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Vertical heterogeneity in trace gas distributions - fast photochemical degradation of reactive gases in the megacity environments.

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Massive reactive reduced gas emissions from anthropogenic activities have been a major research topic to address regional air pollution to global air quality directly related to climate change from short lived climate forcers. It can be conceptually speculated that the oxidation process is very fast in the boundary layer of the megacity environment as high NO_x emission likely elevate oxidation capacity in the region. In this presentation, we will discuss vertical distribution of reactive gases over Seoul Metropolitan Area in South Korea particularly over the forested area in the suburban region. The boundary layer circulation is typically considered in the time scale of 15 minutes in the vertical spatial scale of 1.5 to 2 km. The short time scale may give an impression that all the trace gas may vertically well mixed in the boundary layer but the coordinated observations using ground and airborne platforms during KORUS-AQ clearly illustrate that is not the case. In this context, we will present quantitative examinations of the vertical distributions of various trace gases in the various degrees of chemical reactivity and OH a prominent tropospheric oxidant. This work illustrating the detailed snapshots of heterogeneity of the boundary layer of a megacity provides will provide a test bed to improve the boundary layer treatments in the regional and global chemical transport model framework, particularly in the surface layer.