Supplement of

Self-enhanced aerosol-fog interactions in two successive radiation fog events in the Yangtze River Delta: a simulation study

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Supporting materials for "Self-enhanced aerosol-fog interactions in two successive radiation fog events in the Yangtze River Delta: a simulation study"

The normalized mean bias (NMB), normalized mean error (NME), mean fractional bias (MFB), and mean fractional error (MFE) are calculated as follows (Eq.S1-S4):

$$\mathrm{NMB} = \frac{\sum_{i=1}^{N}(M_i - O_i)}{\sum_{i=1}^{N} O_i} \tag{S1}$$

$$\mathrm{NME} = \frac{\sum_{i=1}^{N}|M_i - O_i|}{\sum_{i=1}^{N} O_i} \tag{S2}$$

$$\mathrm{MFB} = \frac{1}{N}\sum_{i=1}^{N}\frac{(M_i - O_i)}{(O_i + M_i/2)} \tag{S3}$$

$$\mathrm{MFE} = \frac{1}{N}\sum_{i=1}^{N}\frac{|M_i - O_i|}{(O_i + M_i/2)} \tag{S4}$$

where M and O represent the results from simulation and observation; N is the total number of observation stations; i is the number for each site.

The following equations S5-S8 are the calculations about contributions to turbulent kinetic energy (TKE) including wind shear (TKE_{shear}), buoyancy (TKE_{buoy}), dissipation (TKE_{diss}), and vertical mixing (TKE_{mixing}).

$$TKE_{\mathrm{shear}} = -\overline{u'w'}\frac{\partial u}{\partial z} - \overline{v'w'}\frac{\partial v}{\partial z} \tag{S5}$$

$$TKE_{\mathrm{buoy}} = \frac{g}{\theta}\overline{\theta_v' w'} \tag{S6}$$

$$TKE_{\mathrm{diss}} = \frac{q^3}{B_1 L} \tag{S7}$$

$$TKE_{\mathrm{mixing}} = -\frac{1}{2}\frac{\partial}{\partial z}\overline{q'w'} \tag{S8}$$

where $\overline{u'w'}$ and $\overline{v'w'}$ are the Reynolds stress of the turbulent zonal pulsation u' and meridional pulsation v' in the vertical direction respectively, u and v are the zonal and meridional components of the horizontal wind, g is the acceleration of gravity, θ is

potential temperature, $\overline{\theta_v' w'}$ is virtual potential temperature turbulent flux, φ is the dynamic physical quantity (e.g. u and v) or thermal quantity (e.g. θ), $\overline{\varphi' w'}$ is the turbulent flux of dynamic or thermal quantity, q is related with TKE and its calculation is $q = \sqrt{2TKE}$, B_1 is closing constant, L is the master length scale, z is the height above ground.

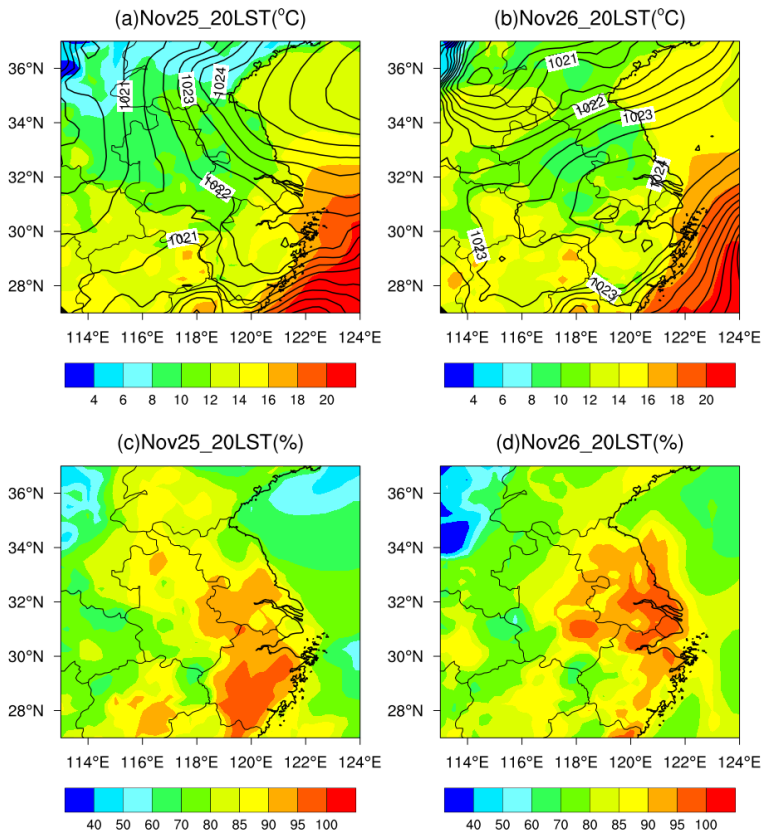

Figure S1. Surface weather map at 20:00 local standard time (LST = Universal Time Coordinated + 8 h) on 25 and 26 November 2018. (a-b) the shaded color is 2 m temperature (°C), the contour line is surface pressure (hPa), (c-d) the 2 m relative humidity (%). The time "Nov25_20LST" means 20:00 LST on 25 November 2018. The other time expressions follow the same logic.

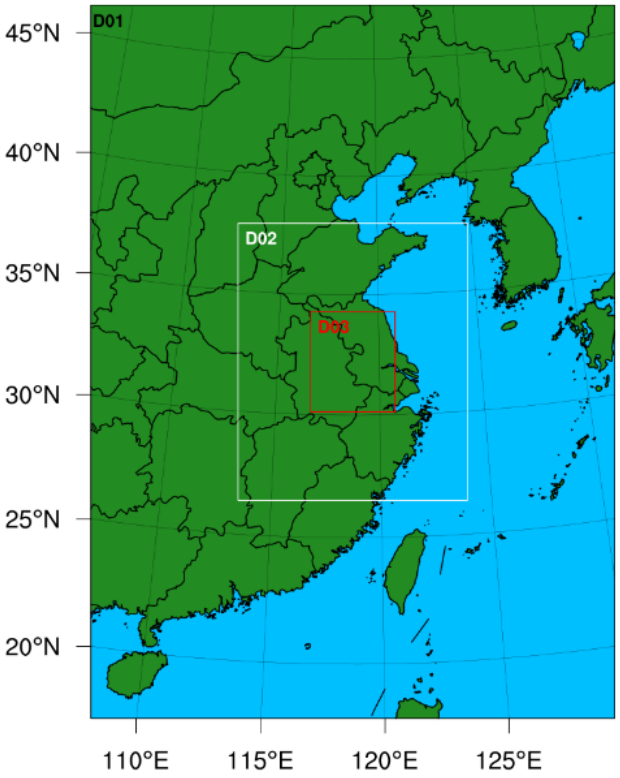

Figure S2. The model domain configuration with 3 nested domains and D01-D03 stand for domain 01-03, respectively.