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Supplement of

Meteorological, snow and soil data (2013–2019) from a herb tundra permafrost site at Bylot Island, Canadian high Arctic, for driving and testing snow and land surface models

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Table S1. Coordinates and dates of snow pits of Figures S7 and S8

Site	Latitude N	Longitude W	Dates when pits were dug				
TUNDRA	73.1504	80.0046	14 May 2014	12 May 2015	13 May 2017	14 May 2018	13 May 2019
Wet 0	73.1502	80.0044	14 May 2014	12 May 2015	14 May 2017	14 May 2018	15 May 2019
Pit 3	73.1501	80.0047	16 May 2014	13 May 2015			
Plaine1	73.1494	79.9751	18 May 2014	19 May 2015	18 May 2017	16 May 2018	
Plaine2	73.1676	79.9158	18 May 2014	19 May 2015	18 May 2017		
Bombe	73.1570	79.9744	19 May 2014				
COTO1G	73.1508	79.9395		18 May 2015			
COTO2	73.1510	79.9399		18 May 2015			
attk01	73.1560	79.9825				10 May 2018	

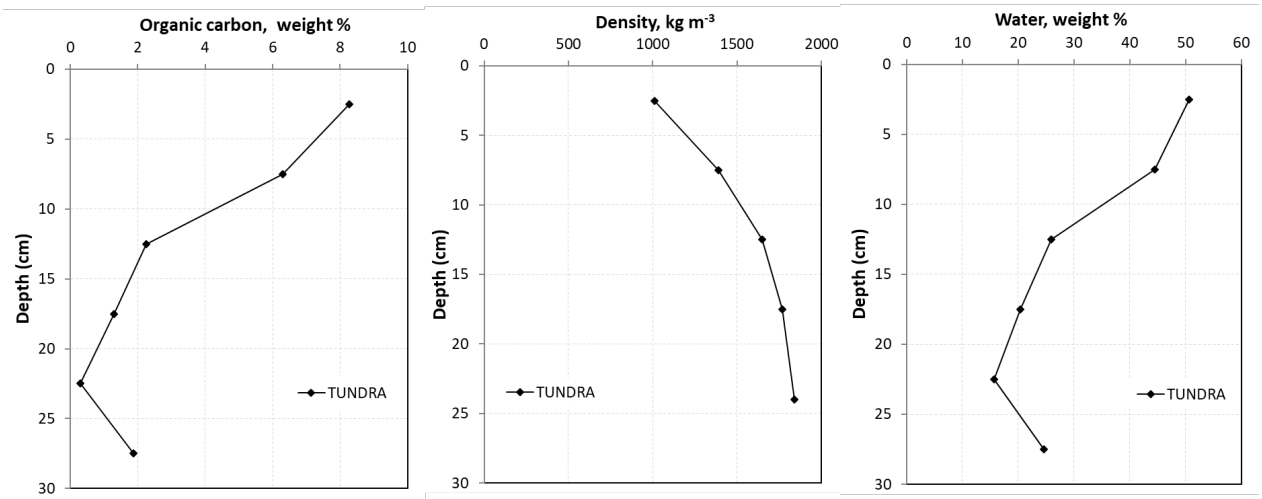

Figure S1. Vertical profile of soil organic carbon content, density and water weight fraction at the TUNDRA site on 3 July 2017. Density includes the water fraction. The water weight fraction was determined by weighing samples taken for carbon analysis before and after drying.

