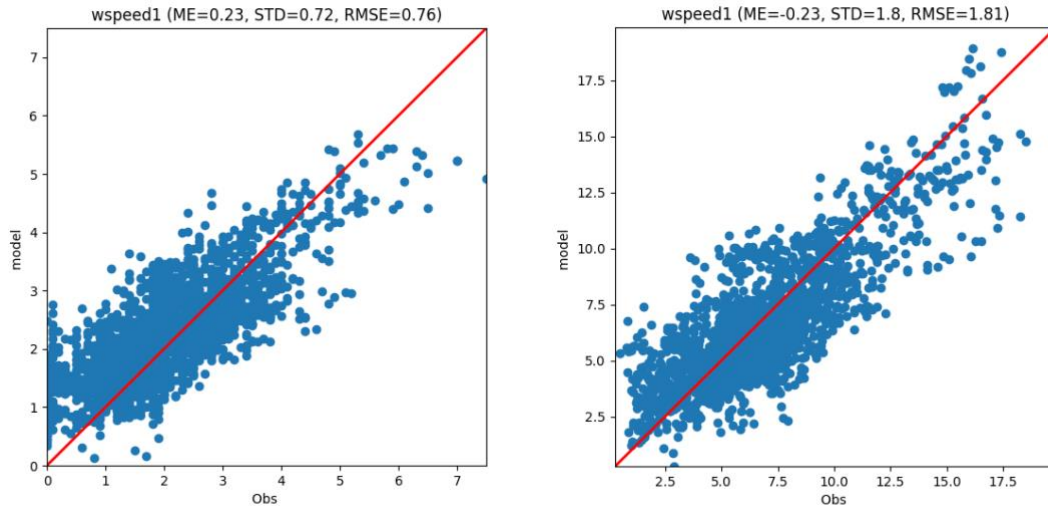


Figure S8. Verification of day-2 lowest model level wind (~10m) from SL forecasts at Sodankyla (left) and Summit (right).