

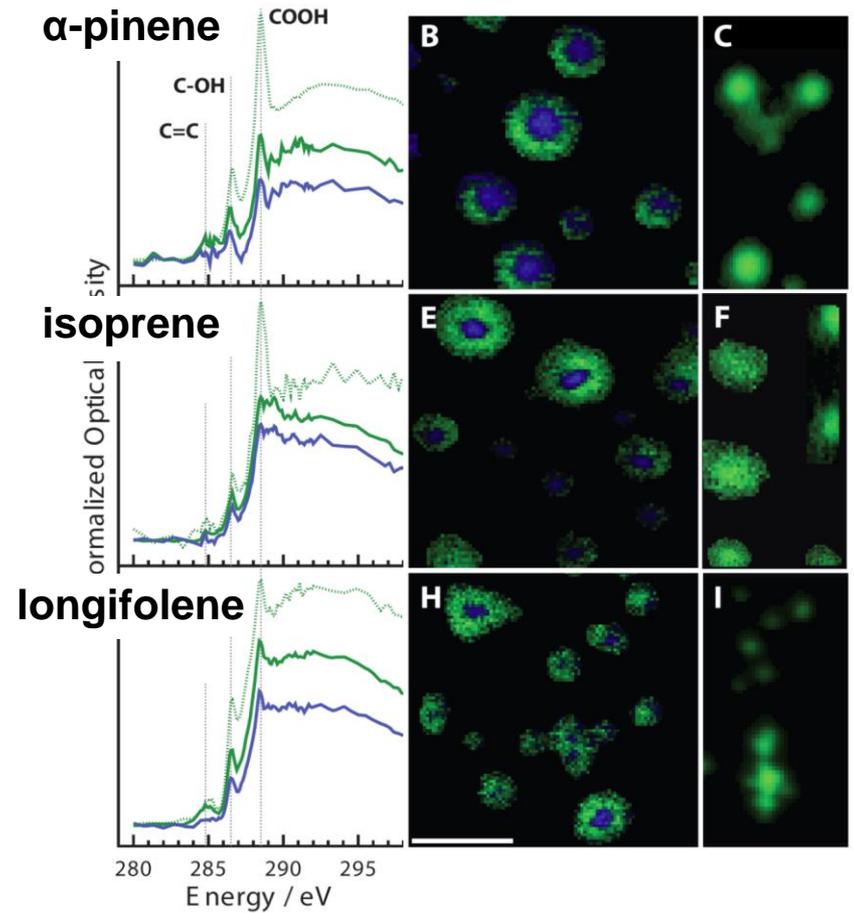
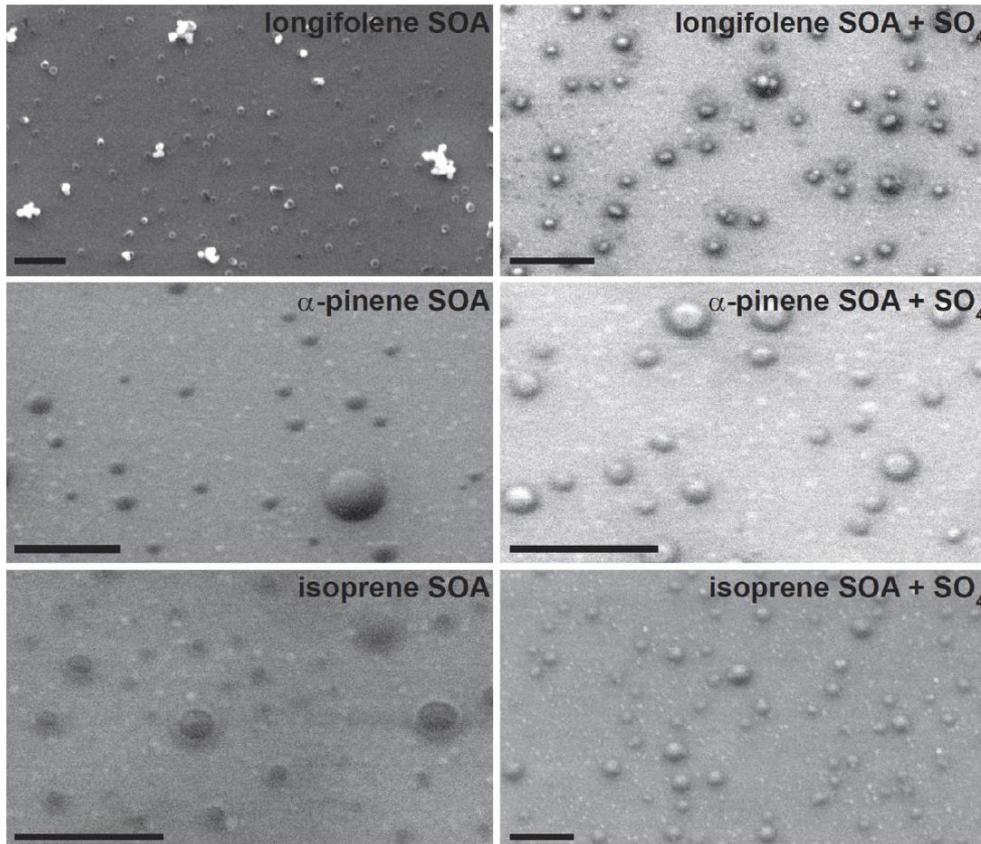


