



Supplement of

The correlation between Arctic sea ice, cloud phase and radiation using A-Train satellites

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Table S1. Mean ratio (%) of mixed-phase to liquid plus mixed-phase clouds for each dataset. Datasets are subset to 2007-2010.

(%)	DARDAR	PHACT	CERES	GOCCP
mix/(liquid+mix)	50	27	N/A	20

Table S2. Sensitivity of spatial correlations between cloud types and SIC to SIC thresholds for all seasons and for PHACT (2007-2020).

PHACT					
0.99 and 0.01	DJF	MAM	JJA	SON	ANN
ΔIce	-0.05	0.13	0.11	0.15	0.23
ΔLiq	-0.45	-0.25	0.11	-0.29	-0.39
ΔMix	-0.57	-0.39	-0.05	-0.46	-0.48
ΔTot	-0.55	-0.32	0.13	-0.45	-0.44
0.98 and 0.02	DJF	MAM	JJA	SON	ANN
ΔIce	-0.03	0.16	0.12	0.16	0.23
ΔLiq	-0.46	-0.26	0.10	7-0.30	-0.38
ΔMix	-0.56	-0.39	-0.05	-0.45	-0.46
ΔTot	-0.55	-0.31	0.12	-0.45	-0.43
0.97 and 0.03	DJF	MAM	JJA	SON	ANN
ΔIce	0.02	0.19	0.12	0.15	0.23
ΔLiq	-0.47	-0.28	0.10	-0.30	-0.34
ΔMix	-0.55	-0.39	-0.04	-0.43	-0.42
ΔTot	-0.55	-0.33	0.13	-0.44	-0.39

