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Atmospheric measurements at Mt. Tai – Part I: HONO formation and its role in the oxidizing capacity of the upper boundary layer

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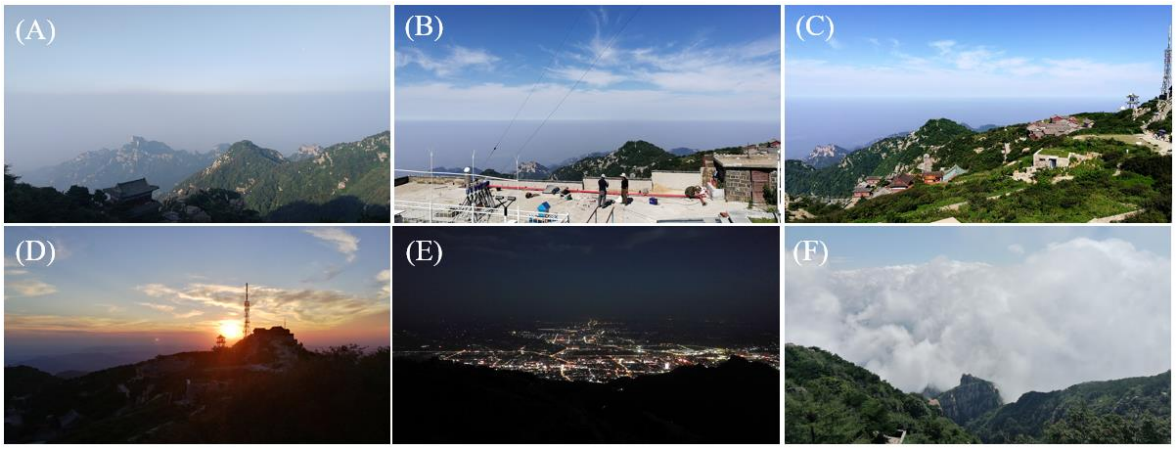

Figure S1: Photos taken around the summit station (Photo copyright: Chaoyang Xue). The polluted layer is visible in photos (A), (B), and (C). (D): The Jade Emperor Peak at sunset; (E): A overlooking view of Tai'an city (south of the summit station) at night. F: Clouds at the summit level (southeast of the summit station).

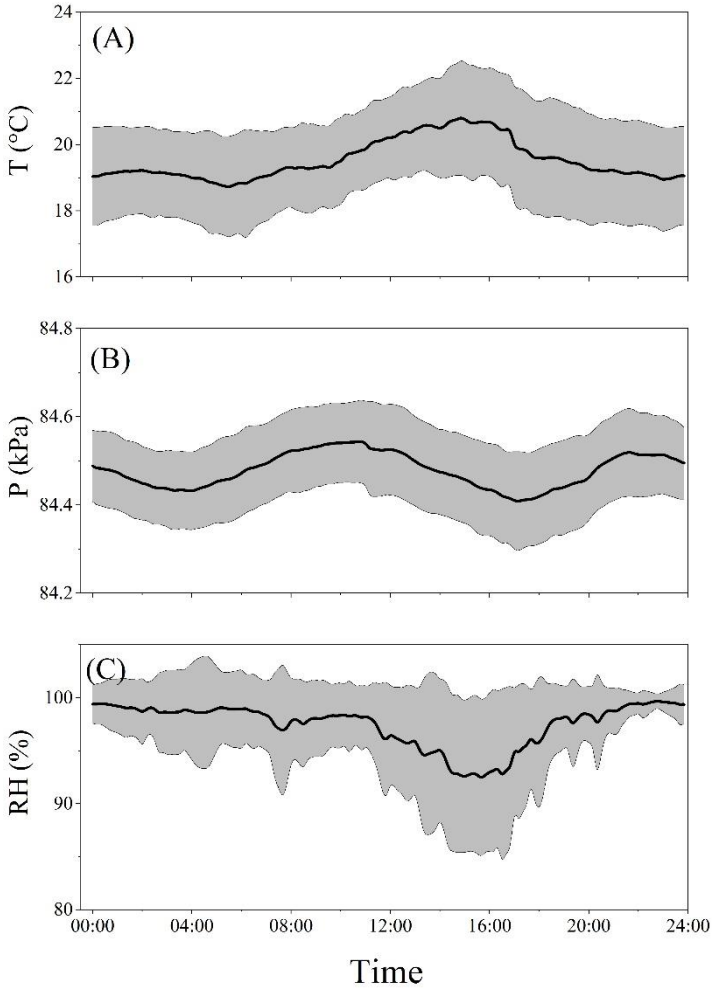

Figure S2: Diurnal profiles of (A): temperature (T), (B): pressure (P), and (C): the atmospheric relative humidity (RH) observed at the summit of Mt. Tai.

