



Supplement of

Influence of air mass origin on microphysical properties of low-level clouds in a subarctic environment

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1. Air mass characteristics at different altitudes

Temperature (T), specific humidity (Q) and wind speed (WS) profiles from ERA5 for the different source regions (Fig. S1) were compared. In ERA5 profiles, Southern source region stands out as the one with higher T and Q, which is also reflected in the observed cloud microphysical properties. For Western and Eastern region, the median profiles are quite similar to the Arctic profile, but the interquartile range is wider. For these source regions we observe higher variability in e.g., LWC compared to the Arctic source region, which suggests more variable meteorological conditions for these source regions. For WS the differences are relatively small.

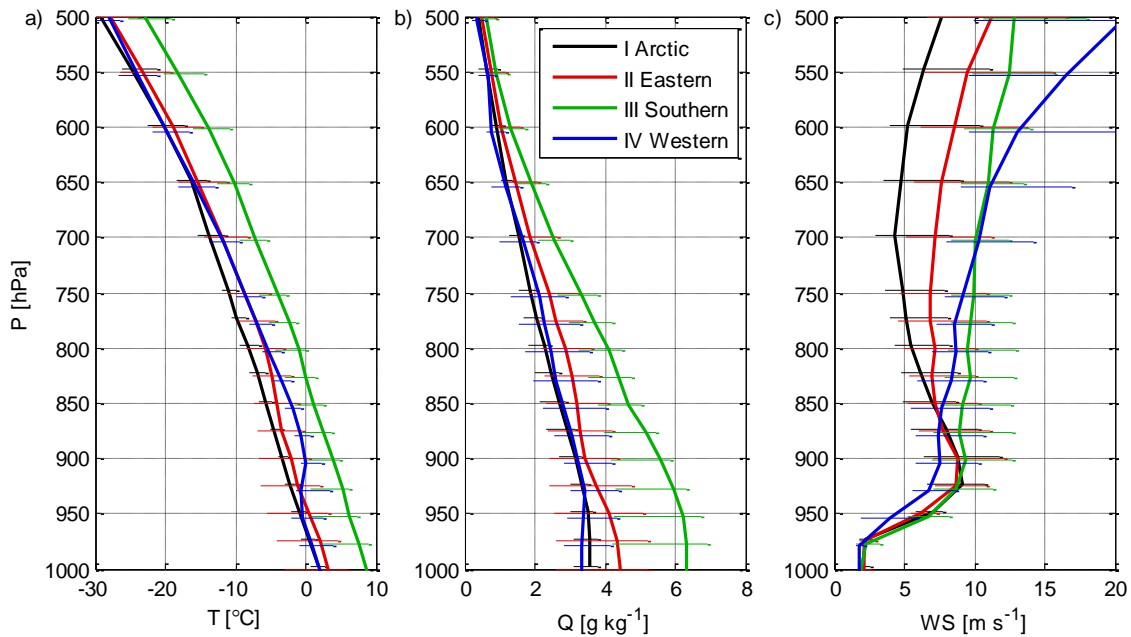


Figure S1. ERA5 temperature, specific humidity and wind speed profiles for the cases, when at least 80% of PES was within a source region. Line is the median and error bars indicate upper and lower quartiles. I, II, III and IV corresponds to the arctic, eastern, southern, and western region respectively. Station pressure is ~970 hPa.

2. Additional information on borders of the source regions and cloud observation hours during PaCEs.

Table S1. Detailed borders of the source regions. Latitude and longitude ranges for each sector.

Sectors	Latitude (x)	Longitude (y)
Arctic, marine, area I	$x \geq 70^\circ \text{ N}$	
Eastern, continental, area II	$x < 70^\circ \text{ N}$	$y > 30^\circ \text{ E}$
Southern, continental, area III	$x < 65^\circ \text{ N}$	$10 < y < 30^\circ \text{ E}$
	$x < 63^\circ \text{ N}$	$5 < y < 10^\circ \text{ E}$
	$x < 55^\circ \text{ N}$	$5^\circ \text{ W} \leq y < 5^\circ \text{ E}$
Western, marine, area IV	$65 \leq x \leq 70^\circ \text{ N}$	$10 < y < 15^\circ \text{ E}$
	$63 \leq x \leq 70^\circ \text{ N}$	$5 < y < 10^\circ \text{ E}$
	$55 \leq x \leq 70^\circ \text{ N}$	$5^\circ \text{ W} \leq y \leq 5^\circ \text{ E}$
	$x \leq 70^\circ \text{ N}$	$y \leq 5^\circ \text{ W}$
Local, continental, area V	$65 < x < 70^\circ \text{ N}$	$15 < y < 30^\circ \text{ E}$

Table S2. Observation hours related to each region for each PaCE.

	Arctic(h)	Eastern(h)	Southern(h)	Western(h)
2005	0	0	11	0
2009	0	0	29	9
2012	30	53	0	10
2013	22	54	16	25
2015	8	138	58	46
2017	18	30	0	28
2019	40	0	38	0
TOTAL	118	275	152	118

Table S3. Observation hours related to temperature bin and each region for all PaCEs.

Temperature bin (⁰ C)	Arctic(h)	Eastern(h)	Southern(h)	Western(h)
(-10,-6)	32	99	0	0
(-6,-2)	39	85	52	45
(-2,2)	45	39	49	59
(2,6)	2	52	51	14
TOTAL	118	275	152	118