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Supplement of

Arctic cloud annual cycle biases in climate models

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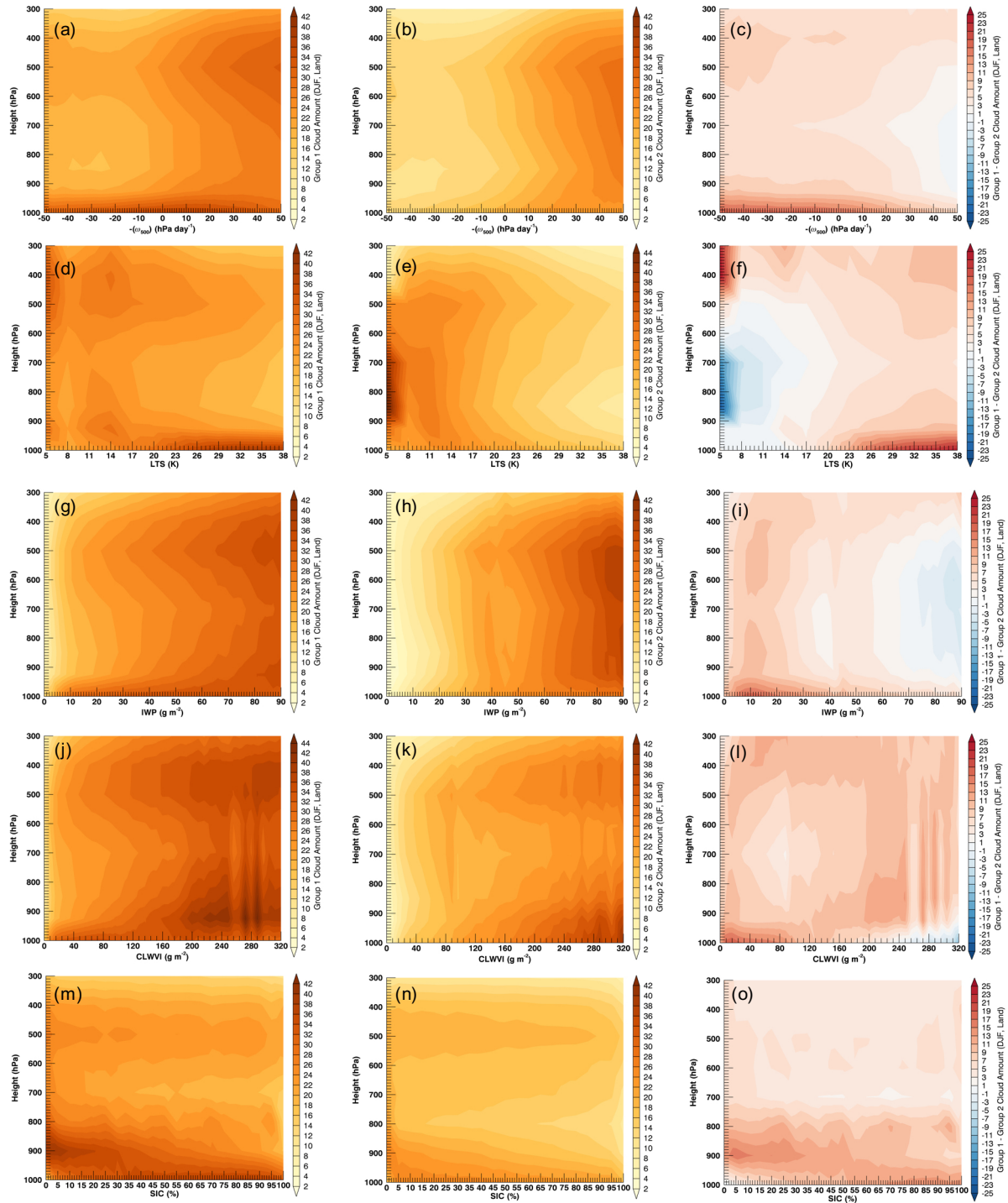


Figure S1: Vertically-resolved, DJF average cloud amount stratified by $-\omega_{sm}$ for (a) Group 1, (b) Group 2, and (c) Group 1 minus Group 2, LTS for (d) Group 1, (e) Group 2, and (f) Group 1 minus Group 2, IWP for (g) Group 1, (h) Group 2, and (i) Group 1 minus Group 2; CLWVI for (j) Group 1, (k) Group 2, and (l) Group 1 minus Group 2, and SIC for (m) Group 1, (n) Group 2, and (o) Group 1 minus Group 2. All panels are for land.

