



Continuous measurements of ice nucleating particles in Beijing using an automated continuous flow diffusion chamber

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Ice nucleating particles (INP) have potentially important impacts on climate and precipitation, but the extent of anthropogenic influences on atmospheric INP remain uncertain. To examine the potential influence of anthropogenic activities on INP, we deployed a newly-automated continuous flow diffusion chamber (CFDC) in Beijing, China, one of the most heavily polluted regions on earth. We measured INP in the spring of 2018 and observed varying influences from dust, urban pollution, and relatively clean/background conditions during a one-month period. The CFDC operated "continuously", sampling four hours out of every six, with a two-hour instrument refresh period. INP concentrations were elevated during both dust and polluted periods, suggesting a potential and significant anthropogenic impact on INP. Our results differ from previous studies showing minimum influence from anthropogenic activities, however our study location is located in a more rural region with a wider range of potential INP sources, including agricultural and light-industrial activities. We discuss our observed INP concentrations at temperatures ranging from -20 to -30 C, potential impacts, and comparisons with previous studies. Finally, we give a brief overview of modifications to the CFDC that enabled its automated operation that could be implemented in other sites to obtain similar highly time resolved measurements of INP.