

**Effect of Enhanced UV-B Radiation and O<sub>3</sub> Concentration on Carbon/Nitrogen Exchange between Farmland and Atmosphere** 地表 UV-B 增强与 O<sub>3</sub> 升高对农田地-气碳氮交换的复合影响

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Enhanced UV-B radiation as well as elevated ozone concentration on the earth's surface are important environmental problems. The farmland ecosystem is an important source of greenhouse gases. As a farmland experiment, this research uses an automatic regulating system to control UV-B radiation and ozone concentration. To study the influence rules of UV-B and ozone on greenhouse gases fluxes, an automatic multi-channel CO<sub>2</sub> analyzer as well as an static dark chamber-gas chromatograph method will be used to measure the fluxes of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O. Soil bacteria, soil organic matter, soil available nitrogen, enzymes' activity, <sup>13</sup>C and <sup>15</sup>N isotope analysis and N-metabolism of plant will be analyzed to study the mechanism. The innovation of this research is using advanced technology to adjust UV-B radiation and ozone concentration, to study the influence of UV-B and ozone on carbon nitrogen exchange between farmland and atmosphere. The implement of this research will help to comprehend the greenhouse gases emission rules under enhance UV-B and ozone, it is also benefit to estimate the emission trend of greenhouse gases in regional agricultural ecosystem.

地表 UV-B 辐射增强与 O<sub>3</sub> 浓度升高是全球重大环境问题，农田是温室气体重要排放源之一。本项目采用自动调控装置模拟 UV-B 增强与 O<sub>3</sub> 升高，运用多通道全自动通量箱分析 CO<sub>2</sub> 净交换通量、静态箱-气相色谱法测定 CH<sub>4</sub> 和 N<sub>2</sub>O 排放通量，并通过对土壤微生物组成与活性、土壤有机碳与有效氮含量、土壤酶活性、<sup>13</sup>C 和 <sup>15</sup>N 同位素分析土壤碳氮转化速率、植株氮代谢过程和生物量等指标的测定，定量研究 UV-B 增强与 O<sub>3</sub> 升高对农田生态系统地-气碳氮交换通量复合影响的规律，并进一步探讨其影响的过程机理。本研究的特色与创新之处是运用先进技术对 UV-B 增强与 O<sub>3</sub> 升高进行适时自动调控，研究 UV-B 增强与 O<sub>3</sub> 升高对农田地-气碳氮交换的复合影响。项目有助于阐明地表 UV-B 辐射增强与 O<sub>3</sub> 浓度升高情景下农田生态系统温室气体排放规律，为客观估计区域农田温室气体排放量及变化趋势提供科学依据。