The integrated impacts on chemical characteristics of fine aerosols, climate and their associated health effect from biomass burning emissions in upper northern Thailand
泰国北部生物质燃烧对细颗粒物化学特征、气候影响和人体健康的复合效应研究

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生物质燃烧是大气颗粒物和痕量气体的重要来源之一，对区域乃至全球空气质量、颗粒物化学组成、气候系统和人体健康具有重要影响。地处热带季风气候影响下的泰国北部地区是亚洲乃至全世界生物质燃烧最重要和最活跃的区域之一，是研究人为和自然活动对大气化学、气候影响和健康效应的理想场所。本项目以南京信息工程大学、北京大学、清华大学和泰国清迈大学为依托单位，拟在泰北生物质燃烧密集区开展国际合作研究。项目将运用生物质燃烧实验-野外观测-化学分析-气溶胶/气候模式-多元健康效应模型等技术方法，旨在（1）阐明泰国北部生物质燃烧排放大气颗粒物的源排放、化学组成和时空变化特征及其关键影响因子；（2）揭示生物质燃烧排放气溶胶的直接辐射效应和影响云和降水的间接效应，以及对研究区域和下游地区气候特征的影响；（3）评价生物质燃烧背景下气候特征和颗粒物化学组成对研究区域内暴露人群心肺功能不良健康影响的交互作用以及综合健康影响。

Biomass burning emissions are important contributor of atmospheric particles and trace gases, and have significant impacts on air quality, chemical compositions of particles, climate and human health at regional or even global scale. Northern Thailand, located in the Southeast Asia with a typical tropical Asian monsoon climate system, is one of the most active and important source region of biomass burning emissions in the world. Thus, this area is regarded as an ideal area to study atmospheric chemistry, climate effects and health effects in terms of both anthropogenic and biomass burning emissions. The main objectives of the proposed project are (a) to clarify the source emission, chemical composition and spatial variation patterns of atmospheric fine particles (PM2.5) emitted from biomass burning in northern Thailand and its key influencing factors; (b) to investigate the biomass burning aerosol effects on the climate, including the directly radiative forcing and indirect effect on cloud and precipitation, and the overall climate impact in local and downwind regions; (c) to evaluate the interactions of climate change and ambient air pollution on the adverse impacts of cardiopulmonary functions of the exposed population, and evaluate the integrated risk of climate types and chemical constituents of PM2.5 on human health in upper northern Thailand.