

Statement of purpose

Contents

1. Introduction.....	1
2. Research Interests	1
3. Research Experiences	2
4. Research Findings	3
5. Inspiration	3
6. Intellectual Background	4
7. Hobbies and Future Plan	5

1. Introduction

I am Chunhong Xiao, a master of Environmental Science at Tongji University in China. I hope to join your team for my Ph.D. study in the fall of 2023. I must tell you very frankly that I like your research very much, but I have little exposure to this area. I have a very strong interest in modeling and programming, but I am a complete beginner in this field. Please forgive my rudeness.

2. Research Interests

I have learned about the research projects of your team, which mainly focus on particulate matter (particulate nitrate), ozone, methane, hydroxyl radical, peroxyacetylnitrate (PAN), nitrogen oxides (NO_x), NH₃, halogens, and volatile organic compounds (VOCs). And I found that the objects may vary, but they are often interrelated and interacting, addressing their chemical processes, influencing factors, source identification, air quality patterns, global trends and distribution, the effects of anthropogenic emissions, emission control strategies, and interactions between different study objects, etc. Based on the results, the models and software can also be optimized.

I am curious about the research on background air pollution. The differentiation of background contributions makes the control of local air pollution more targeted and is a very interesting and challenging task for me.

I hope that one day it will be probable to eliminate the effects of background pollution through one-click background deduction in the software interface and to identify sources of background interference simply, including spatial sources, temporal sources, emission sources, etc.

I hope that we can achieve an understanding of air pollution with extensions in its depth and breadth based on atmospheric chemistry modeling, which can not only control the atmospheric pollution problem but also bring some new insights into human health. What's more, it is probable and interesting to achieve cross-disciplinary and interdisciplinary integration and produce more innovations.

3. Research Experiences

During my master's degree, I engaged in the research about rapid detection of carbamate pesticides under the supervision of professor Hong-Wen Gao. We attach more importance to practical application based on the instruments developed in our laboratory, determining the total residues of carbamate pesticides in water by color reaction based on both organic and inorganic experiments. Unexpected details could lead to the failure of my experiments. Initially, I prepared the stock solution with acetone and then diluted it one hundred times with distilled water for the following experiments. However, color fading occurred during the color reaction. I kept repeating this experimental process to explore the factors that might cause the phenomenon. But no matter how I changed the experimental conditions, the fading phenomenon still existed. Fortunately, because the stock solution ran out, so I tried to use ethanol as the solvent. Given that the solubility of the pesticide in ethanol could not meet the requirements, I proposed the application of the mixed solution, namely a small amount of methylene chloride (a substance that is used for pesticide extraction) and ethanol, solving the problem of discoloration.

Before that, the occurrence characteristics of pollutants in air, soil, and

water were the main hotspots in my research. Over this period, I assisted my teacher to complete the closing of the National Natural Science Foundation, involving the organization and archiving of relevant materials. At the same time, I assisted a companion to complete a Chinese paper investigating the spatial and temporal distribution of the urban heat island effect and its influencing factors, mainly responsible for the analysis of the results and proofreading of the article. In the second year of my master's degree, I had no choice but to change my supervisor, which led to a change in my research. I am not a lucky girl who often needs to fight with life and try to get out of a dilemma.

4. Research Findings

At present, my study on pesticide detection has received some breakthroughs. The whole research system has been established, and the following work mainly focuses on optimizing the various aspects of the system to achieve overall accurate detection. We will try our best to improve this method and eventually achieve its application in practice.

From March to June 2022, due to COVID-19, we were unable to carry out our normal scientific work, and I made the best of such a period to complete a summary on the application of meta-analysis in the field of pollutant concentration analysis. Then, it was turned into a paper and submitted to the journal of Environmental Science and Pollution Research (now it is "Under Review"). It was a long and winding process from not understanding the articles at all to finally forming my understanding and putting forward some suggestions for future work, but it also allowed me to see more possibilities for myself.

5. Inspiration

It was a serendipitous process to know you, and I have a deep impression of your encouragement and answers to Ph.D. application. It is you who gives

me the courage to try and the strong desire to start. If it is love, then it should never be too late to start, just like atmospheric chemistry modeling and me. I appreciate your research philosophies and attitudes towards life. I like the atmosphere of your research group. They are highly individual and have a unique personal charm. At the same time, they all keep their passion and love for science.

Choosing atmospheric chemistry modeling was not an easy decision for me, but I think all my past accumulations will make a difference in a new field. In my previous experiences, air pollution is a critical part, which also makes me curious about the causes behind it. My original research subject is related to the spatial source analysis method of atmospheric particulate matter. Regrettably, I was not able to conduct my research on this topic due to a change of supervisor, but this planted a seed in my heart to continue to work in this field in the following days. And what makes such a seed grow into a big tree is probably your encouragement and research. Your research seems to combine all my points of interest, and I am unconsciously drawn to it. Meanwhile, I have a strong interest in modeling, statistical analysis, and programming, but I had less exposure to them during my master's degree because of different research directions, but that didn't stop me from paying attention to these fields, especially when I was reading papers, I would always unconsciously look at them more.

I think the meaning of science is to be able to bring some changes to human society, and I want to be the realizer of its meaning.

6. Intellectual Background

I have studied advanced mathematics and linear algebra during college, and I also have a foundation in chemistry, inorganic chemistry, organic chemistry, and biochemistry. I am sorry that I know relatively little about atmospheric chemistry. During my master's degree, I studied a simulation course for a semester to simulate the physical field, which also aroused my

interest in simulation and modeling. In programming, I have basic Python programming knowledge. In addition, I created a personal academic website based on the template within a week, even if I do not understand the programming language. When doing this, I was always unconsciously addicted to it. My learning ability, perseverance, unyielding spirit, logical thinking ability, and innovative consciousness are all my powerful weapons on the road to science. My focus, conscientiousness, persistence, and a keen eye for detail will also help me solve one problem after another. In summary, I have the confidence, enthusiasm, and courage to enter a new field and achieve breakthroughs.

7. Hobbies and Future Plan

Scientific research is more like a magnet with an inexplicable attraction to me. I love science and hope to achieve self-worth. For my future plan, I would like to be a university professor, to shine in the field I like, and to teach in the position I love. In my free time, I like to do something relaxing, such as dwelling, thinking, and going out to feel the breath of nature. Sometimes, I am confused and not confident, but I never change my mind and forget my dreams.

Finally, I would like to express my appreciation for you and enthusiasm for your research once again. I have sincerely explained all my circumstances to you and hope to have the opportunity to chat with you. If you think I need to be tested, I would like to spend one year or more to complete all the relevant studies. I will not give up such an opportunity until you rule out all possibilities. Of course, I respect all your decisions and understand all your concerns.

Chunhong Xiao

No.1239 Siping Road, Yangpu District, Shanghai, China

+8613371852150