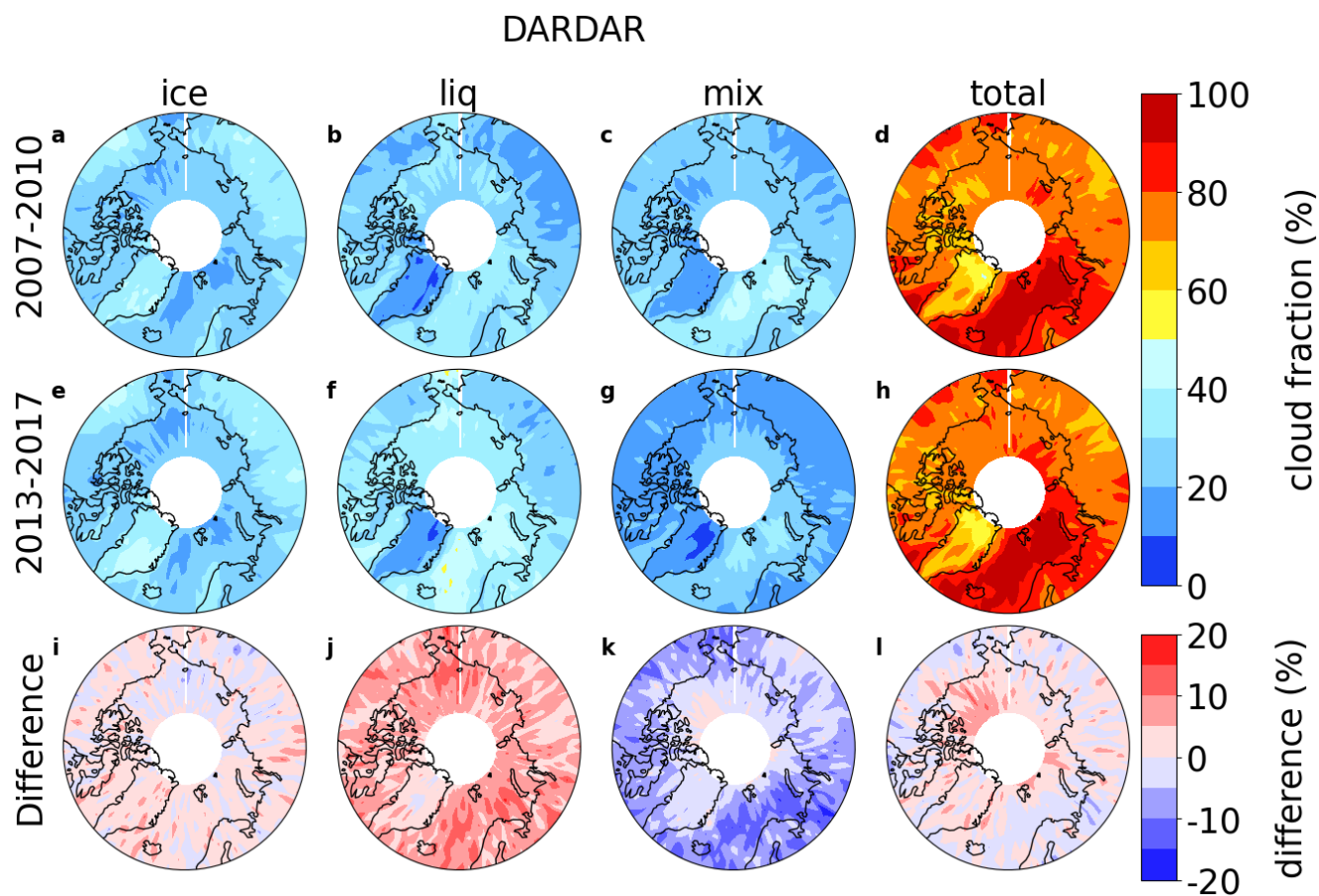


Figure S1. DARDAR cloud cover differences (bottom row) between daytime observing period (2013-2017; middle row) and daytime and nighttime observing period (2007-2010; top row).

