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Comment on "Observation and modelling of HO_x radicals in a boreal forest" by Hens et al. (2014)

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1 Correction on reference

Though as a researcher one is always happy when peers find ones work useful and accordingly cite it, it is unfortunate when the respective paper is cited incorrectly. Hens et al. (2014) write "Studies on oxidation processes in monoterpene–dominated environments are rare. Direct OH reactivity measurements in a boreal forest, conducted by Sinha et al. (2008), and a box model study investigating the OH reactivity budget (Mogensen et al., 2011) revealed a significant fraction of "unknown OH reactivity"." Firstly, the reference of Sinha et al. (2008) must be an error, since that refers to a publication about the method development of the Comparative Reactivity Method (CRM) together with first field tests conducted in the tropical rainforest of Suriname and the urban atmosphere of Mainz, but not in a boreal forest. We assume that Hens et al. (2014) instead are thinking of the paper by Sinha et al. (2010). Further, it is correct that Mogensen et al. (2011) found a large fraction of unaccounted OH reactivity, however they did not reach that conclusion using a box model. Instead they presented the first model study of the total OH reactivity in a boreal forest using a one dimensional column model with near-explicit chemistry (Boy et al., 2011; Mogensen et al., 2011). There exist earlier publications where the OH reactivity has been addressed using a 1-D model; e.g. the OH loss has been simulated with respect to certain primary emitted organic compounds (e.g., Stroud et al., 2005).

By including the dimension of the entire column of the boundary layer, we are capable of providing valuable information. E.g., as shown in Mogensen et al. (2011), the reactivity of OH has a distinct vertical profile, which is obviously not captured by a box model. Due to practical limitations, one can only measure the reactivity of OH (and other parameters of any other compound) at one or a few points in space. To our knowledge, at the time of publication of Mogensen et al. (2011), the OH reactivity had never been measured at more than one height simultaneously at one site. An exception is the aircraft measurements conducted by Mao et al. (2009), however those measurements did not capture the lowest part of the boundary layer. Mogensen et al. (2011)

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therefore gave the first hints about how the space dependent canopy emission and boundary layer meteorology could affect the reactivity in a boreal forest. Hereby we got the first glimpse of how the reactivity of OH could look outside of that one measured height.

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