Supplementary materials for

Cloud vertical structure across China from a national Ka-band cloud radar network: Thermodynamic, dynamical, and land-surface controls

Hui Xu[1], Jianping Guo[1,2*], Jianbo Deng[3], Rongfang Yang[4,5], Deli Meng[6], Zhen Zhang[1], Ning Li[1], Yuping Sun[1], Shuairu Jiang[1], Tianmeng Chen[1], Juan Chen[7], Liping Zeng[8], Yongshui Zhou[9], Bing Tong[10]

[1]State Key Laboratory of Severe Weather Meteorological Science and Technology, Chinese Academy of Meteorological Sciences, Beijing, 100081, China

[2]CMA Field Scientific Experiment Base for Low-Altitude Economy Meteorological Support of Unmanned Aviation in Guangdong-Hong Kong-Macao Greater Bay Area, Shenzhen 518108, China

[3]Hunan Meteorological Research Institute, Changsha, 410118, China
[4]China Meteorological Administration Xiong'an Atmospheric Boundary Layer Key Laboratory, Xiong'an New Area, 071800, China
[5]Hebei Meteorological Technology and Equipment Center, Shijiazhuang 050022, China
[6]National Institute of Natural Hazards, Ministry of Emergency Management of China, Beijing 100085, China
[7]AVIC Leihua Electronic Technology Research Institute, Wuxi 214063, China
[8]Guizhou New Meteorological Technology Co., Ltd, Guiyang 550001, China
[9]Meteorological Observatory of Guizhou, Guiyang 550001, China
[10]State Key Laboratory of Regional and Urban Ecology, Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, 100085, China

