ZHENG, Xunhua

Name: ZHENG, Xunhua **Title:** Professor

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Education and Professional Experience:

She got her degrees of B.S. (soil science and agricultural chemistry) from Beijing Agricultural University (currently China Agricultural University) in 1987, M.S. (ecology) from the Institute of Applied Ecology, Chinese Academy of Sciences (CAS) in 1990, and Ph. D (atmospheric physics) from the Institute of Atmospheric Physics (IAP-CAS) in 1996. As a scientist, she has been employed in the IAP-CAS since 1996, and owned a position of research professor in the institute since 2002. She also owned a senior guest scientist position in the Karlsruhe Research Center of the Helmholtz Society for National Research Centers, Germany in 2004-2005. As a professor of the University of Chinese Academy of Sciences (UCAS) since 2014, she teaches the graduate course “Carbon and Nitrogen Biogeochemistry: Processes and Modeling”. Her research interests are in the exchanges of carbon- and nitrogen-trace gases between terrestrial ecosystems and the atmosphere, as well as their associated carbon and nitrogen biogeochemistry. She has been engaged in the researches through (i) field and laboratory experimental studies, and (ii) development of process-oriented biogeochemical models and high-precision instruments and/or methods to measure gas exchanging fluxes. She has achieved several new findings or technical progresses on these issues. For instance, she reported the trade-off relationship between methane and nitrous oxide emissions from paddy rice fields (in 1997), the impacts of soil moisture on nitrous oxide emission (in 2000), the quantification of environmental enrichment of reactive nitrogen in Asia (in 2002), the nitric oxide emission from croplands and its dependences upon soil temperature (in 2003), the re-quantified direct nitrous oxide emission from the croplands of China (in 2004), the nitrogen-regulated effects of elevated atmospheric carbon dioxide upon methane emission from paddy rice fields (in 2006), the updated gas chromatographic method for nitrous oxide analysis (in 2008), the reduced N_2O emission from rice paddy fields due to addition of organic carbon (in 2010), the inhibitory effects of grazing on methane uptake by and nitrous oxide emission from semiarid temperate grasslands (in 2010-2011), the constant direct emission factor of nitrous oxide against nitrogen doses in calcareous soils (in 2012), and the revised “hole-in-pipe” model (in 2015). Besides, she designed a regional nitrogen cycle model (IAP-N) (in 2002 and 2008), which has been repeatedly chosen as the single tool for compiling the China’s cropland N_2O emission inventories included in the National Reports to the United Nation Frame Convention on Climate Change (UNFCCC) secretariat, supervised the designs of an automated chamber system for simultaneously measuring the net exchanging fluxes of multiple carbon and nitrogen gases including CO_2 (NEE), CH_4, N_2O, and NO (in 2011), a revised N_2 measuring system based on the gas-flow-soil-core technique (in 2013), and the high-resolution biogeochemical model CNMM-DNDC (in 2018)， and developed a decision-supporting method based on a process-oriented biogeochemical model for optimizing carbon, nitrogen and water management of a terrestrial ecosystem (in 2014 and 2019). In addition, she led the preparation for the national emission inventories of greenhouse

gases from the agriculture sector for the Initial National Reports of China on Climate Change to the UNFCCC secretariat (in 2005). She, as a leading author or a co-author, has published more than 200 peer-reviewed research articles, of which more than 160 are in English journals. She and four of her German colleagues jointly won the Erwin Schrödinger science prize (Germany) in 2013, due to their remarkable finding of the inhibitory effect of intensive grazing on nitrous oxide emission from temperate semi-arid grasslands, which was published in Nature in 2010.

Expertise and research field:

Expertise: Development of detection techniques or methods, model design and application, and processes understanding on carbon and nitrogen cycling, and land-atmosphere exchanges of the trace gases of both elements. Research field: Atmospheric chemistry, biogeochemistry, biogeoscience, global change biology, or aerobiology.