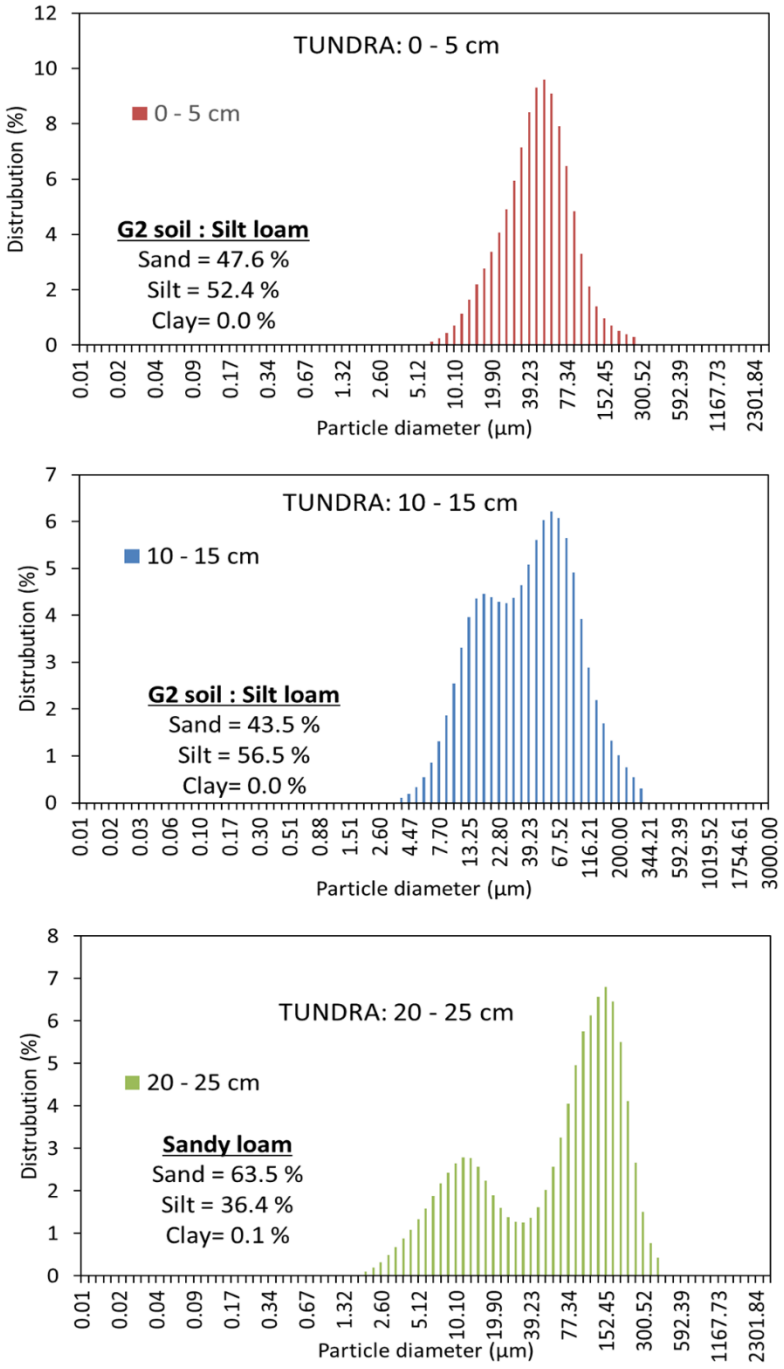

Figure S2. Granulometry of the soil at the TUNDRA site at there depths on 3 July 2017.

