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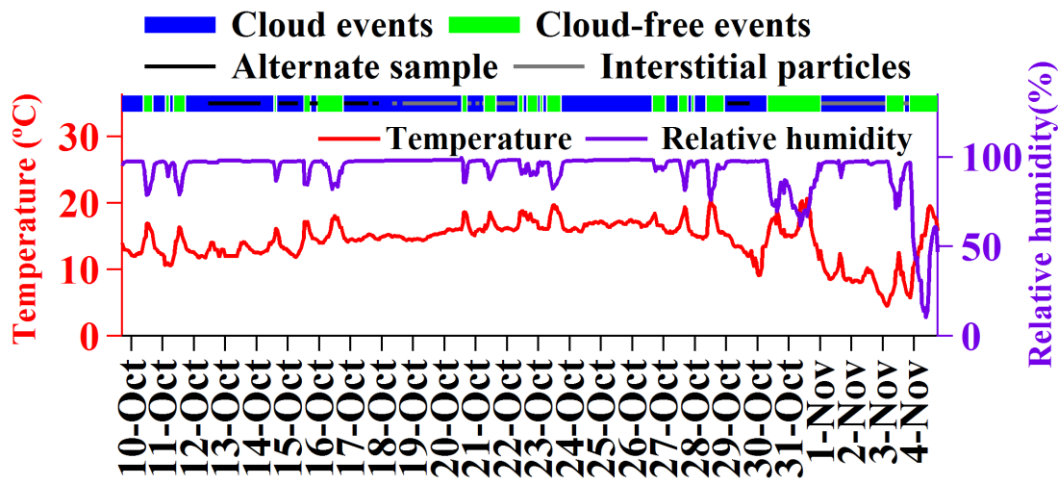
*Supplement of*

## **In-cloud formation of secondary species in iron-containing particles**

**Qinhao Lin et al.**

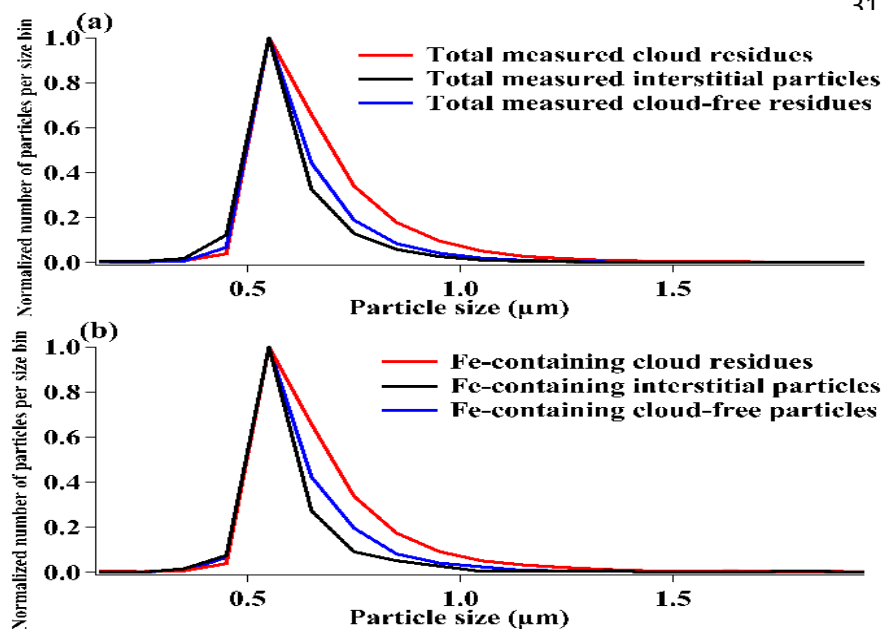
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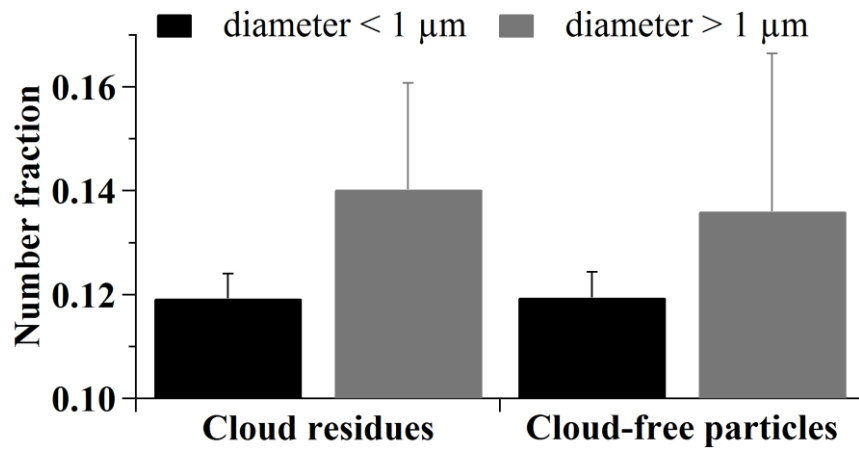