Honors:

2013, the Erwin Schrödinger science prize of Germany (only one outstanding finding is annually prized; Xunhua ZHEG ranked at the 2nd among the five scientists as principle contributors of the achievement);

2007, the “National New Century Talents”;

2007, the Special Central Governmental Allowance;

2004, the project of the Outstanding Young Scientist Program of the National Natural Science Foundation of China;

2003, the Outstanding Youth Honor of the Chinese Academy of Sciences;

2001, the National Prize for Science and Technology Progress (Xunhua ZHENG ranked at the third among the 13 contributors)

Selected publications:

1) **Zheng X**, Han S, 2018. A generic method framework for accurately quantifying greenhouse gas footprints of crop cultivation systems. *Atmospheric and Oceanic Science Letters* 11(1), 15–28.
2) **Zheng X**, Wang R, 2017. *Protocols for Chamber-based Manual Measurement of CH_4 and N_2O Fluxes from Terrestrial Ecosystems*. [In Chinese.] Beijing: The Meteorological Press. pp. 101.
3) Wolf B, **Zheng X**, Brüggemann N, Chen W, Dannenmann M, Han X, Sutton MA, Wu H, Yao Z, Butterbach-Bahl K, 2010. Grazing-induced reduction of natural nitrous oxide release from continental steppe. *Nature* 464, 881-884.
4) **Zheng X**, Xie B, Liu C, Zhou Z, Yao Z, Wang Y H, Wang YL, Yang L, Zhu J, Huang Y, Butterbach-Bahl K, 2008. Quantifying net ecosystem carbon dioxide exchange of a short-plant cropland with intermittent chamber measurements. *Global Biogeochemical Cycles* 22, GB3031.
5) **Zheng X**, Zhou Z, Wang YS, Zhu J, Wang YL, Yue J, Shi Y Kobayashi K, Inubushi K, Huang Y, Han S, Xu Z, Xie B, Butterbach-Bahl K, Yang L, 2006. Nitrogen-regulated effects of free-air CO_2 enrichment on methane emissions from paddy rice fields. *Global Change Biology* 12 (9), 1717-1732.
6) **Zheng X**, S Han, Y Huang, Wang Y, Wang M, 2004. Re-quantifying the emission factors based on field measurements and estimating the direct N_2O emission from Chinese croplands. *Global Biogeochemical Cycles* 18(2), GB2018.
7) **Zheng X**, Huang Y, Wang Y, Wang M, 2003. Seasonal characteristics of nitric oxide emission from a typical Chinese rice-wheat rotation during the non-waterlogged period. *Global Change Biology* 9 (2), 219-227.