The role of anthropogenic and biogenic SOA in cold cloud formation

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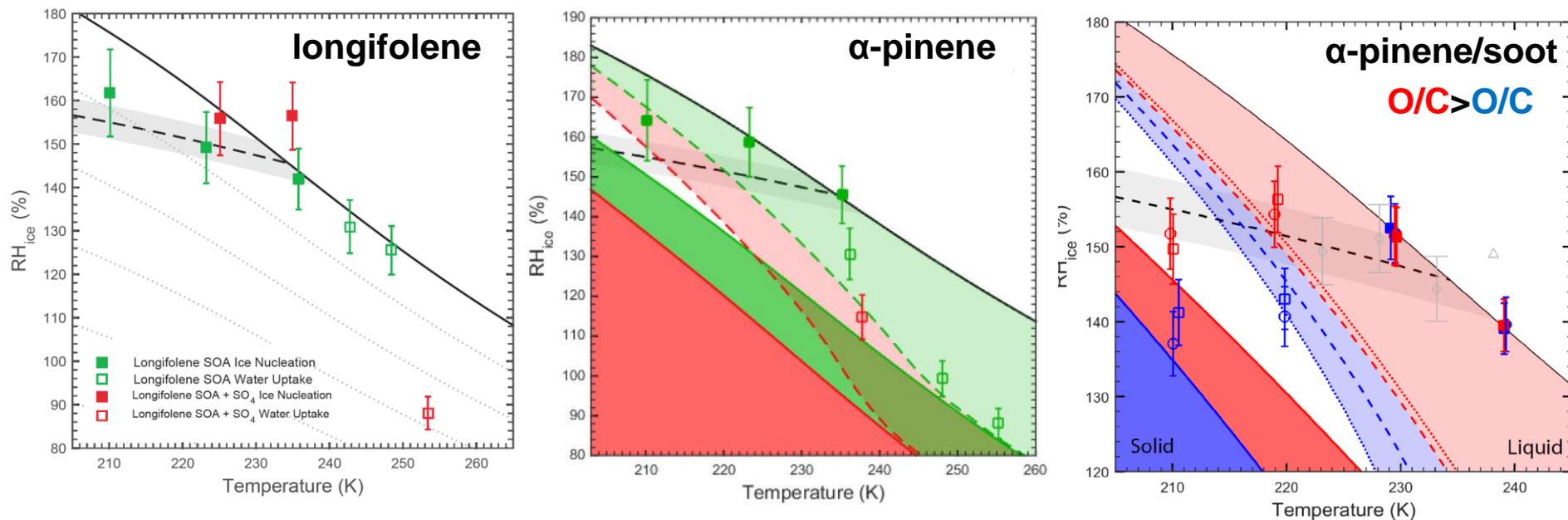
Particle phase and mixing state of laboratory generated SOA particles with and without sulfates and soot: α -pinene, longifolene, isoprene, naphthalene derived SOA particles



Particles generated using PAM, OH oxidation.

