

Ice nucleating particle concentration during a combustion aerosol event

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The formation of ice in supercooled clouds is important for cloud radiative properties, their lifetime and the formation of precipitation. Cloud water droplets can supercool to below -33°C , but in the presence of Ice Nucleating Particles (INPs) freezing can be initiated at much higher temperatures.

The concentration of atmospheric aerosols that are active as INPs depends on a number of factors, such as temperature and aerosol composition and concentration. However, our knowledge of which aerosol types serve as INPs is limited. For example, there has been much discussion over whether aerosol from combustion processes are important as INP. This is significant because combustion aerosol have increased in concentration dramatically since pre-industrial times and therefore have the potential to exert a significant anthropogenic impact on clouds and climate. In this study we made measurements of INP concentrations in Leeds over a specific combustion aerosol event in order to test if there was a correlation between INP concentrations and combustion aerosol. The combustion aerosol event was on the 5th November which is a major bonfire and firework event celebrated throughout the UK. During the event we observed a factor of five increase in aerosol and a factor of 10 increase in black carbon, but observed no significant increase in INP concentration. This implies that black carbon and combustion aerosol did not compete with the background INP during this event.