8) **Zheng X**, Huang Y, Wang Y, Wang M, Jin J, Li L, 2003. Effects of soil temperature on nitric oxide emission from a typical Chinese rice-wheat rotation during the non-waterlogged period. *Global Change Biology* 9(4): 601-611.
9) **Zheng X**, Fu C, Xu X, Yan X, Huang Y, Chen G, Han S, Hu F, 2002. The Asian nitrogen cycle case study. *Ambio* 31(2), 79-87.
10) **Zheng X**, Mei B, Wang YH, Xie B, Wang YS, Dong H, Xu H, Chen G, Cai Z, Yue J, Gu J, Su F, Zou J, Zhu J, 2008. Quantification of N_2O fluxes from soil-plant systems may be biased by the applied gas chromatograph methodology. *Plant and Soil* 311, 211-314.
11) **Zheng X**, Liu C, Han S, 2008. Description and application of a model for simulating regional nitrogen cycling and calculating nitrogen flux. *Advances in Atmospheric Sciences* 25(2), 181-201.
12) **Zheng X**, Wang M, Wang Y, et al., 2000. Impacts of soil moisture on nitrous oxide emission from croplands: a case study on the rice-based agro-ecosystem in Southeast China. *Chemosphere-Global Change Science* 2, 207-224.
13) Chen W, Wolf B, **Zheng X**, Yao Z, Butterbach-Bahl K, Brüggemann N, Liu C, Han S, Han X, 2011. Annual methane uptake by temperate semiarid steppes as regulated by stocking rates, aboveground plant biomass and topsoil air permeability. *Global Change Biology* 17, 2803-2816. (Corresponding author)
14) Chen W, Wolf B, Yao Z, Brüggemann N, Butterbach-Bahl K, Liu C, Han S, Han X, **Zheng X**, 2010. Annual methane uptake by the typical semiarid steppe of Inner Mongolia, China. *Journal of Geophysical Research* 115, D15108 (Corresponding author)
15) Chen W, Wolf B, Brüggemann N, Butterbach-Bahl K, **Zheng X**, 2011. Annual emissions of greenhouse gases from sheepfolds in Inner Mongolia. *Plant and Soil* 340, 291-301 (Corresponding author)
16) Xu Z, **Zheng X**, Wang YS, Wang YL, Huang Y, Zhu J, 2006. Effect of free-air atmospheric CO_2 enrichment on dark respiration of rice plants (Oryza sativa L.). *Agriculture, Ecosystems & Environment* 115, 105-112. (Corresponding author)
17) Xie B, **Zheng X,** Zhou Z, Gu J, Zhu B, Chen X, Shi Y, Wang YY, Zhao Z, Liu C, Yao Z, Zhu J, 2010. Effects of nitrogen fertilizer on CH_4 emission from rice fields in China: multi-site field observations. *Plant and Soil* 326, 393–401 (Corresponding author)
18) Yao Z, **Zheng X**, Xie B, Mei B, Wang R, Butterbach-Bahl K, Zhu J, Yin R, 2009. Tillage and crop residue management significantly affects N-trace gas emissions during the non-rice season of a subtropical rice-wheat rotation. *Soil Biology and Biochemistry* 41, 2131-2140 (Corresponding author)
19) Yao Z, Zhou Z, **Zheng X**, Xie B, Liu C, Butterbach-Bahl K, and Zhu J, 2010. Effects of tillage during the non-waterlogged period on nitrous oxide and nitric oxide emissions in typical Chinese rice-wheat rotation ecosystems. *Journal of Geophysical Research* 115, G01013 (Corresponding author)
20) Yao Z, Wu X, Wolf B, Dannenmann M, Butterbach-Bahl K, Brüggemann N, Chen W, **Zheng X**, 2010. Soil-atmosphere exchange potential of NO and N_2O in different land use types of Inner Mongolia, as affected by soil temperature, soil moisture, freeze-thaw and drying-wetting events. *Journal of Geophysical Research* 115, D17116 (Corresponding author)
21) Yao Z, Wolf B, Chen W, Butterbach-Bahl K, Brüggemann N, Wiesmeier M, Dannenmann M, Blank B, **Zheng X**, 2010. Spatial variability of N_2O, CH_4 and CO_2 fluxes within the Xilin River catchment of Inner Mongolia, China-a soil core study. *Plant and Soil* 331, 341-359. (Corresponding author)
22) Yao Z, Zhou Z, **Zheng X**, Xie B, Mei B, Wang R, Butterbach-Bahl K, Zhu J, 2010. Effects of organic matter incorporation on nitrous oxide emissions from the rice-wheat rotation ecosystems in China. *Plant and Soil* 327, 315-330 (Corresponding author)
23) Liu C, **Zheng X**, Zhou Z, Han S, Wang Y, Wang K, Liang W, Li M, Chen D, Yang Z, 2010. Nitrous oxide and nitric oxide emissions from an irrigated cotton field in Northern China. *Plant and Soil* 332, 123-134. (Corresponding author)
24) Liu C, Meng S, Wang K, Zhou Z, Han S, Chen D, Yang Z, **Zheng X**, 2011. Effects of irrigation, fertilization and crop straw management on nitrous oxide and nitric oxide emissions from a wheat-maize rotation field in northern China. *Agriculture, Ecosystems and Environment* 140, 226-233. (Corresponding author)

