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Atmospheric Chemistry and Physics Discussions

Interactive comment on "HULIS in emissions of fresh rice straw burning and in ambient aerosols in the pearl river delta region, China" *by* P. Lin et al.

Anonymous Referee #2

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Overview This paper describes an interesting set of measurements from South China where Rice Straw burning occurs. The primary measurement of interest is HULIS, an operational definition of reverse phase SPE isolated water-soluble organic compounds. Considering the severe limitation of not knowing the compositional details, and assuming the SPE isolation of such compounds is consistent, the paper provides very interesting insights into the secondary processes of a biomass burning (rather rice straw burning). The manuscript is very well written and is a substantial contribution in the area of biomass combustion emissions and aerosol aging processes, thus I recommend it for publication after minor corrections.

Specific Comments 1. Proper nouns should be capitalized in your title. If Pearl River Delta is a name of a region, then it should be capitalized. 2. Long sentence: abstract lines 8-11. 3. EC concentrations may arise from diesel emissions and other combustion processes (biomass combustions, coal burning, etc) however they are not well associated with gasoline vehicles, thus I'm not convinced that the anti-correlation of HULIS and EC negates vehicle emissions as a source of HULIS. There are many well documented studies of SOA produced from benzene, toluene and other semi-volatile aromatics often emitted by gasoline vehicles. The SOA produced in those reactions may very well be water soluble and isolated by HLB cartridges. 4. HULIS is not thought to be comprised of polycyclic ring structures. It may indeed have aromatic properties, but it also has aliphatic properties as well. The list of functional groups should also include oxides of nitrogen and sulfur. 5. The molecular composition of isolated water soluble organic compounds has been under investigation by several groups and some interesting papers have recently been published that include molecular details. Please see Wozniak et al., ACP 2008; Altieri et al., ACP 2009; Altieri et al., ES&T 2009; and Mazzoleni et al., ES&T 2010. 6. HULIS concentrations vary of 3 orders of magnitude. Is this due to differences in operational definition? Perhaps a summary of HULIS definitions are in order here. Also, please note that some investigators chose to not use the ill defined term HULIS in their work. 7. I found reading Lin et al., J. Aerosol Science, 2010 to be very helpful in understanding the significance of this work, perhaps more brief details with the reference to that work can be added to this paper. 8. BB emissions and HULIS concentrations. This section is very well done; I especially like the summary of how BB emissions may contribute to HULIS on page 7196. This section and the conclusions can be strengthened even further by the inclusion of OC concentration changes with dilution. Note that the chamber studies of fresh rice straw emissions did not include substantial dilution, thus the OC concentrations may be higher due to semi-volatile compounds. As noted, there are substantial concentrations of semi-volatiles in biomass combustion. Please see Robinson et al., Science 2007. 9. HULIS versus oxidant concentrations (O3 and NO2), does point toward aerosol aging and secondary

chemistries. Similar analysis was done previously SOA versus “odd oxygen” (O3 and NO2) in Mexico City. Please see Herndon et al., GRL, 2008.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 7185, 2010.