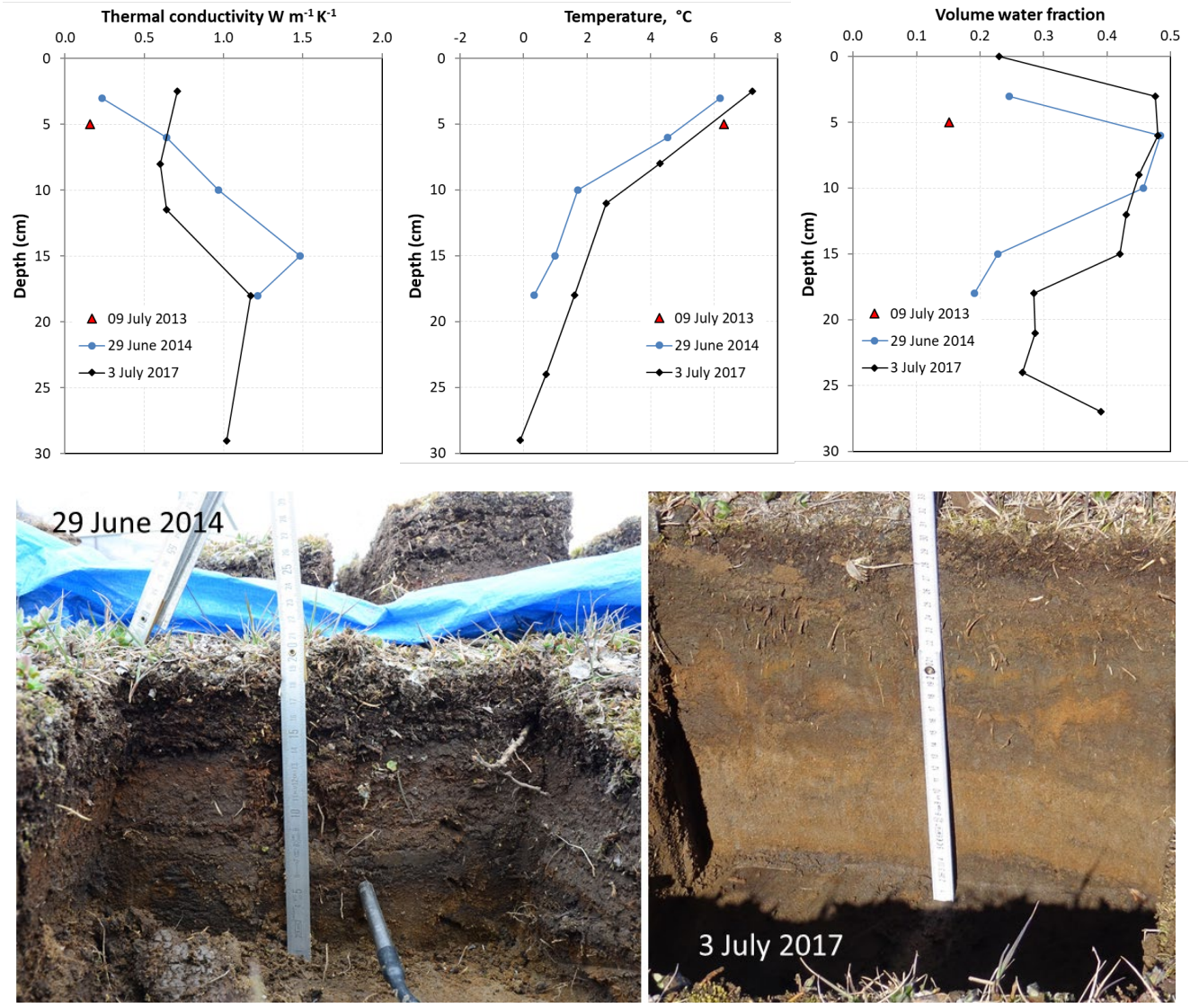

Figure S3. Soil properties at the TUNDRA site. (Top) Vertical profiles of thermal conductivity, temperature and fractional volume water content for three dates. Water content was measured with an EC5 probe from Decagon (now Meter). (Bottom) Photographs of soil pits on 29 June 2014 and 3 July 2017.