25) Liu C, Holst J, Butterbach-Bahl K, Yao Z, Brüggemann N, Han X, Tas B, Susenbeth A, Han S, **Zheng X**, 2009. Growing season methane budget of a typical Inner Mongolian steppe. *Atmospheric Environment* 43, 3086-3095. (Corresponding author)
26) Liu C, Holst J, Yao Z, Brüggemann N, Butterbach-Bahl K, Han S, Han X, **Zheng X**, 2009. Sheepfolds as "hotspots" of nitric oxide (NO) emission in a semi-arid Inner Mongolian steppe. *Agriculture, Ecosystems and Environment* 134, 136-142. (Corresponding author)
27) Liu C, Holst J, Brüggemann N, Butterbach-Bahl K, Yao Z, Han S, Han X and **Zheng X**, 2008. Effects of irrigation on nitrous oxide, methane and carbon dioxide fluxes in an Inner Mongolian steppe. *Advances in Atmospheric Sciences* 25 (5): 748-756. (Corresponding author)
28) Liu C, Holst J, Brüggemann N, Butterbach-bahl K, Yao Z, Yue J, Han S, Han X, Krümmelbeind J, Hornd R, and **Zheng X**, 2007. Grazing reduces methane uptake by soils in a semi-arid steppe in Inner Mongolia, China. *Atmospheric Environment* 41, 5948-5958. (Corresponding author)
29) Zhou Z, **Zheng X**, Xie B, Liu C, Han S, Zhu J, 2010. Nitric oxide emissions from rice-wheat rotation fields in eastern China: effect of fertilization, soil water content, and crop residue. *Plant and Soil* 336, 87-98. (Corresponding author)
30) Zhou Z, **Zheng X**, Xie B, Han S, Liu C, 2010. A process-oriented model of N_2O emission from rice-winter wheat rotation agro-ecosystem: structure, validation and sensitivity. *Advances in Atmospheric Sciences* 27, 137-150. (Corresponding author)
31) Mei B, **Zheng X**, Xie B, Dong H, Zhou Z, Wang R, Deng J, Cui F, Tong H, Zhu J, 2009. Nitric oxide emissions from conventional vegetable fields in southeastern China. *Atmospheric Environment* 43, 2762-2769 (Corresponding author)
31) Mei B, **Zheng X**, Xie B, Dong H, Yao Z, Liu C, Zhou Z, Wang R, Deng J, Zhu J, 2011. Characteristics of Multiple-Year Nitrous Oxide Emissions from Conventional Vegetable Fields in Southeastern China. *Journal of Geophysical Research* 116, D12113 (Corresponding author)
32) Gu J, **Zheng X**, Zhang W, 2009. Background nitrous oxide emissions from croplands in China in the year 2000. *Plant and Soil* 320, 307-320. (Corresponding author)
33) Gu J, **Zheng X**, Wang Y, Ding W, Zhu B, Chen X, Wang Y, Zhao Z, Shi Y, Zhu J, 2007. Regulatory effects of soil properties on background N_2O emissions from agricultural soils in China. *Plant and Soil* 295, 53-65. (Corresponding author)
34) Cui F, **Zheng X**, Liu C, Wang K, Zhou Z, Deng J, 2014. Assessing biogeochemical effects and best management practice for a wheat-maize cropping system using the DNDC model. *Biogeosciences* 11, 91-107. (Corresponding author)
36) Yue J, Han S, **Zheng X**, 2012. Designing a regional nitrogen cycle module of grassland for the IAP-N model. *Advances in Atmospheric Sciences* 29, 320-332. (Corresponding author).
37) Cui F, Yan G, Zhou Z, **Zheng X**, Deng J, 2012. Annual emissions of nitrous oxide and nitric oxide from a wheat-maize cropping system on a silt loam calcareous soil in the North China Plain. *Soil Biology & Biochemistry* 48, 10-19. (Corresponding author)
38) Yao Z, **Zheng X**, Dong H, Xie B, Wang R, Mei B, Zhu J, 2012. A 3-year record of N_2O and CH_4 emissions from a sandy loam paddy during rice seasons as affected by different nitrogen application rates. *Agriculture, Ecosystems and Environment* 152, 1-9. (Corresponding author)
39) Liu C, Wang K, **Zheng X**, 2012. Responses of N_2O and CH_4 fluxes to fertilizer nitrogen addition rates in an irrigated wheat-maize cropping system in northern China. *Biogeosciences* 9, 839-850. (Corresponding author)
40) Deng J, Zhou Z, **Zheng X**, Liu C, Xie B, Yao Z, Cui F, Han S, Zhu J, 2012. Annual emissions of nitrous oxide and nitric oxide from rice-wheat rotation and vegetable fields: a case study in the Tai-Lake region, China. *Plant and Soil* 360, 37-53. (Corresponding author)
41) Xie B, Zhou Z, Mei B, **Zheng X**, Dong H, Wang R, Han S, Cui F, Wang Y, Zhu J, 2012. Influences of free-air CO_2 enrichment (FACE), nitrogen fertilizer and crop residue incorporation on CH_4 emissions from irrigated rice fields. *Nutrient Cycling in Agricultural Ecosystems* 93, 373–385. (Corresponding author)
42) Chen W, Wolf B, **Zheng X**, Yao Z, Butterbach-bahl K, Brüggemann N, Han S, Liu C, Han