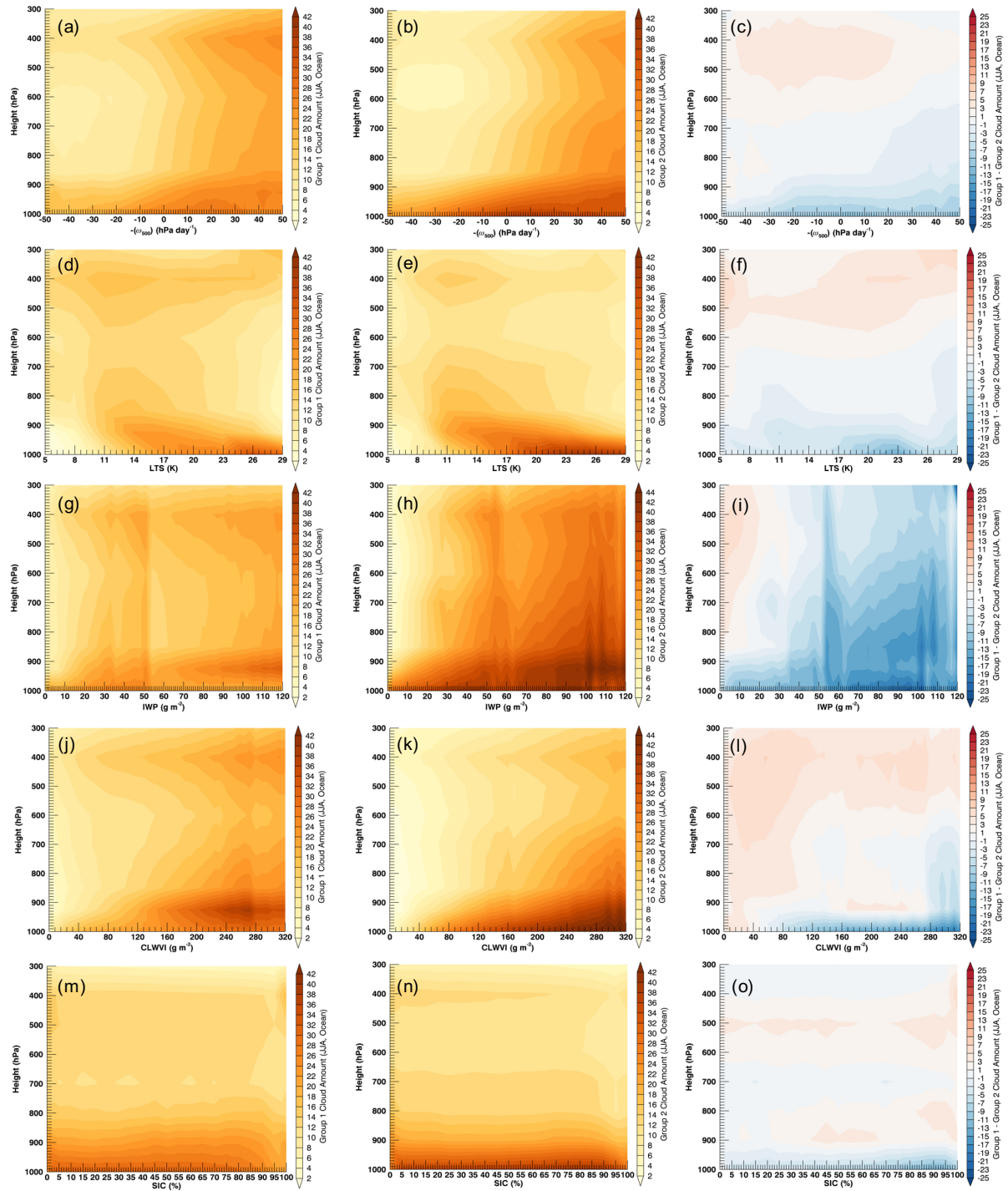


Figure S2: Vertically-resolved, JJA cloud amount stratified by $-\omega_{500}$ for (a) Group 1, (b) Group 2, and (c) Group 1 minus Group 2, LTS for (d) Group 1, (e) Group 2, and (f) Group 1 minus Group 2, IWP for (g) Group 1, (h) Group 2, and (i) Group 1 minus Group 2; CLWVI for (j) Group 1, (k) Group 2, and (l) Group 1 minus Group 2, and SIC for (m) Group 1, (n) Group 2, and (o) Group 1 minus Group 2. All panels are for ocean.