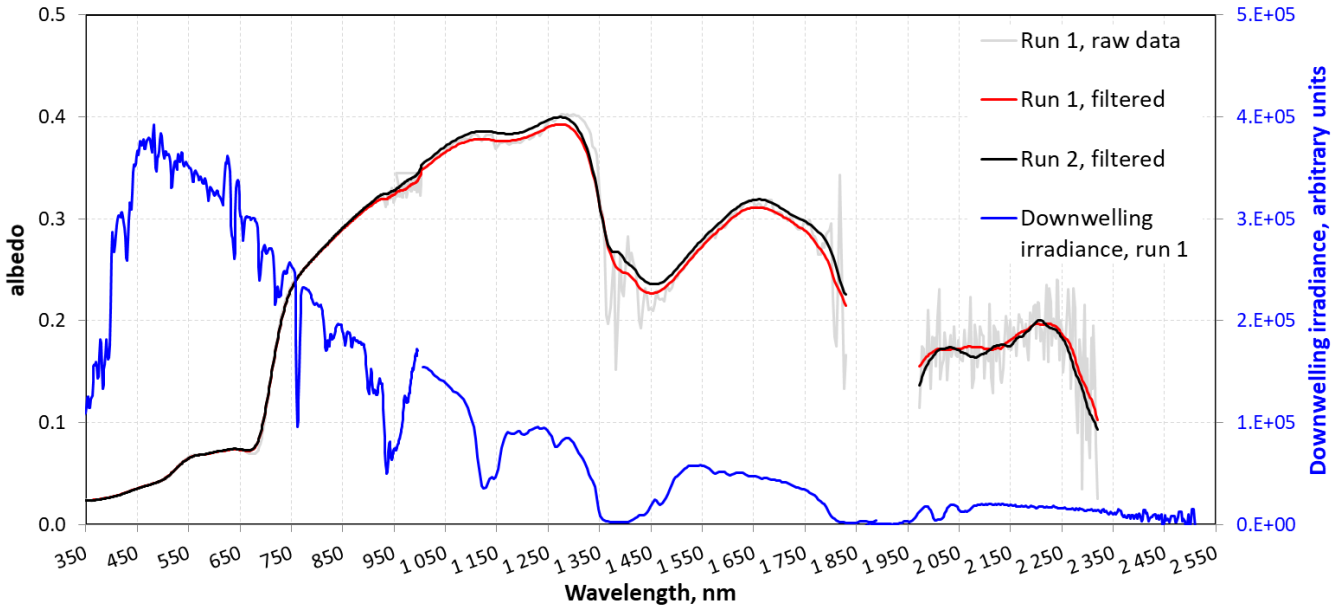

Figure S4. Albedo spectra measured at the TUNDRA site on 11 July 2015. Data have been filtered to reduce noise caused by the absorption bands of atmospheric water vapor. A first-order Butterworth filter was applied to remove variations with intensity amplitudes of 0.05 or lower. The Butterworth filter was provided by the Python scipy.signal.butter function and used with a cutoff frequency of 0.05. Data in the range 1830-1970 nm and beyond 2330 nm are not shown because of excessive noise. There is essentially no incident energy at those wavelengths, as illustrated by the plot of downwelling irradiance (right Y axis). The broadband albedo derived from these spectra is 0.18.

