

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 College of Urban and Environmental Sciences, Peking University for two months. Prof. Liu is an excellent 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 a very good research team and gains rich achievements. Currently, he is the leader of several national projects.

During my staying in Peking University, I talked with Prof. Liu many times and got a lot of good comments from him. Besides appointment talk with Prof. Liu, he also frequently came to the office to talk with us about the progresses and shared his ideas. Prof. Liu provided me a desk in the office of his working group. I can talk with the colleagues very conveniently. 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 relaxed, but everyone worked very hard. They achieved a lot of 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 hold 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 attended some 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

Chinese Academy of Meteorological Sciences, Chinese Academy of Agricultural Sciences and 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 a lot of differences. Firstly, air pollution in Beijing is much serious than in Berlin. Although my staying is in summer without emissions for heating, the air pollution in Beijing is still serious because of the dense traffic. There are a lot of cars on the road, and the traffic jam is 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 consider their respective concerns, and ignore the other one, especially the urban climate. Under the background of global change, the heat wave occurs more frequently and leads to serious health and energy problems. Sustainable development should consider both air pollution and urban climate. The good mitigation strategies should achieve the improvement in both sides.

Through this project, I knew new friends and learned the latest progress in the field of atmospheric environment 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 during this staying, 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 this 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 really 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 staying at Peking University.