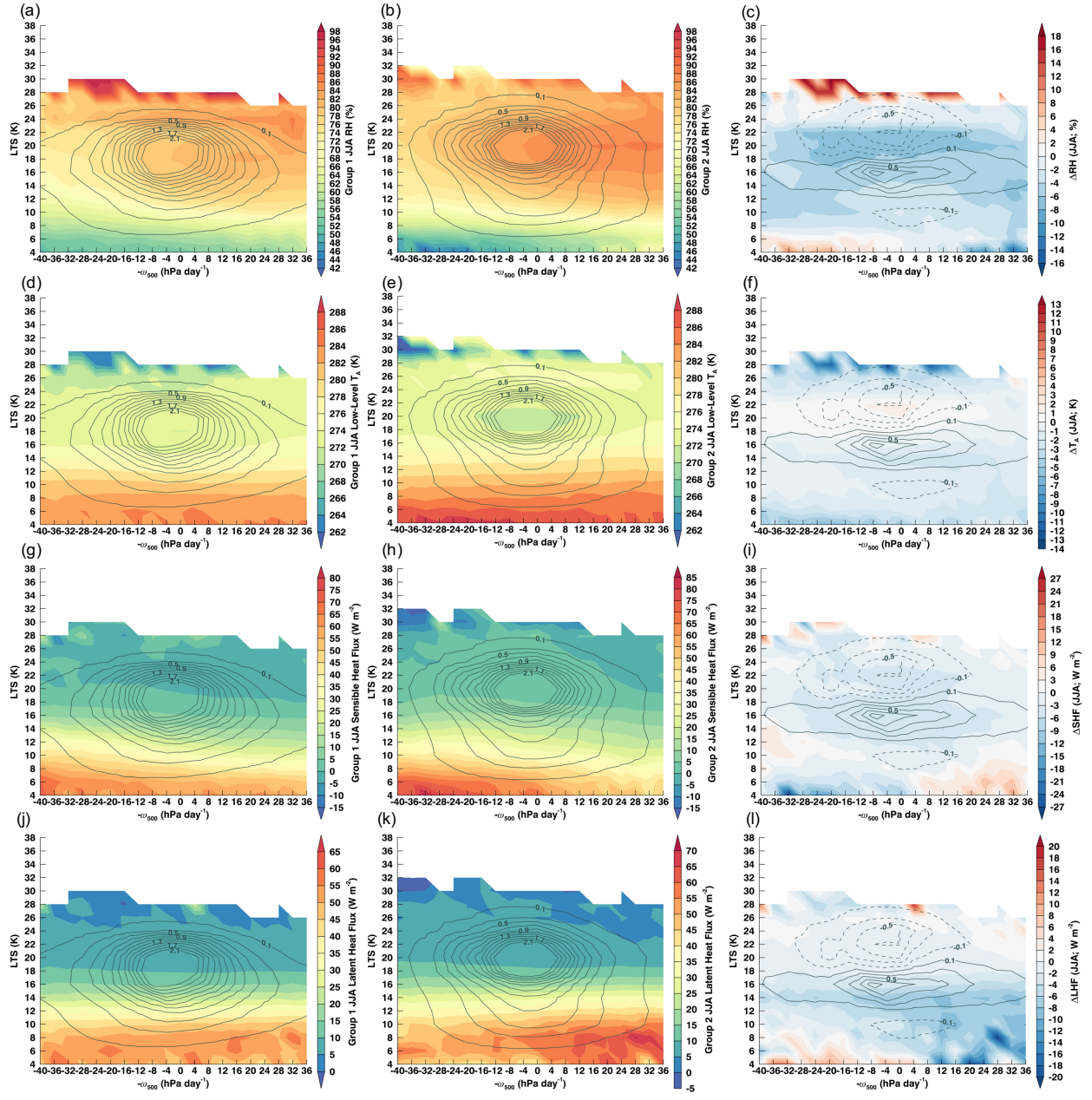


Figure S3: Contours of JJA atmospheric and surface conditions in the LTS and $-\omega_{900}$ joint distribution for (left column) Group 1, (middle column) Group 2, and (right column) Group 1 minus Group 2 for (a-c) RH, (d-f) T_L at 950hPa, (g-l) SHF, and (j-l) LHF.