X, 2013. Carbon dioxide emission from temperate semiarid steppe during the non-growing season. *Atmospheric Environment* 64, 141-149. (Corresponding author)

43) Chen W, **Zheng X**, Chen Q, Wolf B, Butterbach-Bahl, K, Brüggemann N, Lin S, 2013. Effects of increasing precipitation and nitrogen deposition on CH_4 and N_2O fluxes and ecosystem respiration in a degraded steppe in Inner Mongolia, China. *Geoderma* 192, 335-340. (Corresponding author)

44) Wang K, **Zheng X**, Pihlatie M, Vesala T, Liu C, Haapanala S, Mammarella I, Rannik Ü, Liu H, 2013. Comparison between static chamber and tunable diode laser-based eddy covariance techniques for measuring nitrous oxide fluxes from a cotton field. *Agricultural and Forest Meteorology* 171-172: 9-19. (Corresponding author)

45) Wang R, Feng Q, Liao T, **Zheng X**, Butterbach-Bahl K, Zhang W, Jin C, 2013. Effects of nitrate concentration on the denitrification potential of a calcic cambisol and its fractions of N_2, N_2O and NO. *Plant and Soil* 363, 175-189. (Corresponding author)

46) Liu C, Wang K, **Zheng X**, 2013. Effects of nitrification inhibitors (DCD and DMPP) on nitrous oxide emission, crop yield and nitrogen uptake in a wheat-maize cropping system. *Biogeosciences* 10, 2427–2437.(Corresponding author)

47) Yao Z, **Zheng X**, Wang R, Dong H, Xie B, Mei B, Zhou Z, Zhu J, 2013. Greenhouse gas fluxes and NO release from a Chinese subtropical rice-winter wheat rotation system under nitrogen fertilizer management. *Journal of Geophysical Research-Biogeosciences* 118, 623-638. (Corresponding author)

48) Wang K, Liu C, **Zheng X**, Pihlatie M, Li B, Haapanala S, Vesala T, Liu H, Wang Y, Liu G, Hu F, 2013. Comparison between eddy covariance and automatic chamber techniques for measuring net ecosystem exchange of carbon dioxide in cotton and wheat fields. *Biogeosciences* 10, 6865–6877. (Corresponding author)

49) Yan G, **Zheng X**, Cui F, Yao Z, Zhou Z, Deng J, Xu Y, 2013. Two-year simultaneous records of N_2O and NO fluxes from a farmed cropland in the Northern China Plain with a reduced nitrogen addition rate by one-third. *Agriculture, Ecosystems & Environment* 178, 39–50. (Corresponding author)

50) Yao Z, **Zheng X**, Dong H, Xie B, Liu C, Wang R, Butterbach-Bahl K, Zhu J, 2013 Nitrous oxide and methane fluxes from a rice-wheat crop rotation under wheat residue incorporation and no tillage practices. *Atmospheric Environment* 79, 641-649. (Corresponding author)

51) Liao T, Wang R, **Zheng X**, Sun Y, Butterbach-Bahl K, Chen N, 2013. Automated online measurement of N_2, N_2O, NO, CO_2, and CH_4 emissions based on a gas-flow-soil-core technique. *Chemosphere* 93, 2848-2853. (Corresponding author)

52) Deng J, Zhou Z, **Zheng X**, Li C, 2013. Modeling impacts of fertilization alternatives on nitrous oxide and nitric oxide emissions from conventional vegetable fields in southeastern China. *Atmospheric Environment* 81, 642-650. (Corresponding author)

53) Cui F, **Zheng X**, Liu C, Wang K, Zhou Z, Deng J, 2014. Assessing biogeochemical effects and best management practice for a wheat-maize cropping system using the DNDC model. *Biogeosciences* 11, 91-107. (Corresponding author)

54) Zhang W, Gu J, **Zheng X**, 2015. Direct nitrous oxide emissions related to fertilizer-nitrogen, precipitation, and soil clay fraction: empirical models. *Atmospheric and Oceanic Science Letters* 8(5), 277-282. (Corresponding author)

55) Chen W, **Zheng X**, Wolf B, Yao Z, Liu CY, Butterbach-Bahl K, 2017. The potential of soil carbon dioxide, methane and nitrous oxide exchanges of differently grazed semiarid steppes: based on soil core experiment. *Fresenius Environmental Bulletin* 26, 2571-2581. (Corresponding author)