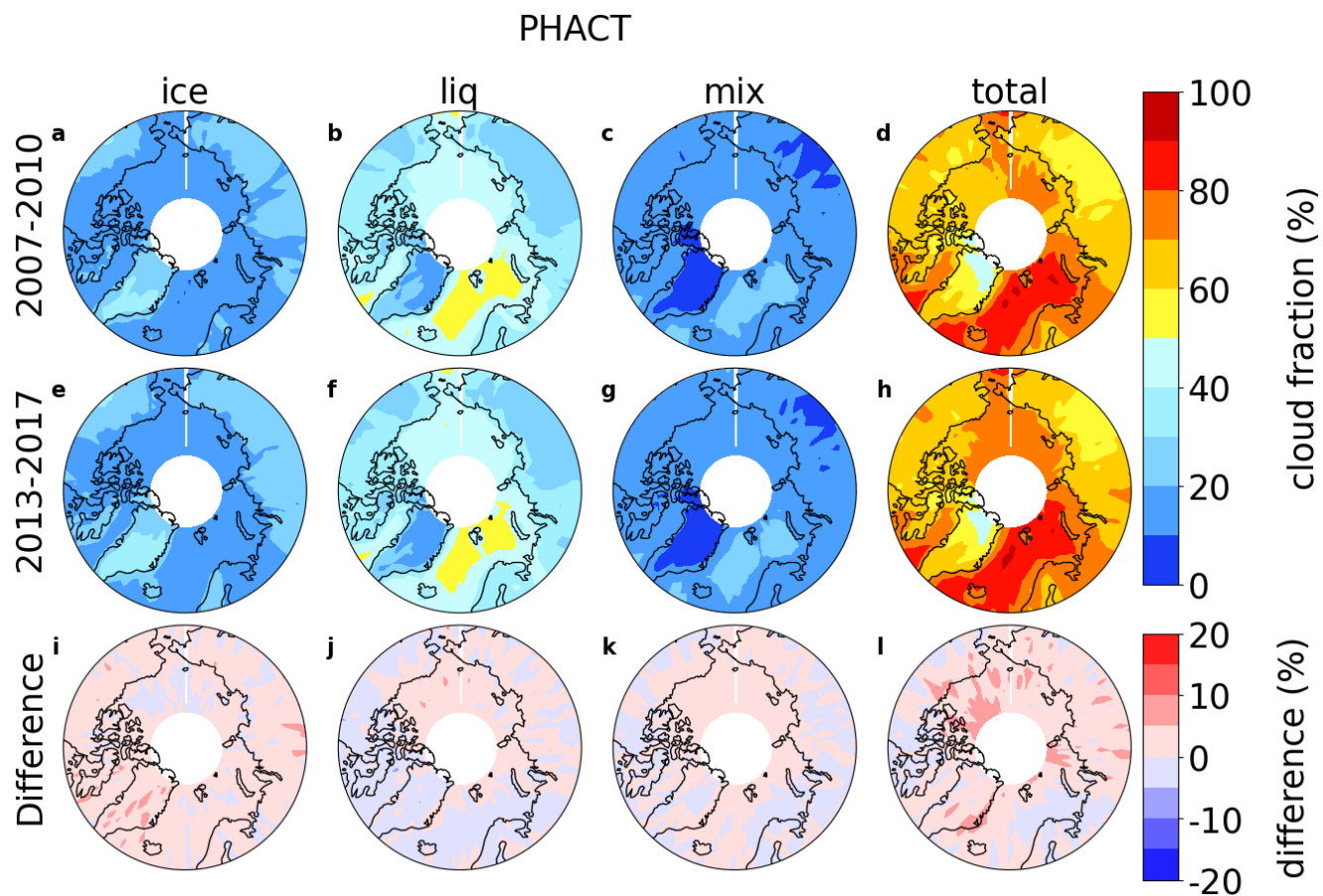


Figure S2. Same as Fig. S1 for PHACT, except that daytime and nighttime data are used in both time periods.

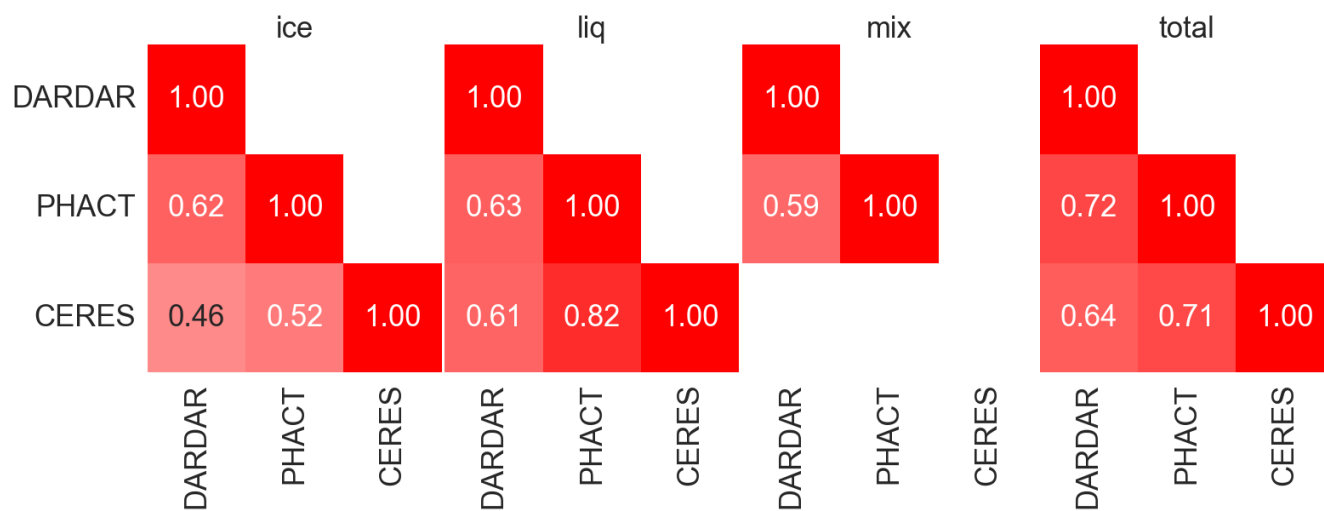


Figure S3. Pattern correlation between datasets for the different cloud covers (subset to 2007-2010).