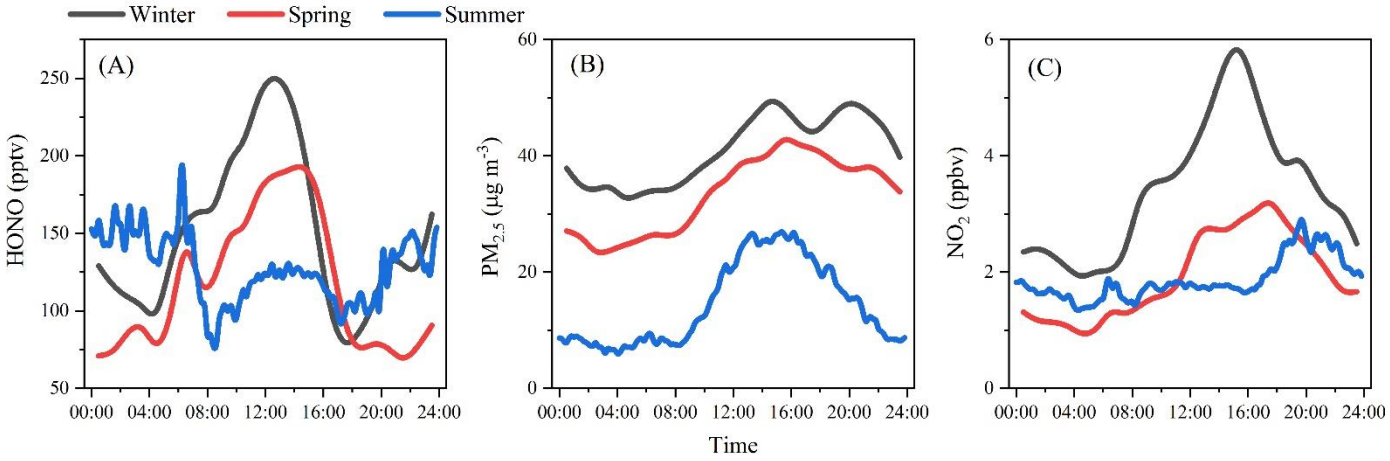

Figure S3: Diurnal variations of (A): HONO, (B): $PM_{2.5}$, and (C): NO_2 observed at the summit station in winter, spring, and summer.

