

Climatology of Cloud Phase, Cloud Radiative Effects and Precipitation Properties over the Tibetan Plateau

Supplemental Information

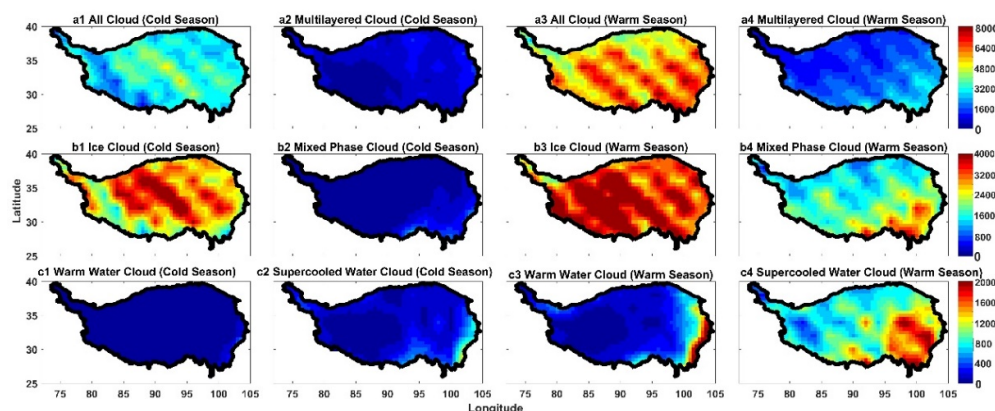


Figure S1. Four-year sample of cloud fraction of different cloud phases over the TP. Here, each cloud phase is a single-layer plus multiple layers; for example, the ice cloud is the total ice cloud. (a1–c4 represent the different cloud phases during the cold season and warm season).

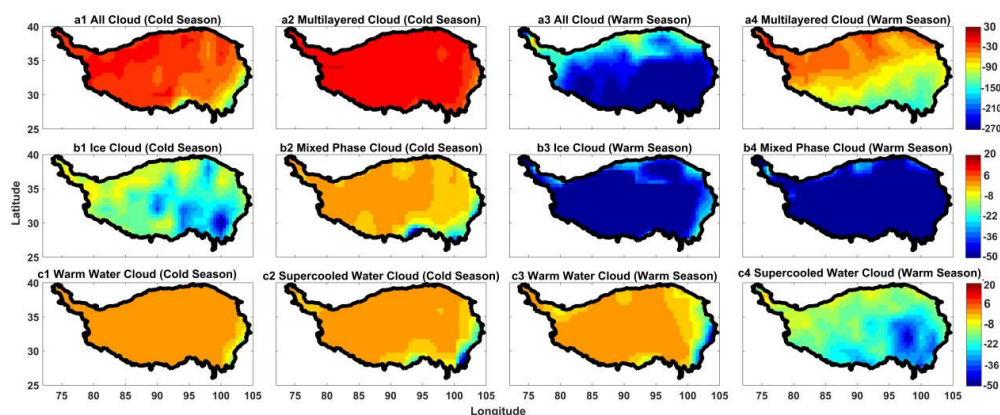


Figure S2. Four-year CRE of different cloud phases over the TP. (a1–c4) represent the surface. The spatial resolution is a $0.5^\circ \times 0.5^\circ$ grid (The two columns on the left represent the cold season, and the two columns on the right represent the warm season. Here, ice clouds, water clouds, and mixed-phase clouds refer to the case of single-layer clouds.).

The radiative effects of different cloud phases											
TOA											
ice		mixed		warm water		supercooled water		Multilayered		total	
warm	cold	warm	cold	warm	cold	warm	cold	warm	cold	warm	cold
-18.5	-7.0	-30.4	-8.8	-2.6	-2.1	-9.2	-6.0	-34.1	-9.1	-94.8	-33.0
ATM											
ice		mixed		warm water		supercooled water		Multilayered		total	
warm	cold	warm	cold	warm	cold	warm	cold	warm	cold	warm	cold
17.7	9.5	10.9	0.2	0.0	-0.3	0.5	-0.6	13.6	1.1	42.9	9.9
SFC											
ice		mixed		warm water		supercooled water		Multilayered		total	
warm	cold	warm	cold	warm	cold	warm	cold	warm	cold	warm	cold
-27.3	-16.5	-35.9	-9.0	-2.6	-1.8	-9.4	-5.4	-40.9	-10.2	-116.2	-42.9

Figure S3. Four-year CRE of different cloud phases at TOA, ATM, and SFC over the TP (The numerical values in the figure represent different cloud phase radiative effects in different seasons. Here, ice clouds, water clouds, and mixed-phase clouds refer to the case of single-layer clouds).

The radiation contribution of different cloud phases									
TOA									
ice		mixed		warm water		supercooled water		Multilayered	
warm	cold	warm	cold	warm	cold	warm	cold	warm	cold
19.5	21.3	32.1	26.7	2.8	6.4	9.7	18.2	36.0	27.5
ATM									
ice		mixed		warm water		supercooled water		Multilayered	
warm	cold	warm	cold	warm	cold	warm	cold	warm	cold
41.4	81.0	25.4	2.0	0.1	2.4	1.3	5.4	31.8	9.2
SFC									
ice		mixed		warm water		supercooled water		Multilayered	
warm	cold	warm	cold	warm	cold	warm	cold	warm	cold
23.5	38.4	30.9	21.1	2.3	4.3	8.1	12.5	35.2	23.7

Figure S4. Four-year cloud radiation contribution of different cloud phases at TOA, ATM, and SFC over the TP. Radiation contribution of different cloud phases over the TP (The numerical values in the figure represent different cloud phase radiative effects in different seasons. Here, ice clouds, water clouds, and mixed-phase clouds still refer to the case of single-layer clouds.).