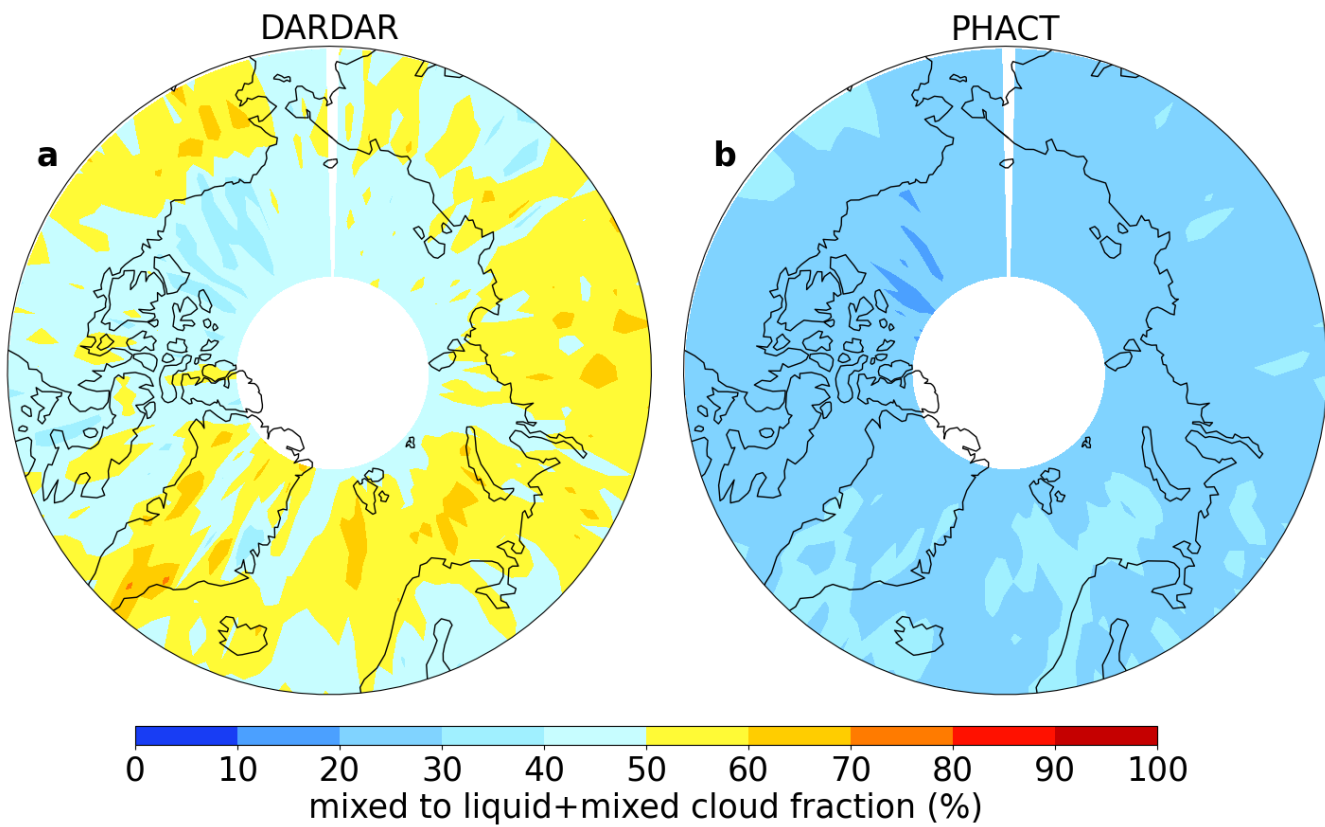


Figure S4. Ratio (%) of mixed-phase to liquid plus mixed-phase clouds for DARDAR (left) and PHACT (right). Datasets are subset to 2007-2010.