Correspondence to: Dr./Prof. Jianping Guo (Email: jpguocams@gmail.com)
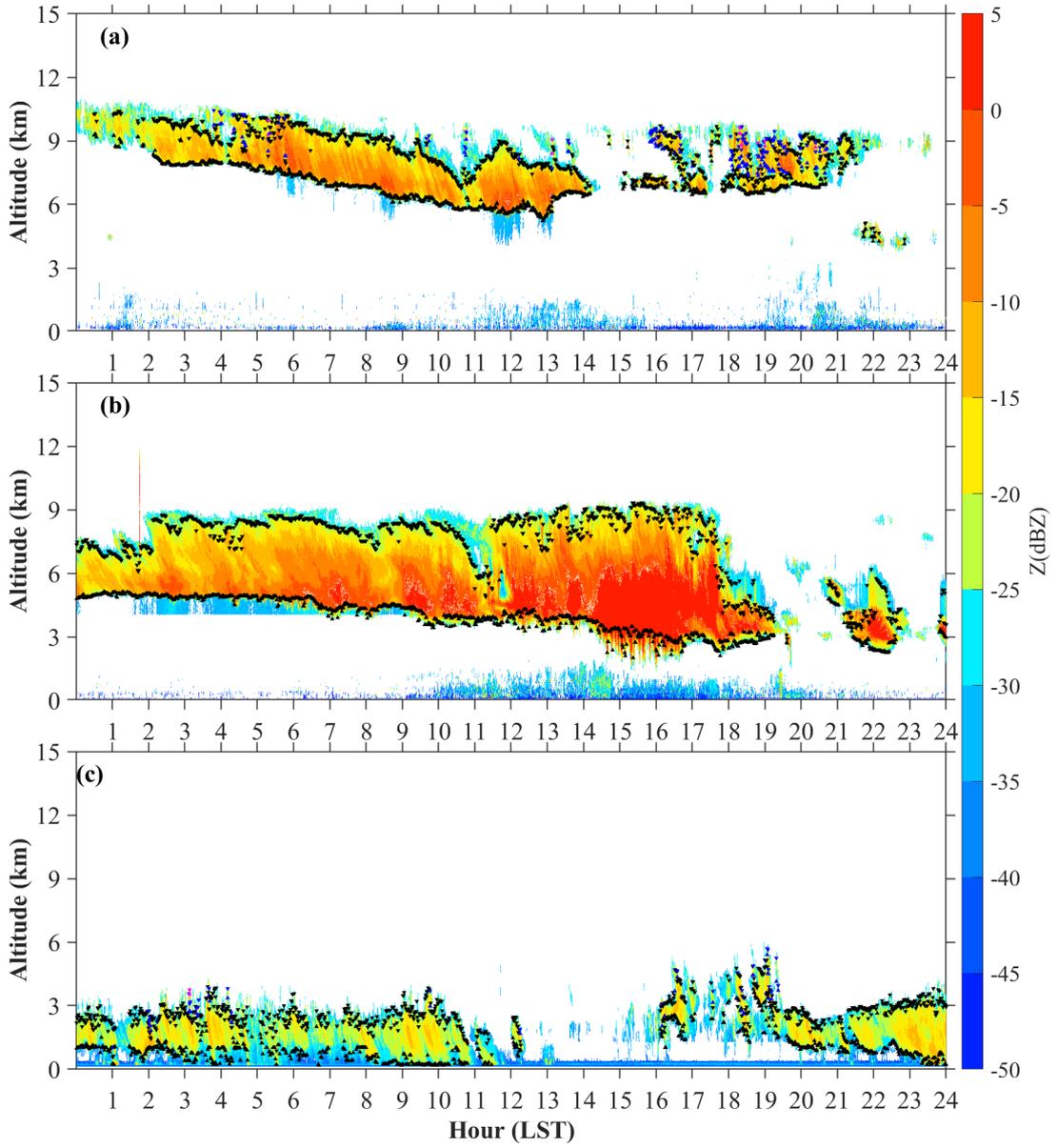
Figure S1. Examples of cloud vertical structure (CVS) detection for three selected cases: (a) high cloud, (b) middle cloud, and (b) low cloud.
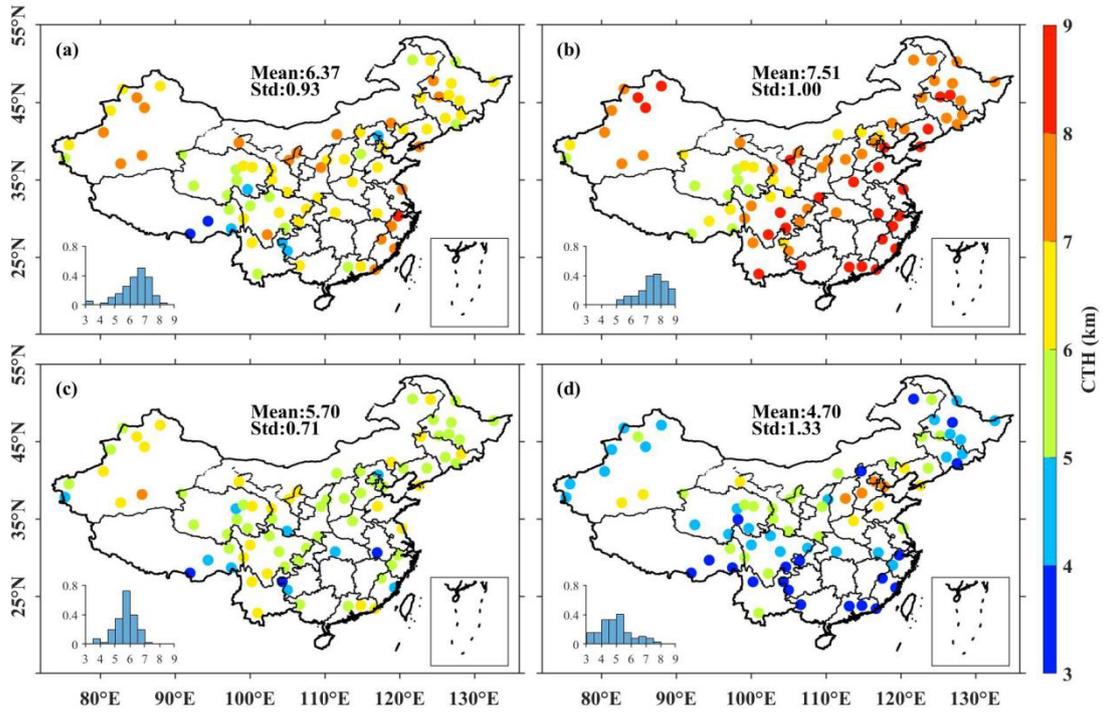
Figure S2. Seasonal geographic distribution of cloud top height (CTH) over China in 2024, derived from the 80 MMCR stations of the same network referenced in Figure 1. The four panels correspond to (a) spring (March–April–May), (b) summer (June–July–August), (c) autumn (September–October–November), and (d) winter (December–January–February). Note that each panel presents a histogram illustrating the probability