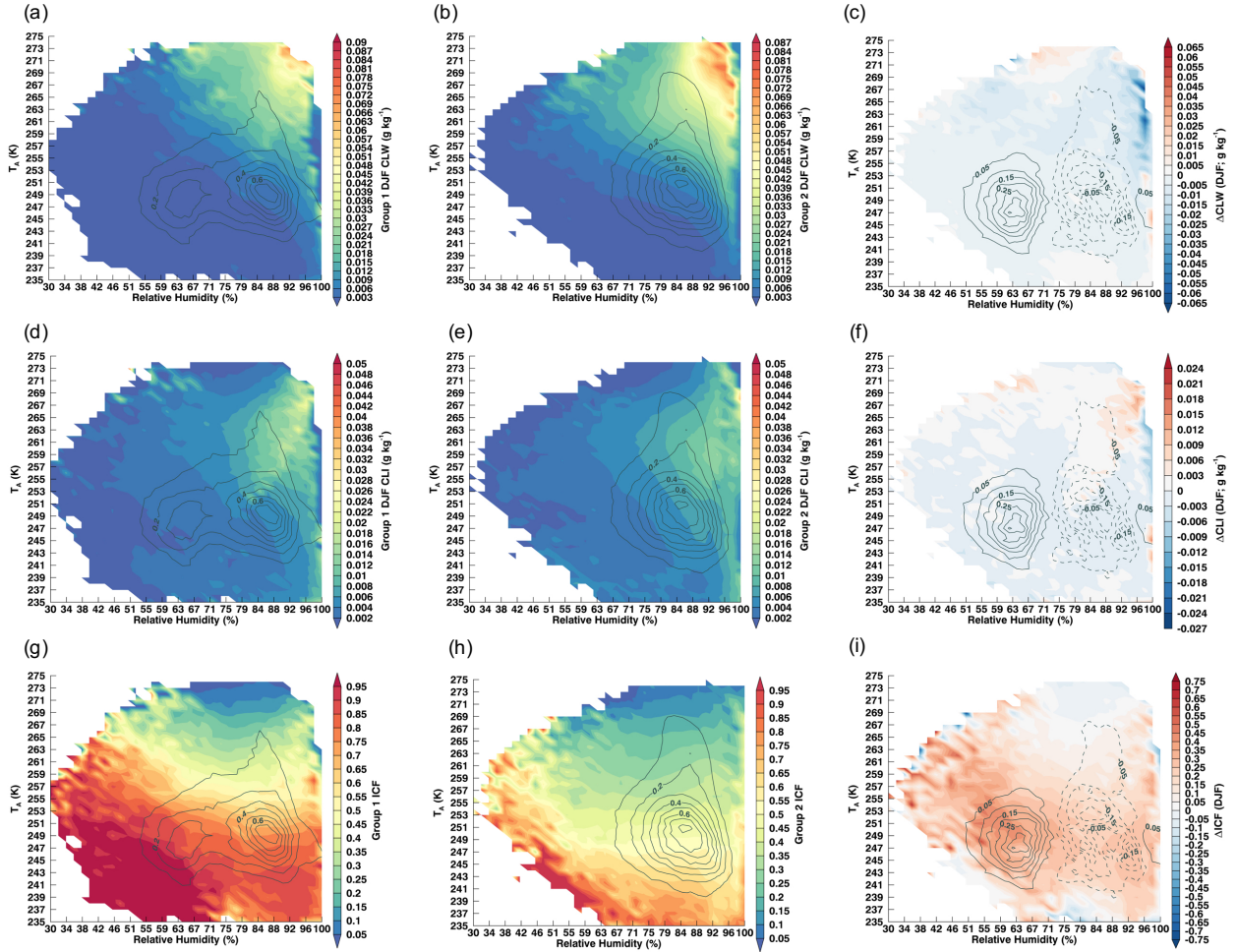


Figure S4: Contours of winter low cloud CLW for DJF for the T_e -RH joint distribution for (a) Group 1, (b) Group 2, and (c) Group 1 minus Group 2, CLI (d) Group 1, (e) Group 2, and (f) Group 1 minus Group 2, and ice condensate fraction for (g) Group 1, (h) Group 2, and (i) Group 1 minus Group 2. The frequency of occurrence of T_e -RH bins is contoured in solid black with an interval of 0.2%.

