## Supplementary Materials for

## Potential impact of aerosols on convective clouds revealed by Himawari-8 observations over different terrain types in eastern China

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**Figure S1**. Frequencies of cloud types corresponding to the identified convective cloud with TCT-CID method. Cloud type numbers represent 1 = cirrus (Ci), 2 = stratocirrus (Cs), 3 = deep convective cloud (DCC), 4 = altocumulus (Ac), 5 = altostratus (As), 6 = nimbostratus (Ns), 7 = cumulus (Cu), 8 = stratocumulus (Sc), 9 = stratus (St). Red solid and dashed line represent the median and  $2\sigma$  of frequency distribution, respectively. Orange bars are cloud types with frequencies pass the median value.



Figure S2. Surface elevation distribution over the region of interest (ROI).



**Figure S3**. Number of convective cloud clusters with respect to convective cloud area (the bin size is 10 pixels) in polluted (red) and clean (blue) environments during daytime in May-September, 2016-2017. P# and C# marked at the bottom of each panel are the total number of convective cloud clusters identified by the TCT-CID method in polluted and clean environments, respectively. The time marked above each figure is the local time.



**Figure S4.** May-September (2016 and 2017) longitude-altitude cross-sections of mean relative humidity (color-shaded) and mean zonal-vertical wind (vectors) over the continent for clean (left panel) and polluted (right panel) conditions at (a, b) 08:00 LT, (c, d) 11:00 LT, (e, f) 14:00 LT and (g, h) 17:00 LT over 35-45°N within ROI. Vectors are composed by eastern wind u and vertical velocity  $\omega$  scaled with -100. Gray shaded parts are the zonal mean terrain heights of 35-45°N within ROI.



Figure S5. Same as Figure S4, but for cases over 25-35°N.

1	$\partial$ $\partial$ -			
Variables	8:00	11:00	14:00	17:00
LTS	75655308	99388476	124998461	122906540
θ	75680546	99346479	123881586	122078779
ω850	11453844	17493959	24488329	26313924
ω925	46757310	61271395	70101959	59605615
RH700	15603357	23220634	34724306	39361478
RH850	60011553	76086959	90144929	83362006
q	75676313	99390321	125010900	122913304

Table S1. Sample numbers in each subfigure in Figure 13

 Table S2. Sample numbers in each subfigure in Figure 14

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Variables	0m-500m	500m-1000m	1000m-1500m	1500m-2000m	
LTS	216513524	93504332	86660723	26270206	
θ	216541215	93471060	85769179	25205936	
ω850	0	0	68034534	11715522	
ω925	188562102	49174177	0	0	
RH700	0	0	86644430	26265345	
RH850	216539621	93065826	0	0	
q	216544497	93508434	86664779	26273128	