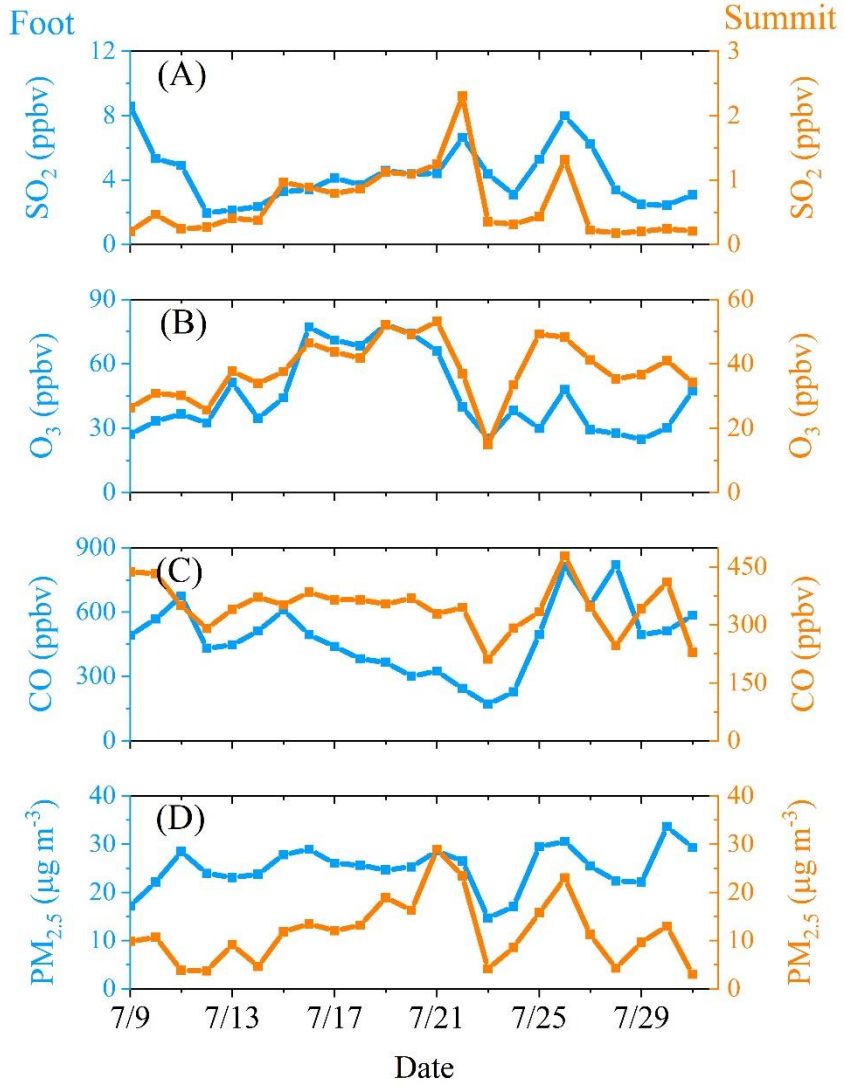

Figure S4: Comparison of night-time (18:00 – 5:00) average (A): SO_2, (B): O_3, (C): CO, and (D): $PM_{2.5}$ observed at the foot station (Left axis in blue) and summit station (Right axis in orange) during the same period from 9th to 31st July.

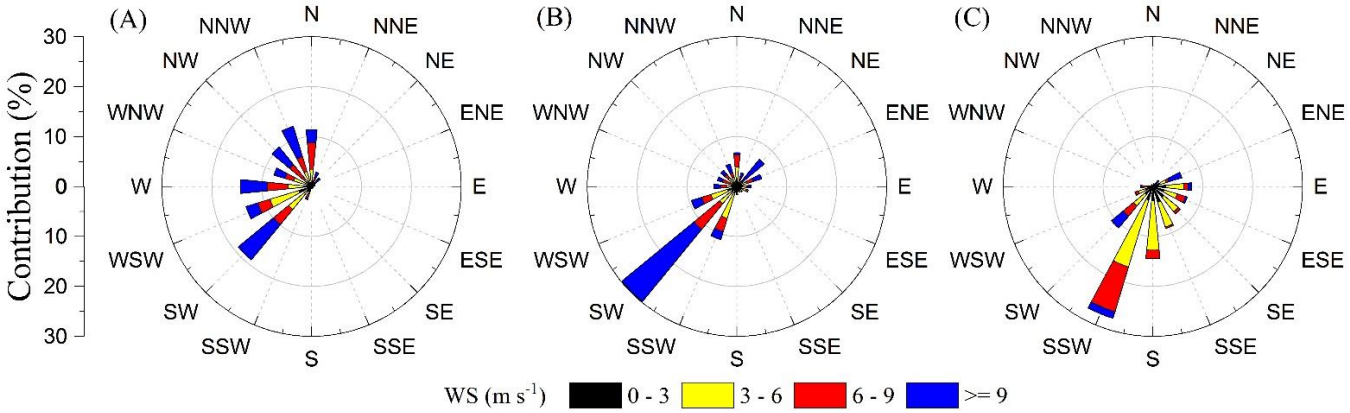

Figure S5: Windrose plots of the measurement in (A): winter, (B): spring, and (C): summer.