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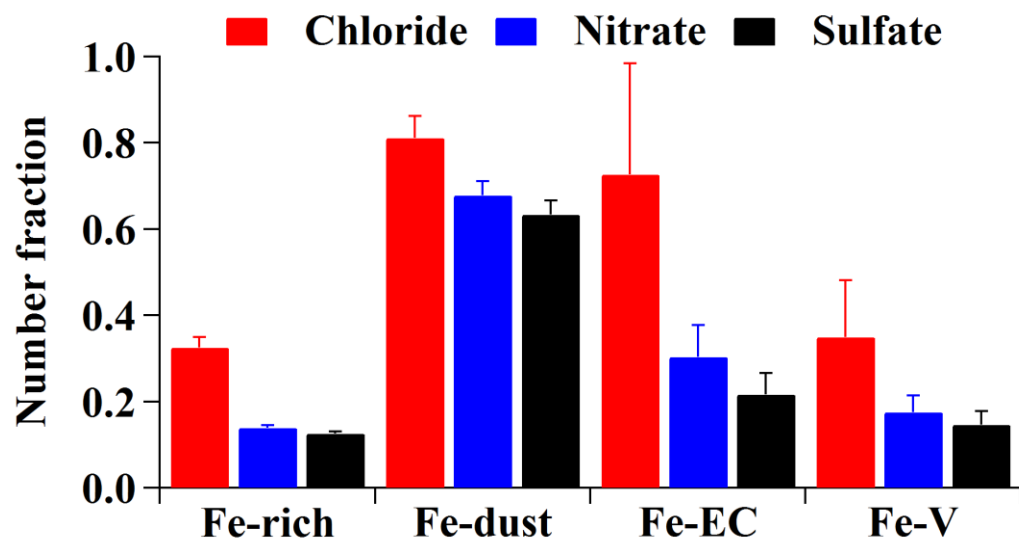
25 Figure S1. Hourly mean in temperature and relative humidity during the  
 26 study period. Alternate sample (black lines) represents the period that the  
 27 GCVI and PM<sub>2.5</sub> cyclone inlets were alternately applied with an interval of  
 28 one hour to collect cloud residues and interstitial particles respectively  
 29 during cloudy events. The PM<sub>2.5</sub> inlet (gray lines) is only used to correct  
 30 interstitial particles during cloud processing.



45 Figure S2. Normalized size distribution of the total measured (a) and Fe-  
46 containing (b) cloud residues, interstitial and cloud-free particles.

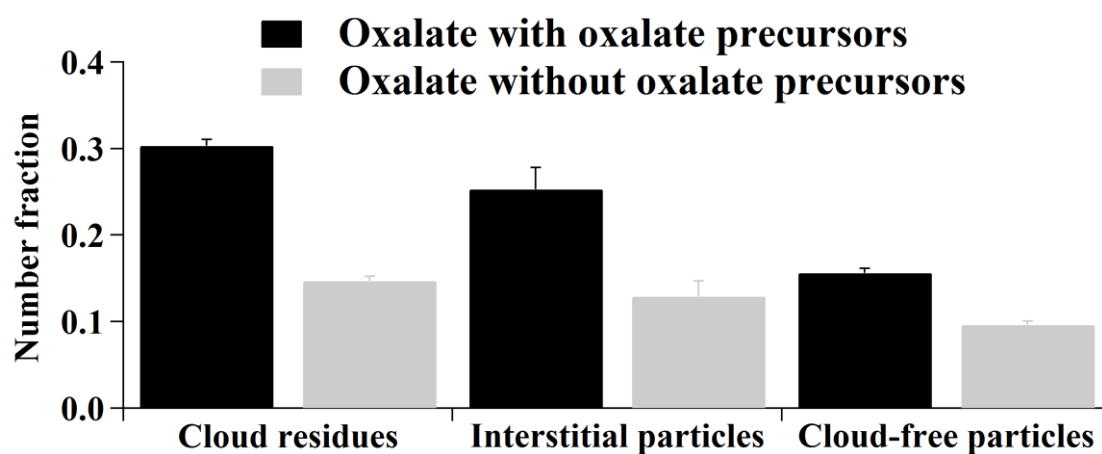


54 Figure S3. The number fraction of the Fe-dust cloud residues and cloud-  
55 free particles in diameter 0.2-1.0  $\mu\text{m}$  (black color) and 1.0-2.0  $\mu\text{m}$  (gray  
56 color).



