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Variation of eddy covariance ozone flux and its main controlling factors over corn field in North-China Plain

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High concentration ozone in the troposphere has negative effect on ecosystem and the indexes based on ozone flux (F_o) are considered the better metric than that based on O_3 concentration. To investigate the effect of ozone on cropland ecosystem, ozone concentration, deposition velocity and ozone flux was measured by eddy covariance technique at corn field in North-China-Plain. The results show that (1) there was a diurnal change pattern in O_3 concentration, with low (16.5 nL L^{-1}) and high (60.1 nL L^{-1}) mean O_3 concentrations at about 6:30 and 16:00, respectively. Mean O_3 concentration in daytime (6:00-18:00) and nighttime (18:00-6:00) were 39.8 $\pm$ 23.1 nL L^{-1} and 20.7 $\pm$ 14.1 nL L^{-1} (mean $\pm$ SE), respectively. O_3 concentration is mainly affected by solar radiation and temperature. (2) The diurnal course of mean deposition velocity (V_d) can be divided into 4 phases: weak and stable process in nighttime; fast increasing in the early morning; strong and steady changes around noon and quickly decreasing in the later afternoon. Mean V_d were 0.29cm $s^{-1}$and 0.09cm s^{-1}in daytime and nighttime, respectively. The magnitude of V_d is influenced by corn growth period, and its diurnal change is significantly related to radiation and relative humidity. (3) Mean F_o were -317.7 ng m^{-2} s^{-1} and -70.2 ng m^{-2} s^{-1} in daytime and nighttime, respectively. There are evident relationships between F_o and CO_2/H_2O fluxes. By comparing the differences in deposition velocities of daytime and nighttime, we can infer that the stomatal uptake of corn is the main sink of near-ground O_3.