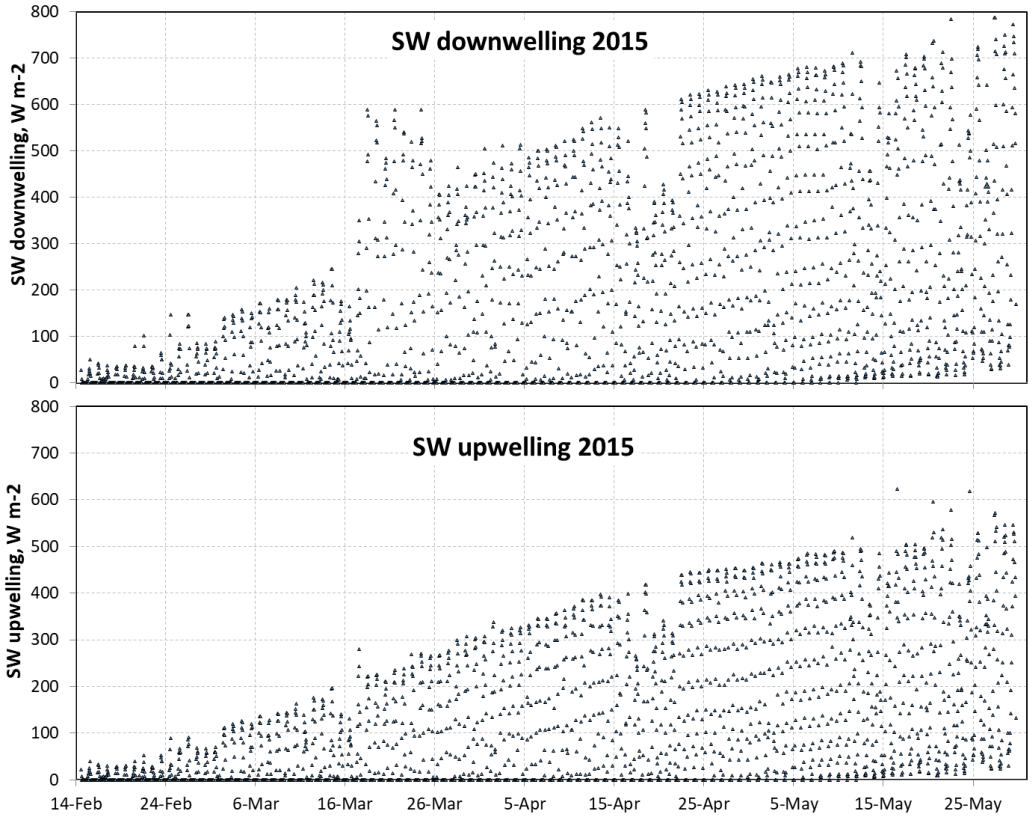

Figure S5. SW↓ and SW↑ hourly data for spring 2015 showing the surprinsigly high values of SW↓ radiation between 17 and 25 March, responsible for measured albedo values around 0.4.

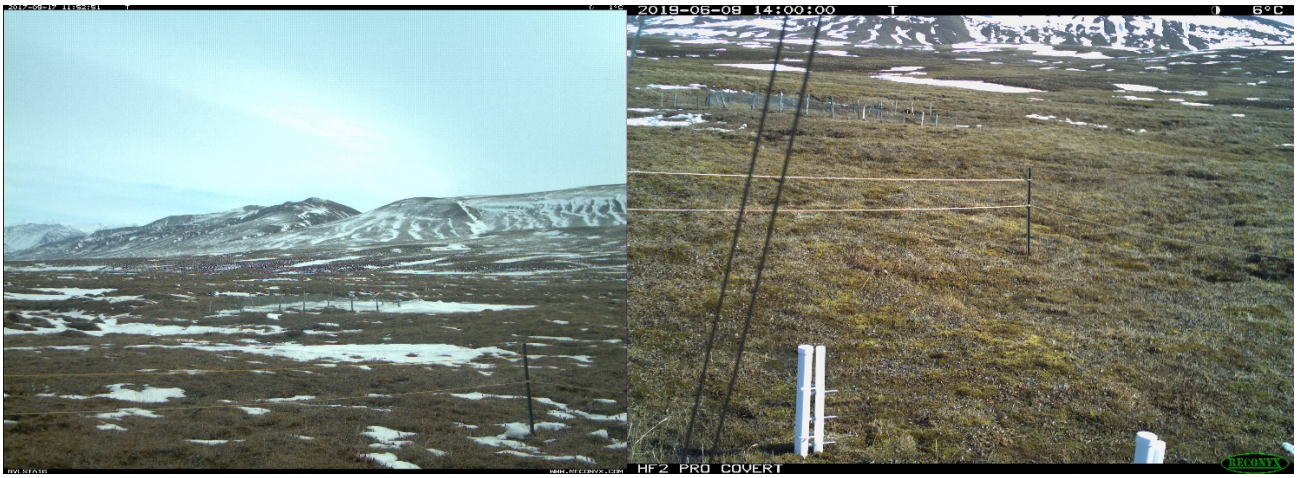

Figure S6. Time-lapse images of the snow cover at the TUNDRA site. (Left) On 17 September 2017. The snow that fell on 7 September is mostly melted and is considered melted-out. Snow started falling just after this picture was taken and the snow onset date considered for 2017 was 17 September, as that snow did not melt until spring. (Right) On 8 June 2019. The snow is considered melted-out in the valley on that date as only thick drifts remain.