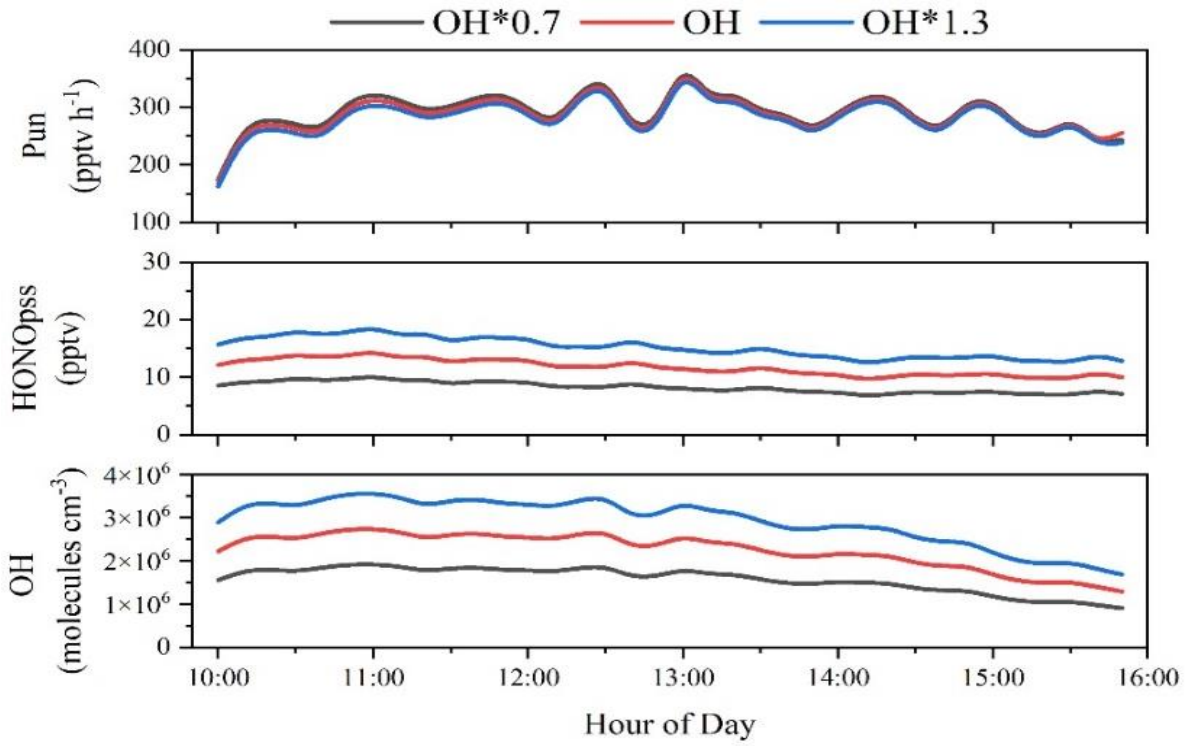

Figure S6: Estimated OH concentrations (red line) used in this study and corresponding $HONO_{pss}$ and P_{un} (red lines). Black lines represent OH level reduced by 30% and corresponding $HONO_{pss}$ and P_{un}. Blue lines represent OH level enlarged by 30% and corresponding $HONO_{pss}$ and P_{un}.

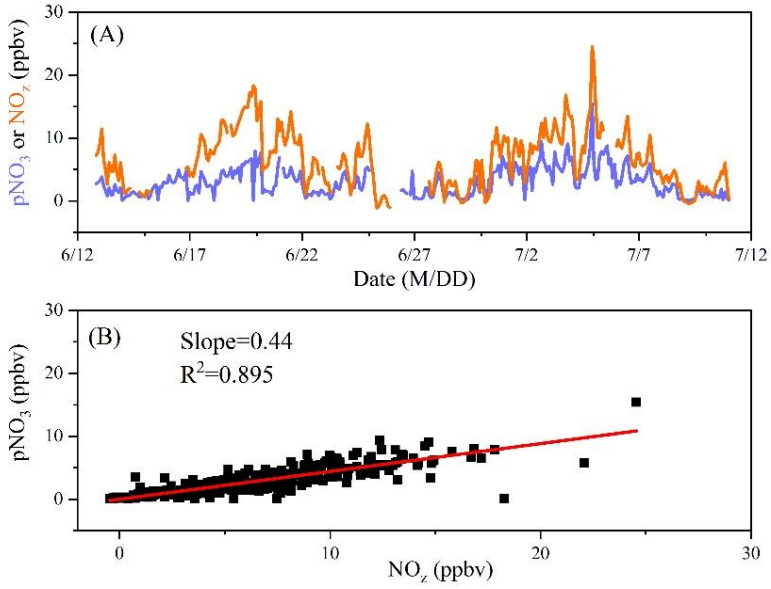

Figure S7: (A): The measured particulate nitrate, pNO_3 (with unit converted from μg m^{-3} to ppbv) by the filter method and the measured NO_z (ppbv), and (B): their correlations from 12th June to 12th July. Caused by variable molar masses, NO_z species can be only specified in mixing ratios (ppbv).

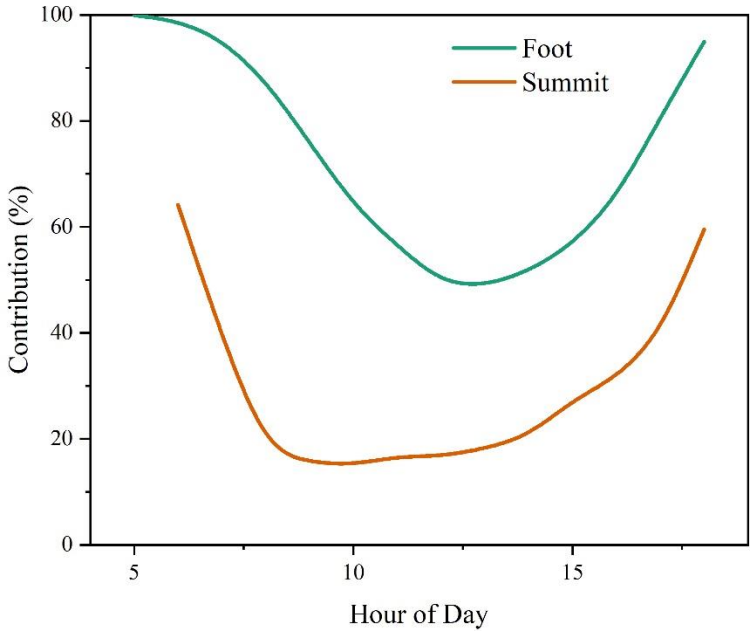

Figure S8: Relative contribution of $P(OH)_{HONO\_net}$ to $P(OH)_{sum}$ at the foot and the summit stations.