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Heterogeneous sulphate formation in the aerosol, the cloud and the frost

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The rapid formation of sulphate is the main driving force behind the explosive growth of PM_{2.5} in China. Our comprehensive study, combined with field observations, laboratory simulations and modelling, indicated that high concentration of hydroperoxide (H₂O₂) from heterogeneous reactions significantly promoted sulphate formation in winter north China. Unexpectedly, during the same campaign, a high proportion of sulphate has been observed in the frost. The chemical composition of the frost appeared to be independent of that of PM_{2.5}. These findings can be important for the removal rate of SO₂ in the atmosphere and for the occult deposition of sulphate.

Also, we have investigated the contribution of oxidation channels to sulphate formation in the cloud at the summit of Mt. Tai (1545 m) in summer. Our results suggested that dissolved ozone is the dominant oxidant for the oxidation of S(IV), especially when the pH of the cloud water is less acidic (> 5.5). In recent years, with the increase of ozone concentration in China, the sulphate formation by ozone in the cloud will continue to be pronounced.

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