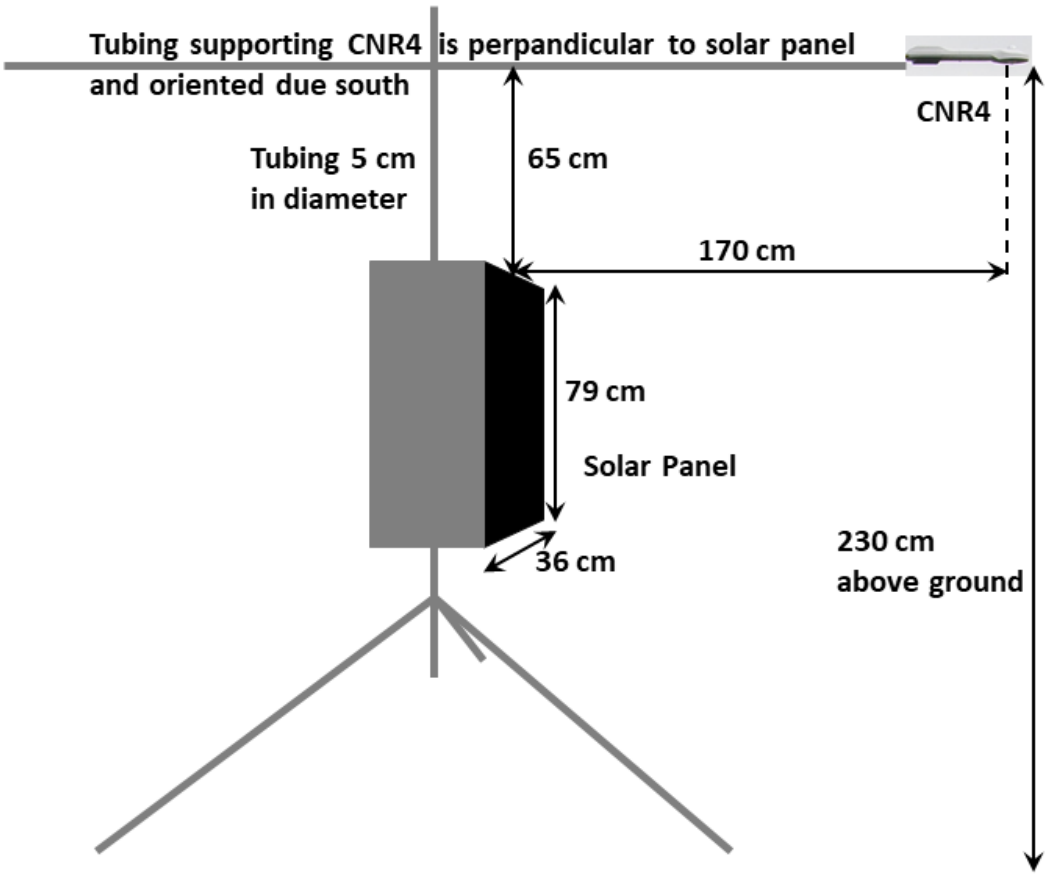

Figure S7. Geometry of the CNR4 radiometer, enabling correction of upwelling radiation.