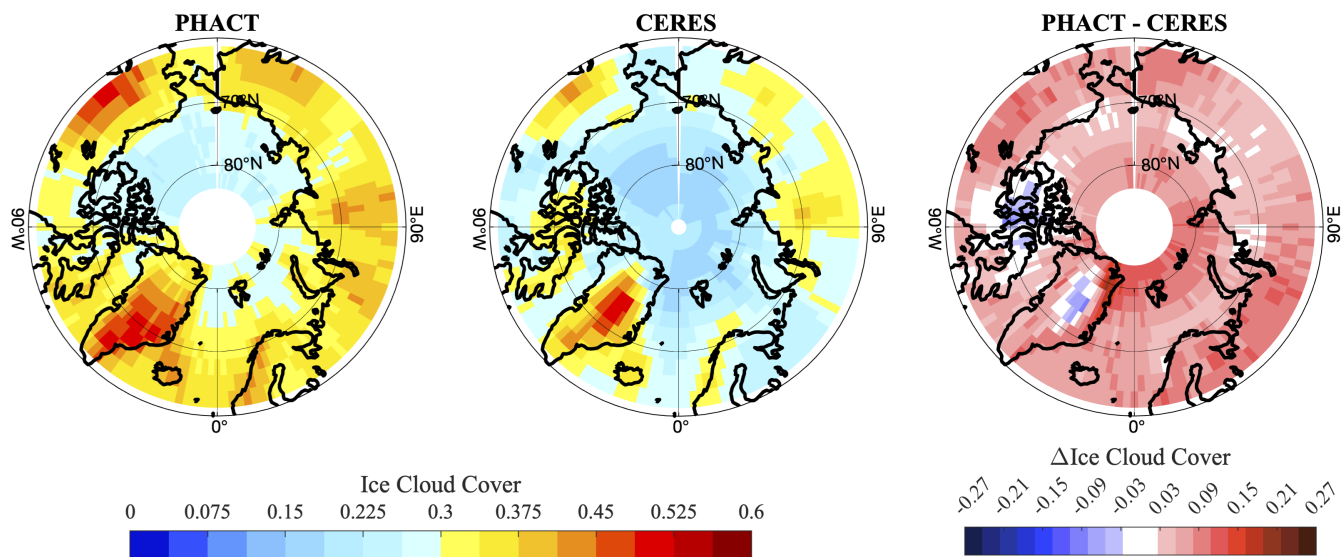


Figure S5. PHACT ice cloud cover when accounting for all ice-only and ice-above-liquid clouds compared to CERES ice cloud cover.

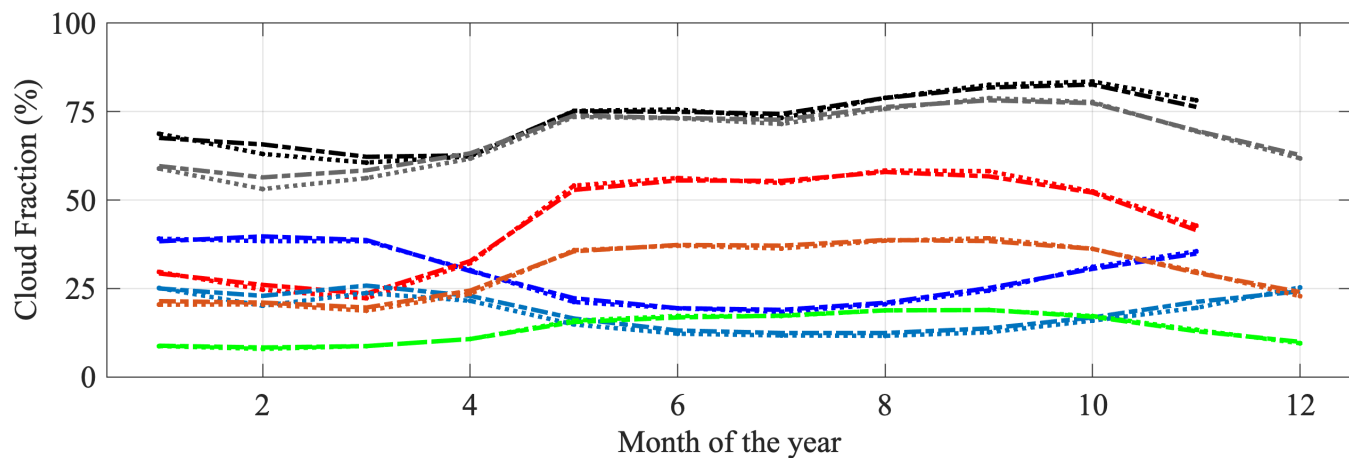


Figure S6. Effect of using 4 years (dotted) instead of 14 (dash dotted) on the seasonal cycle of cloud covers from PHACT and CERES.

