

Final Report: Junior Research Stays at Peking University

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Comparative evaluation of the influence of air pollution on urban heat island
for Berlin and Beijing

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Invited by Prof. Junfeng Liu, I visited the College of Urban and Environmental Sciences at Peking University for two months in the framework of the University Alliance for Sustainability. Prof. Liu is a leading young scientist in the field of atmospheric environment. He has long-term experience with wide research interest, involving in air pollution modeling, climate effect of air pollution, and strategies of air pollution mitigation. He has an excellent research team and many insightful research achievements. Currently, he is the leader of several national research projects.

During my stay in Peking University, I talked with Prof. Liu many times and got many good comments for my research project. Besides the appointments, Prof. Liu also frequently came to the office to talk with us about the progress and shared his ideas. Prof. Liu provided me a desk in the office of his working group. This facilitated the exchange the colleagues greatly. Most of his group members are very young and enterprising. They conducted independent project in different topics. Talking with them greatly expanded my knowledge. The study environment in the group is very friendly and everyone worked very hard. They achieved many good results. During the two months, three of their submitted papers were accepted by the top journals in the field of atmospheric environment. Their efficient work and great achievements are very impressive to me.

Besides the academic discussions, I also attended other academic activities held by Prof. Liu and the university. We visited the traffic lab of the Beijing City together. I learned a lot of information about the current traffic institutions in Beijing, including the road network, traffic monitoring network, and traffic modelling system. We discussed together about how to link the current traffic data to the air pollution modeling. During the summer holiday, Peking University organized some summer schools in different topics. They invited some famous scientists from all over the world to give reports. I had the chance to attend reports about the remote sensing of urban environment. The contents of the presentations are very new and interesting to me. I met some well-known scientists and learned the latest research progress in this field. In addition, I visited some other institutions in Beijing, including the Chinese Academy of Meteorological Sciences, the Chinese Academy of Agricultural Sciences and

the Chinese Academy of Sciences. I talked with the scientists there and learned about their current work. I also shared my work with them and got some good feedback and advice.

During the talks and discussions, I found that the atmospheric environments in Berlin and in Beijing really have many differences. Firstly, air pollution in Beijing is much more serious than in Berlin. Although my stay in summer was without emissions for heating, the air pollution in Beijing is still serious because of the dense traffic. There are many cars on the road, and traffic jams are very common, especially during the rush hours. Secondly, in spatial patterns, the urban-rural difference of air pollution in Beijing is not as large as in Berlin. Thirdly, the components of air pollution in Berlin are very different from that in Beijing. Beijing has more weighted sulfate aerosols, while Berlin has more weighted nitrogen aerosols. The very important components of aerosols, black carbon shows higher percentage in Berlin due to the larger number of diesel cars, although the absolute concentration is lower than in Beijing. Black carbon acts as greenhouse effect. Totally, the cooling effect of aerosols on climate in Beijing is more significant than in Berlin. The different conditions of air pollution lead to different study results and conclusions. This is very interesting. In the future research, we should make more comparison studies among different regions.

Air pollution and urban heat island are two most important problems of urban environment. They can interact with each other. In the past, the scientists in the two fields usually only considered their respective research fields, and ignore the other one, especially regarding the urban climate issues. In the light of global climate change, the heat waves occur more frequently and lead to serious health and energy problems. Sustainable development should consider both air pollution and urban climate. Good mitigation strategies should achieve improvement in both cases.

Through this project, I made new friends and learned the latest progress in the field of atmospheric environment research in China. We shared scientific experience and results with each other. This process helped me to build the contact and potential chance for cooperation with the scientists in China. Based on the previous study results and the new findings of this stay, I am preparing a manuscript with the topic of the impact of aerosols on urban climate. I will submit it in the next few months. The financial support from the UAS project will be addressed in the acknowledgement of this manuscript.

At last, I want to thank UAS again for the scholarship. This fellowship project is helpful for me to build my research network and broaden my research career. Special thanks go to Katrin Risch, and Anjuli Weigelt for their helps during the application and project processing, and to Siying Zhu for her help during my stay at Peking University.