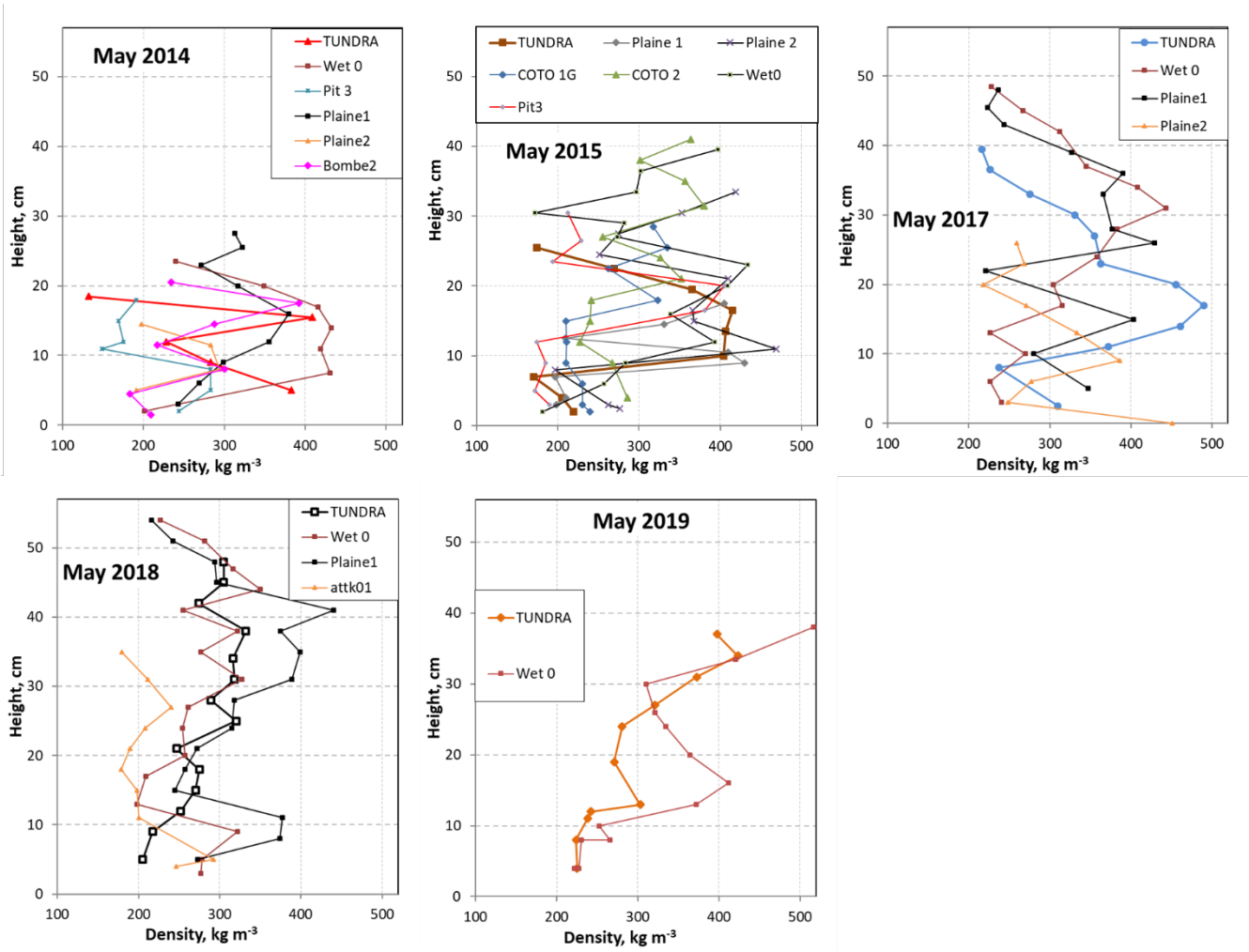

Figure S8. Density profiles measured in mid-May each year where access to Bylot Island was possible. All sites are herb tundra without *Salix richardsonii* shrubs. Soil properties may vary. In particular the Wet 0 site is a polygon next to the TUNDRA polygon, but very wet and with a thick organic layer. All other sites are more similar to TUNDRA.