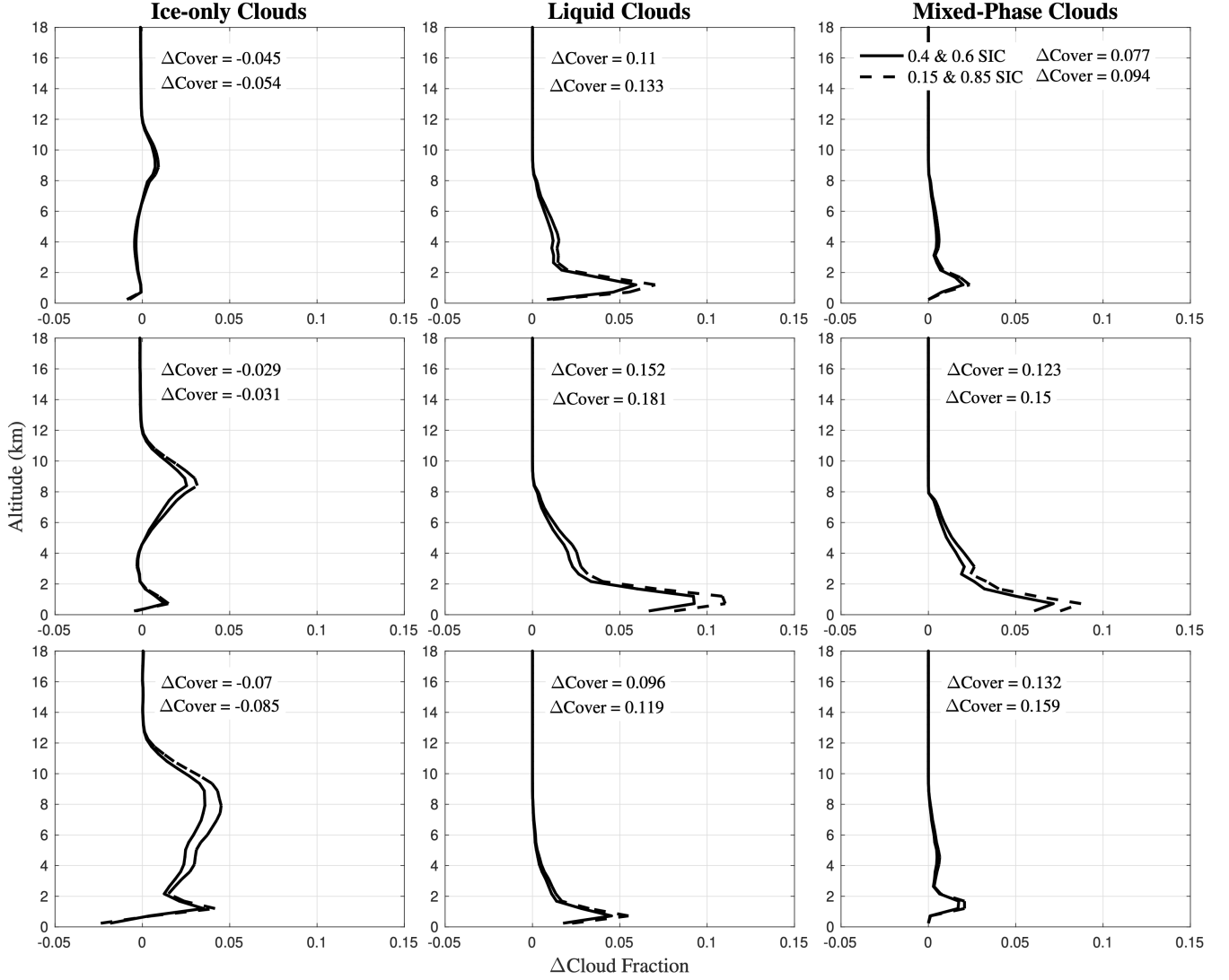


Figure S7. Effect of using 0.85 and 0.15 SIC thresholds (dashed lines) for sea-ice and open-ocean dominated grid boxes, respectively, on the relationship between cloud profiles and SIC in PHACT (up), CALIPSO-GOCCP (middle) and DARDAR (bottom). The original SIC thresholds are 0.6 and 0.4 (solid lines). The corresponding cloud covers are shown on each subplot.