Figure S1. The vertical profiles of temperature (a and e), dewpoint depression (b and f), and the U (c and g) and V (d and h) wind components, averaged over the outer domain during NT (a-d) and T (e-h), are presented for both the WRF simulations (red lines for the Control experiment) and MICAPS (black lines), along with the spatial correlation between them at each vertical level (blue lines, upper axis).
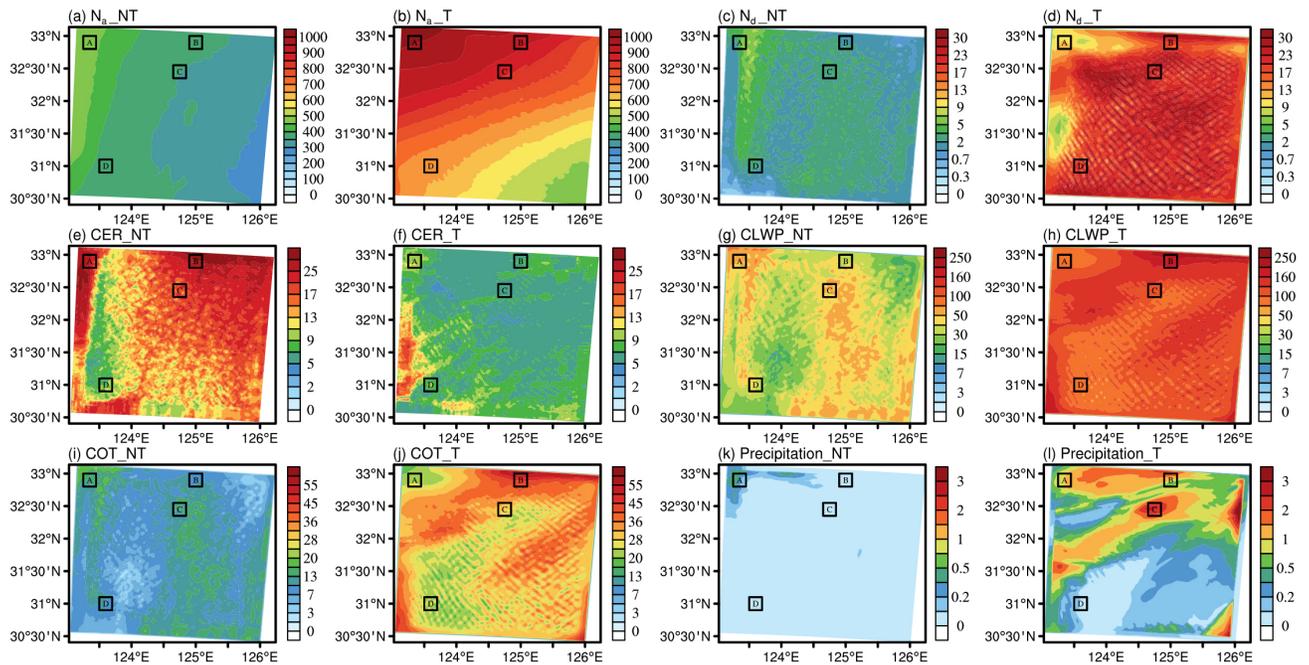
Figure S2. The distributions of N_a (a-b, in cm^{-3}), N_d (c-d, in cm^{-3}), CER (e-f, in μm), CLWP (g-h, in g·cm^{-2}), COT (i-j), and accumulated precipitation (k-l, in mm) in ECO during NT and T.

Table S1. Explanations of acronyms used in this paper.

Acronym	Explanation
AOD	Aerosol optical depth
CAM-chem	The Community Atmosphere Model with Chemistry
CCN	Cloud condensation nuclei
CER	Cloud droplet effective radius

CIWC	Cloud ice water content
CLWC	Cloud liquid water content
CLWP	Cloud liquid water path
COT	Cloud optical thickness
COTI	Cloud optical thickness of ice
COTW	Cloud optical thickness of water
EC	Eastern China
ECO	Eastern China's adjacent ocean
IMERG	The Integrated Multi-satellitE Retrievals for GPM
LTS	Lower tropospheric stability
MEGAN	The Model of Emissions of Gases and Aerosols from Nature
MEIC	The Multi-resolution Emission Inventory for China
MODIS	The Moderate Resolution Imaging Spectrometer
MOSAIC	The Model for Simulating Aerosol Interactions and Chemistry
N_a	Aerosol number concentration
N_d	Cloud droplet number concentration
N_r	Raindrops number concentration
NCEP	The National Center for Environmental Prediction
NMC	The National Meteorological Center of China
NT	The periods of EC aerosol non-transiting ECO
RH	Relative humidity
RWC	Rainwater content
RWP	Rainwater path
SBM	Spectral bin cloud microphysics
T	The periods of EC aerosol transiting ECO
WRF-Chem	The online-chemistry version of the Weather Research and Forecasting model