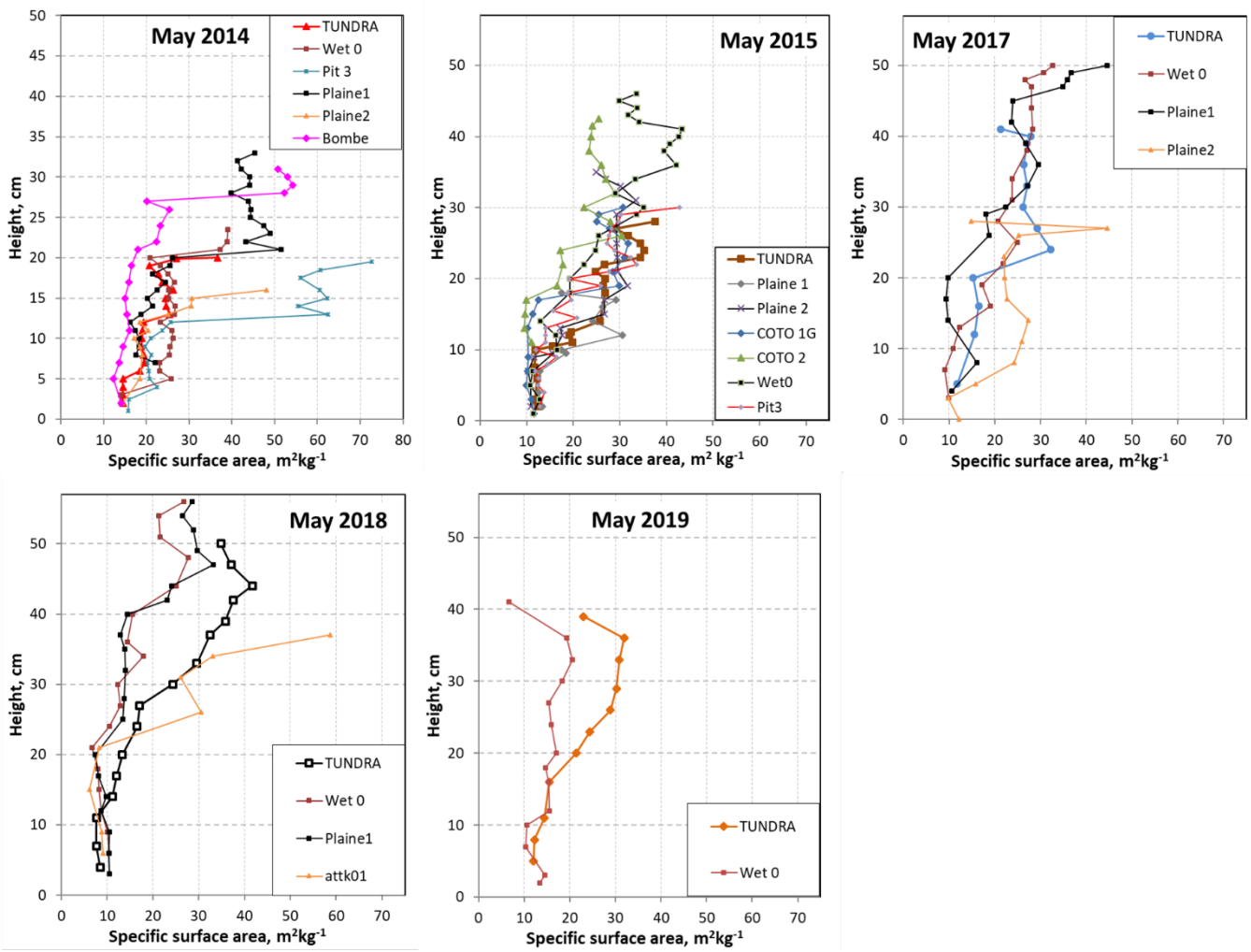

Figure S9. Same as Figure S8 but for SSA.