56) Zhang W, Li Y, Zhu B, **Zheng X**, Liu C, Tang J, Su F, Zhang C, Ju X, Deng J, 2018. CNMM-DNDC: a process-oriented hydro-biogeochemical model enabling simulation of the gaseous carbon and nitrogen emissions and hydrologic nitrogen losses from a subtropical catchment. *Science of the Total Environment* 616 617, 305-317. (Corresponding author)

57) Zhang H, Yao Z, Wang K, **Zheng X**, Ma L, Wang R, Liu C, Zhang W, Zhu B, Tang X, Hu Z, Han S, 2018. Annual N2O emissions from conventionally grazed typical alpine grass meadows in the eastern Qinghai-Tibetan Plateau. *Science of the Total Environment* 625, 885-899. (Corresponding author)

58) Li S, **Zheng X,** Liu C, Yao Z, Zhang W, Han S, 2018. The influences of observation method, season, soil depth, land use and management practice on soil dissolvable organic carbon concentrations: a meta-analysis. *Science of the Total Environment* 631-632, 105-114. (Corresponding author)
59) Lin F, Liu C, Hu X, Fu Y, **Zheng X**, Zhang W, Wang R, Cao G, 2018. Non-cropping period accounting for over a half of annual nitric oxide releases from cultivated calcareous-soil alpine ecosystems with marginally low emission factors. *Atmospheric and Oceanic Science Letters* 11(4), 338-344. (Corresponding author)
60) Chen W, **Zheng X**, Wolf B, Yao Z, Liu C, Butterbach-Bahl K, Brüggemann N, 2019. Long-term grazing effects on soil-atmosphere exchanges of CO_2, CH_4 and N_2O at different grasslands in Inner Mongolia: a soil core study. *Ecological Indicators* 105, 316-328. (Corresponding author)
61) Lin F, Liu C, Hu X, Fu Y, **Zheng X**, Wang R, Zhang W, Cao G, 2019. Characterizing nitric oxide emissions from two typical alpine ecosystems. *Journal of Environmental Sciences-China* 77, 312-322. (Corresponding author)
62) Zhang H, Yao Z, Ma L, **Zheng X**, Wang R, Wang K, Liu C, Zhang W, Zhu B, Tang X, Hu Z, Han S, 2019. Annual methane emissions from degraded alpine wetlands in the eastern Tibetan Plateau. *Science of the Total Environment* 657, 1323-1333. (Corresponding author)
63) Dubache G, Li S, **Zheng X**, Zhang W, Deng J, 2019. Modeling ammonia volatilization following urea application to winter cereal fields in the United Kingdom by improving a biogeochemical model. *Science of the Total Environment* 660, 1403-1418. (Corresponding author)
64) 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. *Science of the Total Environment* 660, 931-946 (Corresponding author)
65) Zhang W, Liu C, **Zheng X**, Wang K, Cui F, Wang R, Li S, Yao Z, J Zhu, 2019. Using a modified DNDC biogeochemical model to optimize field management of a multi-crop (cotton, wheat, and maize) system: a site-scale case study in northern China. *Biogeosciences* 16, 2905-2922. (Corresponding author)
66) Wang K, Wang D, **Zheng X**, Nelson D, 2020. Applicability of a closed-path quantum cascade laser spectrometer for eddy covariance flux measurements of nitric oxide over a cropland during a low emission period. Agricultural and Forest Meteorology 282–283, 107855.

Projects:

She was a subcontractor of the European Union integrated project NitroEurope IP in 2006-2011, and the leader of several research projects granted by the National Natural Science Foundation of China (e.g., a key project in 2004-2007, an National Outstanding Young Scientist Program project in 2005-2008, a Research Team Program project in 2011-2016, and a Key International Cooperation Program project with the United Nations Environment (UNEP) in 2018-2022), a Key Fundamental Research Program (973) project granted by the Chinese Ministry of Science and Technology in 2012-2015, and two key project granted by CAS (one in 2006-2008, and another in 2019-2023). All these projects focused or are focusing on fundamental researches of terrestrial ecosystems-atmosphere exchanges of nitrogen- and carbon-gases (CO_2, CH_4, N_2O, NH_3, NO, N_2) and associated biogeochemistry.