

# Electronic Supplementary Material to: Objective Identification and Climatic Characteristics of Heavy-Precipitation Northeastern China Cold Vortexes\*

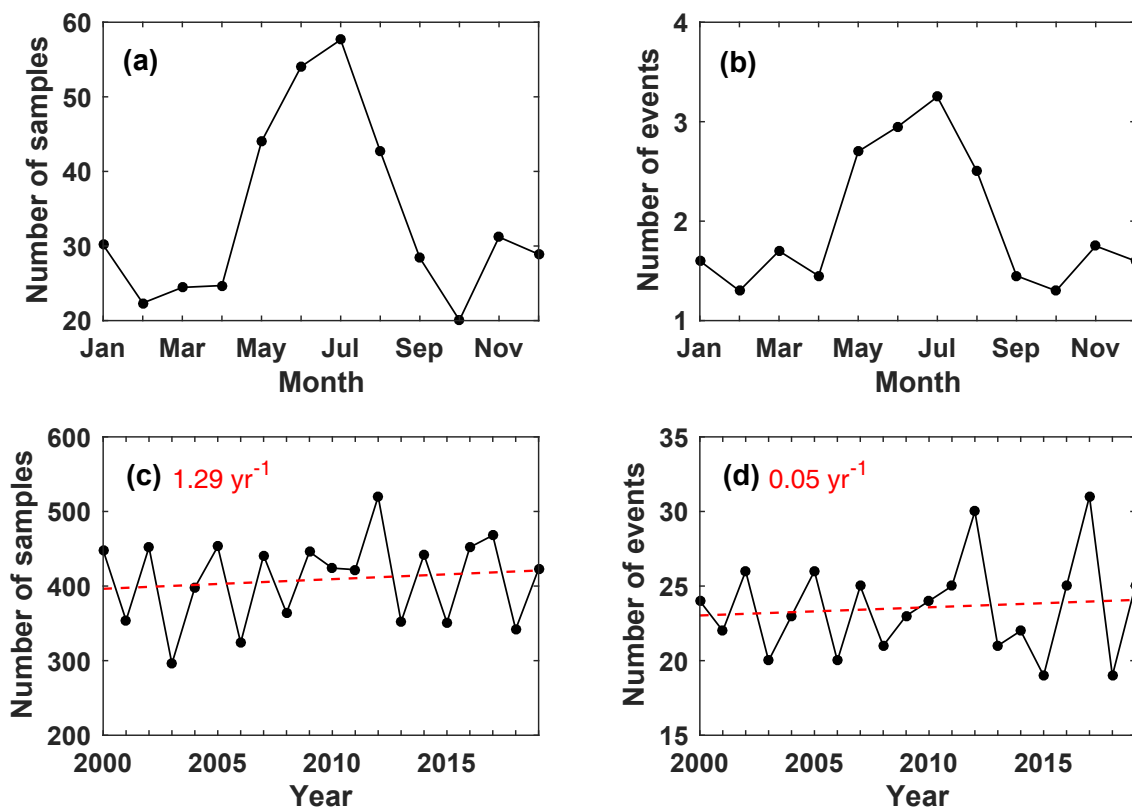
Xu CHEN<sup>1</sup>, Xiaoyong ZHUGE<sup>2</sup>, Xidi ZHANG<sup>1,3</sup>, Yuan WANG<sup>1</sup>, and Daokai XUE<sup>1</sup>

<sup>1</sup>Key Laboratory of Mesoscale Severe Weather of Ministry of Education, and School of Atmospheric Sciences, Nanjing University, Nanjing 210023, China

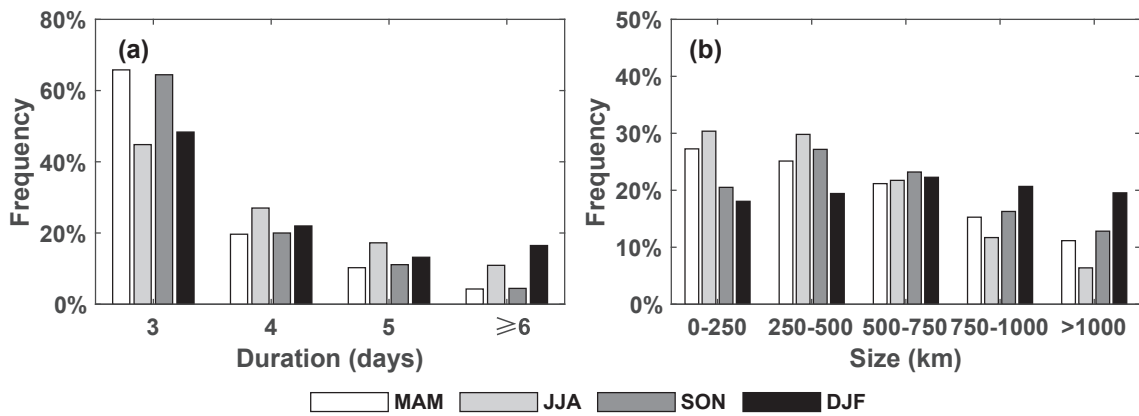
<sup>2</sup>Key Laboratory of Transportation Meteorology of China Meteorological Administration, Nanjing Joint Institute for Atmospheric Sciences, Nanjing 210041, China

