This study investigates the temperature effect on the formation of highly oxidized molecules (HOMs) from the a/b-pinene ozonolysis. The authors found that temperature plays a controlling role in the yields of HOMs: the molar yields dropped by around a factor of 50 when experiments were performed at 273 K, compared to 293 K. Interestingly, the distribution of HOMs molecules is not significantly affected by the temperature, that is, the formation rates of more oxidized HOMs did not decrease more than the less oxidized HOMs. A possible explanation, as the authors proposed, is that the rate limiting step forming these HOMs occurs before the products become oxygenated enough to be detected by the CIMS instrument used in this study. Overall the paper is well written and approaches an important aspect of atmospheric nucleation processes. Yet there seem to be various uncertainties in the quantitative representation of HOMs formation and comparison under different temperature scenarios, see detailed comments below.

1. Temperature plays a governing role in the SOA formation by affecting the vapor pressure of the condensing molecules. The vapor pressure of any given molecule may decrease by orders of magnitude as the temperature drops to certain degrees. As a result, the SOA yield from the oxidation of a given hydrocarbon like a-pinene at low temperature (e.g., -15 C) is expected to be significantly higher than at room temperature. This in turn provides more surface area to absorb more organic vapors from the gas phase to the particle phase. It is therefore not surprising that the observed gas-phase concentrations of HOMs are lower at low temperature. However, the authors did not take into account of this effect when drawing the conclusion that 'the HOMs molar yields dropped by around a factor of 50 when experiments were performed at 273 K compared to 293 K'. The vapor pressure and saturation concentration of each HOM molecule can be estimated based on the carbon and oxygen numbers (see 2D VBS paper as an example) in the molecule. With the measured total aerosol mass concentration, the authors should be able to estimate the fraction of each HOM molecule in the particle phase vs. gas phase at equilibrium at different temperatures. Or the authors can compare the calculated condensational sinks at different temperatures and evaluate the impact of changes in condensational sinks on the estimated molar yields of HOMs.

2. The authors used a simplified expression for the HOMs molar yield (Eq 2) . The authors assume that all HOMs molecules are first-generation oxidation products and the only source of HOMs is the apiene+O3 reaction. While this assumption seems reasonable for the monomers, it does not seem to work adequately for the dimers, as shown in Figure 5. In the expression of the condensational sinks, the authors stated that the loss rate on the wall is ~10-3 s-1. Many studies have shown that the loss rate of individual molecules depends on their molecular weight or vapor pressure. Is the value of ~10-3 s-1 representative of the loss rate of monomers or dimers? In the presence of relatively little amount of particles at the beginning of low aerosol loading experiments, is the wall loss rate still much lower than the particle condensation rate? Same for the representation of condensation on particles, a single value for the case of C10H16O7 is

applied to all HOMs molecules. Have the authors estimated the uncertainties associated with this simplified treatment?

3. It is well-known that HOMs are easily deposited on the chamber wall or the CIMS inlet. However, factors that likely impact the HOMs loss rate are still unclear. Have the authors performed any characterization experiments on the temperature effect on the wall loss rate? For experiments conducted at low temperature, e.g., -15 C, was the chamber air drawn directly to the CIMS inlet? Would the mixing of the chamber air with room temperature sheath air cause any turbulence inside of the inlet? Would any turbulence cause any unstable signals or intensive loss of HOMs?

4. It seems like experiments conducted at ~30 C are likely more representative of the intensive photochemistry of biogenic emissions at summertime, compared with the conditions in the current study, i.e., -15 C, 0 C, and 20 C.