

Interactive comment on “Unravelling airborne polycyclic aromatic hydrocarbons (PAHs) in southern China using tree-rings of 100-yr old *Pinus Kwangtungensis*” by Y. W. Kuang et al.

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The PAH molecular diagnostic ratios (MDRs) have widely been used to identify the possible origins of environmental PAHs by numerous researchers despite there is some debate on their usefulness, in particular when applied to source apportionment in soils, sludges and sediments. More recently, Katsoyiannis et al. (2011), after studying the temporal ratios of MDRs in air, especially for the MDR of IND/(IND+BghiP) (mentioned as Ipy/(Ipy+BPe) in their research) and evaluating air source inventory and air concentration data in UK, concluded that PAH MDRs were poor markers of known differences in source categories and type and should not be recommended to their use in source

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apportionment, unless the sources is strong, clearly characterized for PAH composition and stability, and the ambient measurement were made close to the known sources. We accepted this scientific finding. In our manuscript, we mainly focused the ratios of the sum of major combustion specific PAHs (Σ COMB) to Σ PAHs in the tree-ring tissues when we tried to evaluate the tree-ring PAHs sources (petrogenic vs. pyrogenic). The use of MDRs in this research (only PA/Ant and FL/Pyr) was hoped to be additionally potential poof on the possible origin (petrogenic VS. pyrogenic). The source apportionment of tree-ring PAHs was investigated by principal component analysis. Among the 5 MDRs mentioned by Athanasios et al. (2011), IND/(IND+BghiP) was the poorest one that was not confirmed by the information about the known sources, while Ant/(Ant+Phe) (we used PA/Ant in our research) was revealed to be quit uniform. As reported by Dvorska et al. (2011), the ratio of Ant/(Ant+Phe) was least seasonal. Because of the seasonal variations of PAHs between plant and atmosphere, we focused on larger time-scale (10-year's growth interval) in the tree tissues and hoped to minimize the influence of the seasonal variation when evaluating the petrogenic or pyrogenic origins in the tree-ring. Furthermore, PAHs at the sampling site (high mountain in a national natural reserve) that acting both as condenser for vapor phase PAHs and as barrier/sink for particulate associated less volatile PAHs were mainly from the adjacent source areas by long-range atmospheric transportation. Historically atmospheric sources of PAHs in China were not clear and strong type could not be confirmed for the lack of historical monitoring data. During the past 60 yrs, atmospheric PAHs were lastingly increased coupled with the rapid transformation of social-economic development. Environmental PAHs have been absolutely anthropogenic emission. Therefore, the use of LMW-PAHs/HMW-PAHs and Σ COMB/ Σ PAHs applied to plant samples (tree-rings) rather than to air, soil and sediment samples, could evaluate the possible petrogenic or pyrogenic origins. Necessarily, we will demonstrate clearer in the revised version of this manuscript so that the PAH ratio can provide unbiased, meaningful results. Dvorska, A.; Lammel, G.; Klanova, J. Use of diagnostic ratios for studying source apportionment and reactivity of ambient polycyclic aromatic hydrocarbons over Central

Europe. Atmos. Environ. 2011, 42(2), 420-427. Athanasios Katsoyiannis, Andrew J. Sweetman, and Kevin C. Jones - PAH Molecular Diagnostic Ratios Applied to Atmospheric Sources: A Critical Evaluation Using Two Decades of Source Inventory and Air Concentration Data from the UK. Environ. Sci. Technol., 45 (20), 8897–8906, 2011.

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