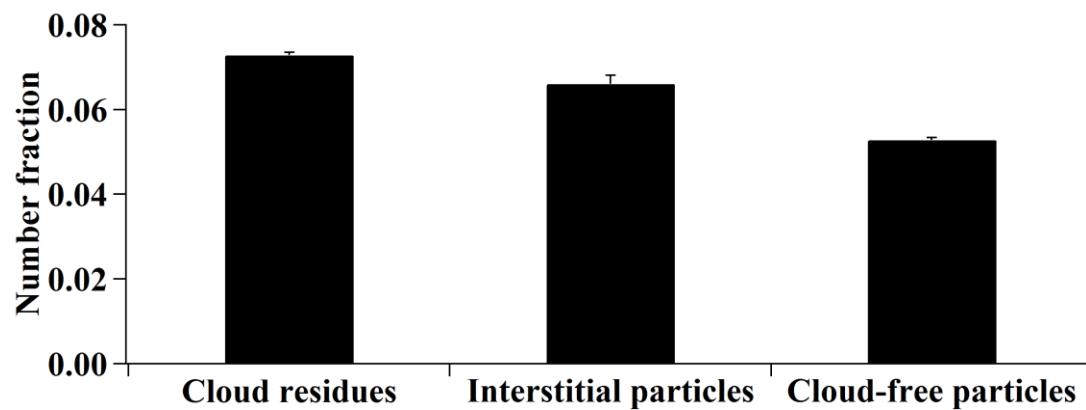
57

58 Figure S4. Number fractions of chloride ( $m/z$  -35 or -37), nitrate ( $m/z$  -46  
 59 or -62), sulfate ( $m/z$  -97), and oxalate ( $m/z$  -89) internally mixed with the  
 60 Ca-containing particles ( $m/z$  40) in the four Fe-containing cloud residual  
 61 types.



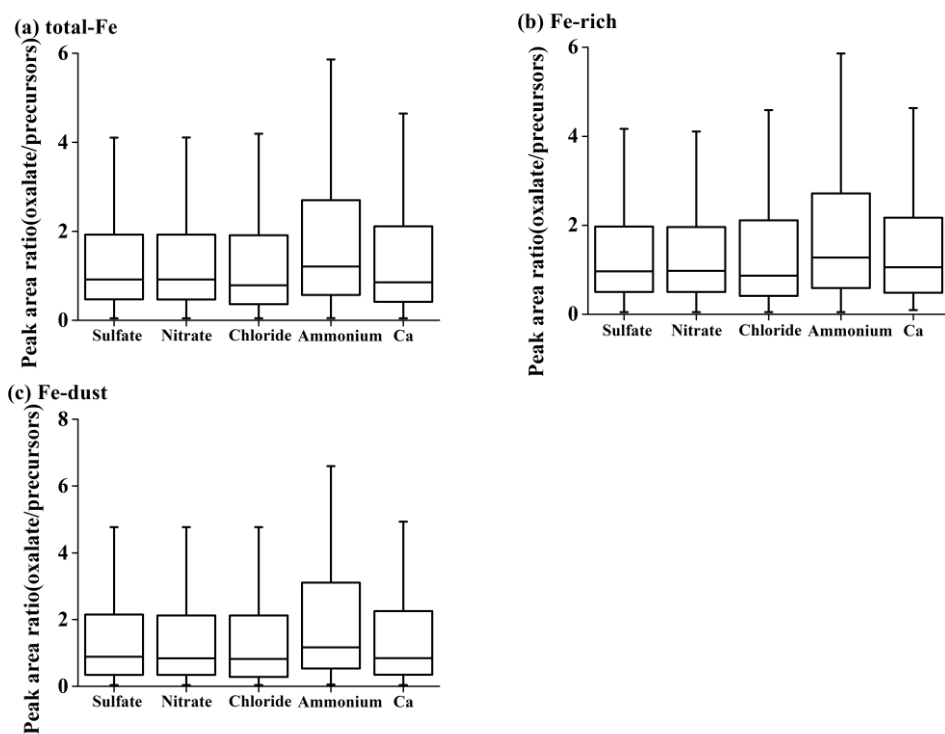
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63 Figure S5. Number fraction of oxalate ( $m/z$  -89) with and without its  
64 precursor ( $m/z$  -59, -71, -73, -87, -103, or -117) in the Fe-containing cloud  
65 residues, interstitial particles, and cloud-free particles.



66

67 Figure S6. Number fraction of oxalate-containing non-Fe cloud residues,  
68 interstitial particles, and cloud-free particles.



69

70 Figure S7. Peak area ratio of oxalate ( $m/z$  -89) to its precursors ( $m/z$  -59, -  
 71 71,-73, -87, -103, or -117) with sulfate ( $m/z$  -97), nitrate ( $m/z$  -46 or -62),  
 72 chloride ( $m/z$  -35 or -37), ammonium ( $m/z$  18), and Ca ( $m/z$  40) in the Fe-  
 73 containing cloud residues.