distribution of cloud occurrence frequency, with the corresponding mean value and standard deviation provided for each distribution.
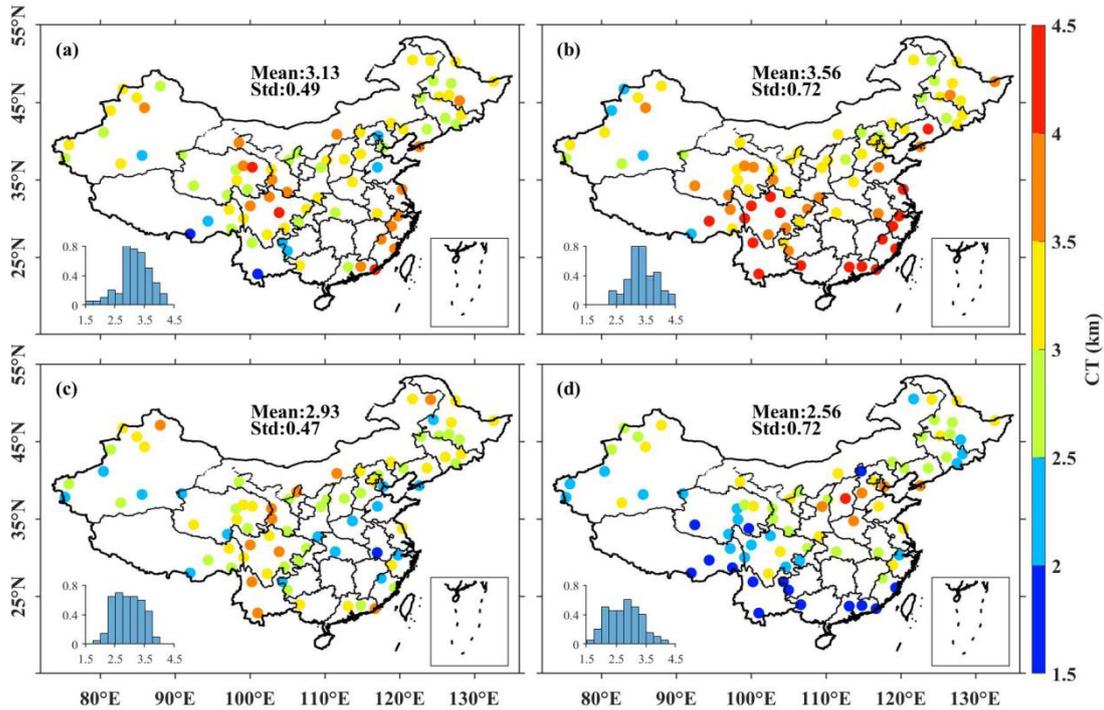
Figure S3. Seasonal geographic distribution of cloud thickness (CT) over China in 2024, derived from the 80 MMCR stations of the same network referenced in Figure 1. The four panels correspond to (a) spring (March–April–May), (b) summer (June–July–August), (c) autumn (September–October–November), and (d) winter (December–January–February). Note that each panel presents a histogram illustrating the probability distribution of cloud occurrence frequency, with the corresponding mean value and standard deviation provided for each distribution.