<sup>3</sup>National Meteorological Center, Beijing 100081, China

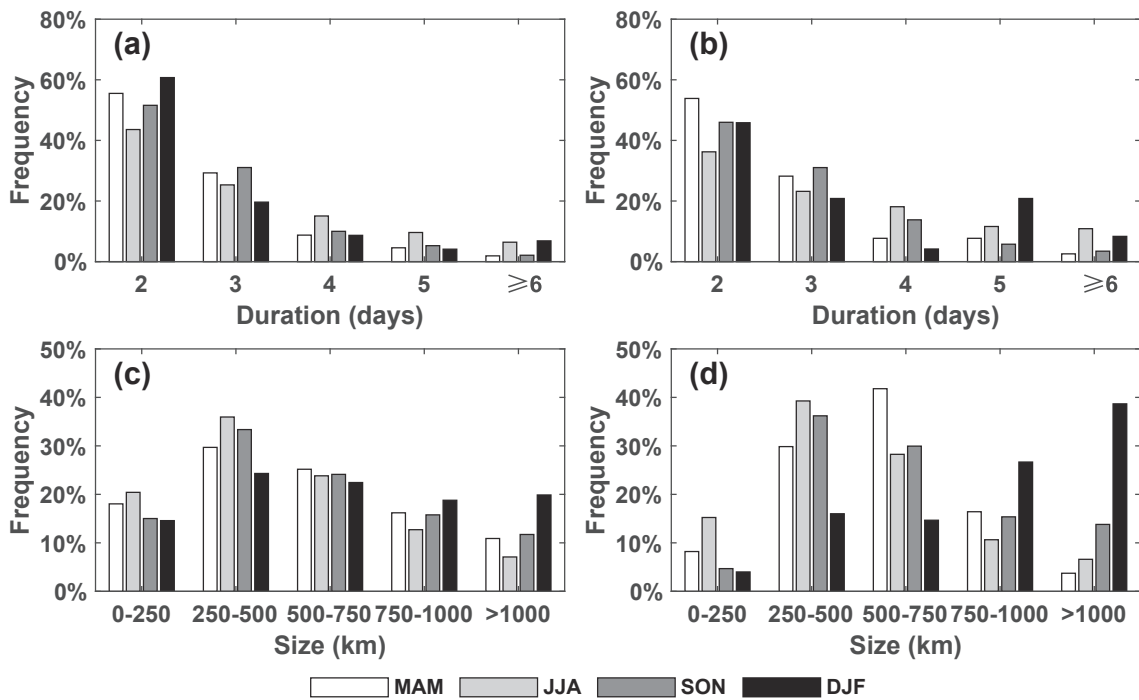
ESM to: Chen, X., X. Y. Zhuge, X. D. Zhang, Y. Wang, and D. K. Xue, 2023: Objective identification and climatic characteristics of heavy-precipitation Northeastern China Cold Vortexes. *Adv. Atmos. Sci.*, **40**(2), 305–316, <https://doi.org/10.1007/s00376-022-2037-y>.



**Fig. S1.** (a–b) Monthly and (c–d) yearly variations (solid black lines) of the number of NCCV (a, c) samples and (b, d) events during 2001–19. The red dashed lines of (c–d) are the linear trend of the yearly variations.



**Fig. S2.** Frequency distributions of the (a) durations for NCCV events and (b) sizes for NCCV samples in MAM, JJA, SON, and DJF.



**Fig. S3.** (a–b) Frequency distributions of durations for (a) NCCV and (b) HPCV events and (c–d) the sizes for (c) NCCV and (d) HPCV samples in MAM, JJA, SON, and DJF. Note that the duration criterion for NCCV identifications used here is two days.