

## ***Interactive comment on “Low hygroscopicity of organic material in anthropogenic aerosols under pollution episode in China” by Juan Hong et al.***

**Anonymous Referee #5**

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### General comments

This manuscript presents results of simultaneous measurements of aerosol hygroscopicity and chemical composition in suburban site in Southern China. The measurement period covers almost 1 month and both polluted and relatively clean conditions were observed. I admit that such measurement can be very costly and labor intensive, and therefore the comprehensive set of data presented in the manuscript may carry certain value for the scientific community. However, with the current state of the manuscript, authors' main conclusion is very difficult to sink in for the readers. Authors seem to persist on determining the HGF<sub>org</sub> and large part of the manuscript is dedicated for that. However, in my opinion, it is obvious from the results that the oxidation level of organics does not affect the hygroscopicity of the suburban aerosols very much, and

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that might pretty much be the end of the story for HGF<sub>org</sub>. Instead, I would like to see much more in-depth discussion on diurnal variations of LH mode in smaller particles (30 and 60 nm) and how the new particle formation and subsequent growth affects the aerosol hygroscopicity. I therefore recommend that the manuscript may be acceptable for publication in ACP after major restructuring.

### Specific comments

152: It is not clear from the manuscript how the HTDMA was operated to obtain the particle number size distribution (10-1000 nm) simultaneously while the instrument was measuring HGF in 4 size classes.

175-178: It is critical to indicate the calibration procedure of ACSM and what calibration parameters were used (e.g. relative ionization efficiency of SO<sub>4</sub>). Such calibration parameters can critically affect the inorganic and organic mass fractions (and therefore the ensemble HGF<sub>org</sub> of 1.1).

300-303: The logical basis to support the following conclusion is not clear. “In case of smaller particles (30 nm, 60 nm), HGFs of MH group particles appeared to decrease during the afternoon until about 8:00 pm, suggesting that these particles were not long-range transported, but rather secondary formed either locally or from nearby emissions.”

462-519: Extra caution must be taken when comparing  $k$  based on supersaturation conditions and HGF based on sub-saturated conditions. The  $k$  derived from sub- and supersaturated conditions can be quite different in some cases. In such case, the discussion on potential bias on CCN concentration may not be relevant.

### Technical corrections

120: "self-assembly" should appear "self-assembled"

188: what does it mean by "individual size bins"?

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330: rephrase “uncertainties of in growth factor”

423: "as followed" should appear "as follows"

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