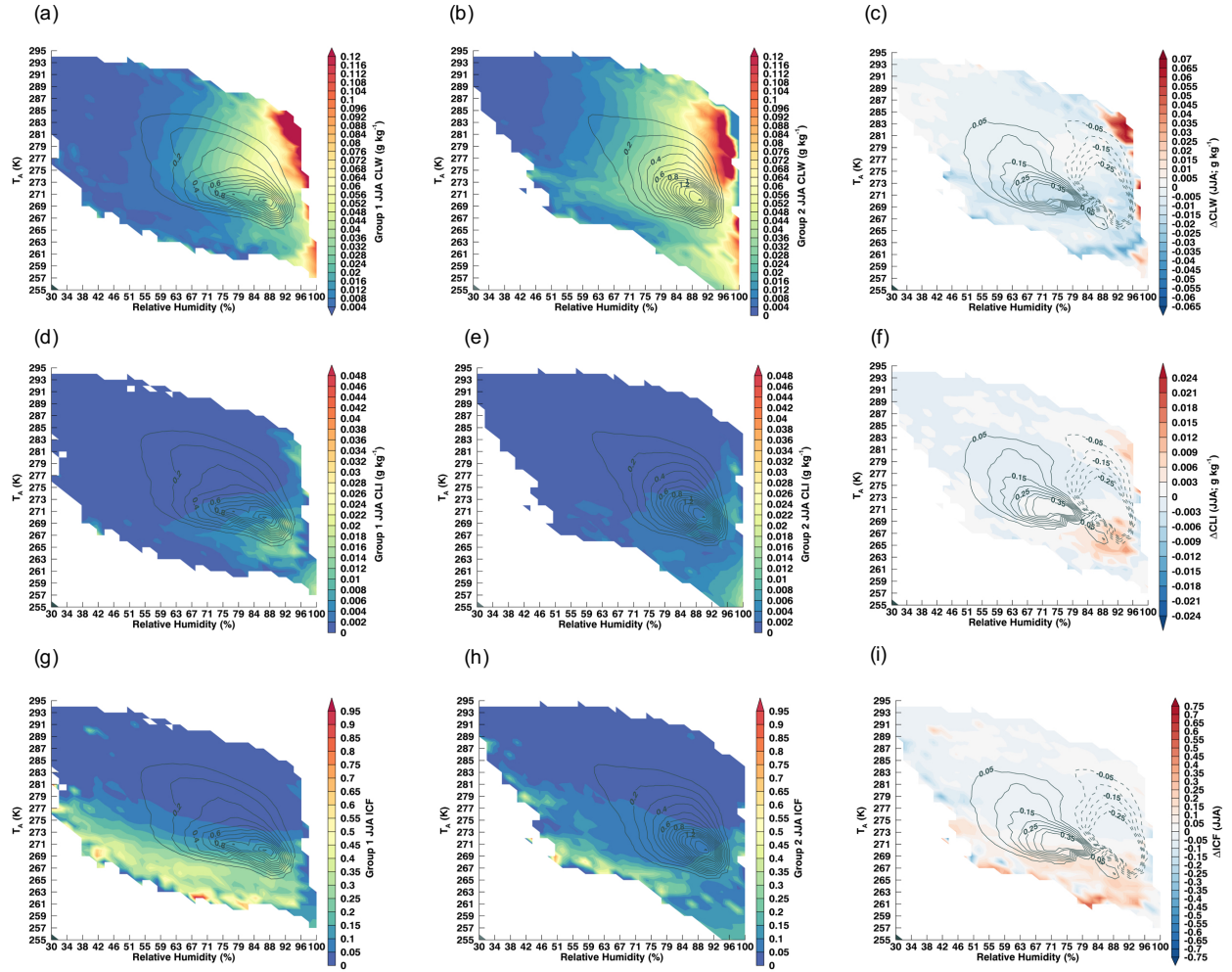


Figure S5: Contours of winter low cloud CLW for JJA for the T_r -RH joint distribution for (a) Group 1, (b) Group 2, and (c) Group 1 minus Group 2, CLI (d) Group 1, (e) Group 2, and (f) Group 1 minus Group 2, and ice condensate fraction for (g) Group 1, (h) Group 2, and (i) Group 1 minus Group 2. The frequency of occurrence of T_r -RH bins is contoured in solid black with an interval of 0.2%.