

Text S1. Preparation for the inputs of meteorological data.

For the meteorological data inputs for the upland sites, the reported 3-hourly meteorological data from the weather station at the experimental site were used. If these data were not available, then the daily maximum and minimum temperature (T_{\max} and T_{\min} , respectively), the daily P and W derived from Li et al. (2019), and the daily maximum solar radiation (R_{\max}), moment of R_{\max} appearing (M) and daily RH of the adjacent weather station in the China Meteorological Administration (CMA, <http://www.data.cma.cn>) were adapted by referring to the reported average or maximum values. With regard to the rice paddy sites, the daily meteorological data inputs from the adjacent weather station in CMA were used, which are listed in Table S1, and were adapted referring to the reported maximum or average values. Then, the daily meteorological data of the upland and rice paddy sites were converted to 3-hourly data according to the following algorithms for time-scale transformation. The three-hourly T_{air} and R values were interpolated using a sinusoidal curve that uses daily maximum and minimum values as well as the moments of those appearing. T_{\max} and T_{\min} were derived from the adjacent weather station in CMA. The authors assumed that T_{\max} occurred at 14:00 and T_{\min} occurred at the moment of sunrise, which was set at 7:00 from January to March and from September to December as well as at 6:00 from April to August. R_{\max} and M were derived from the adjacent weather station in CMA. The authors assumed that the daily minimum R (i.e., a value of zero) occurred at the moment of sunset, which was set at 18:00 from January to March and from September to December as well as at 19:00 from April to August. The moments of

sunrise and sunset and the moment of T_{\max} appearance can be adjusted according to the real situation of the study site. CMA provided the average W at 02:00, 08:00, 14:00 and 20:00 measured at a height of 10 m. W at those moments was set as the CMA average value, and W at other moments was randomly set as a value ranging from 0 to the average value. The three-hourly P was derived from the CMA daily precipitation, which was randomly allocated to each 3-hour period. The 3-hourly RH used the daily average RH from CMA due to the lack of a reliable interpolation algorithm.

Reference

Li, S., Zheng, X., Zhang, W., Han, S., Deng, J., Wang, K., Wang, R., Yao, Z., Liu, C., 2019. Modeling ammonia volatilization following the application of synthetic fertilizers to cultivated uplands with calcareous soils using an improved DNDC biogeochemistry model. *Sci. Total Environ.* 660, 931–946.
<http://dx.doi.org/10.1016/j.scitotenv.2018.12.379>