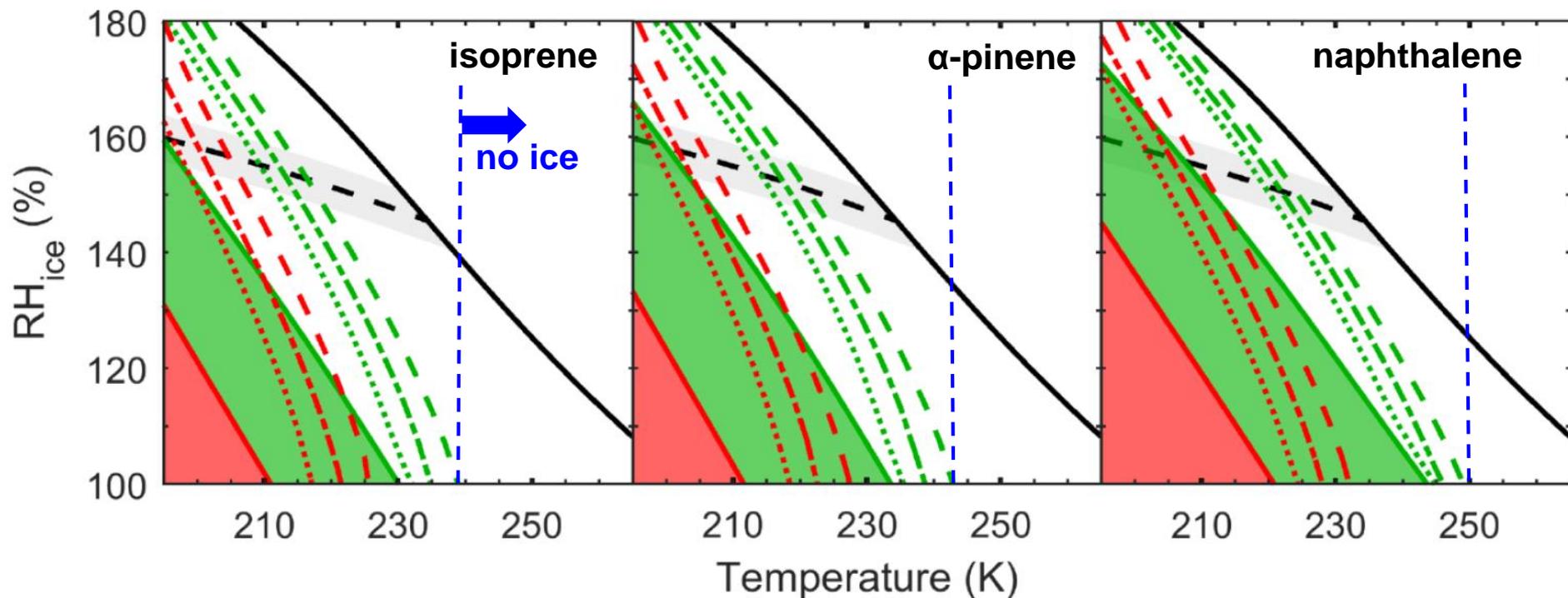
Charnawskas et al., Faraday Disc., 2017

Ice nucleation propensity of amorphous SOA particles with and without sulfates or soot



- Presence of sulfates reduces RH for water uptake.
- Sulfates act as plasticizer. Reduces ability of SOA to act as IN.
- Soot can act as immersion ice nuclei at higher temperature.
- Biogenic SOA seem not to be efficient IN under mixed-phase cloud conditions, in contrast to anthropogenic SOA.

SOA phase state estimation by numerical diffusion model accounting for updraft velocity- Implications for ice nucleation



- Glass transition temperature and full deliquescence relative humidity depend on **sulfate** presence.
- T_g and FDRH depend strongly on updraft velocities.
- SOA phase state may govern ice nucleation pathway.

RESEARCH ARTICLE

10.1002/2016JD025817

Key Points:

- Long-range transported particles in the free troposphere (FT) can promote ice formation
- Ice nucleating particles at a remote FT site are multicomponent and contain organics
- Aged FT particles transported from different locations show similar ice formation potentials

Supporting Information:

- Supporting Information S1

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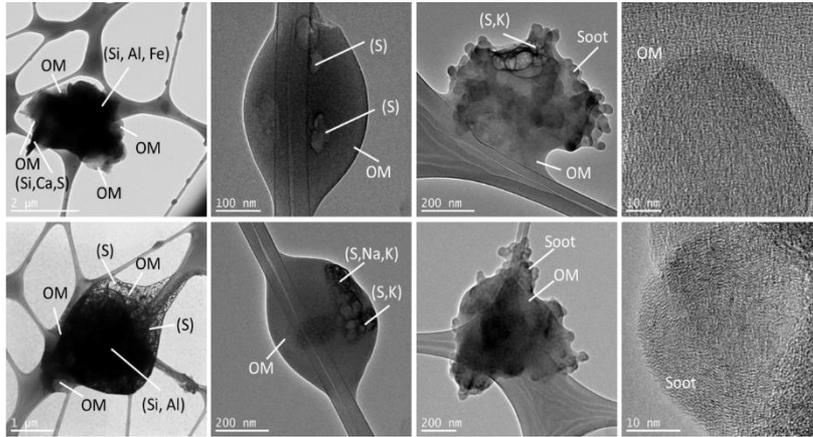
Ice cloud formation potential by free tropospheric particles from long-range transport over the Northern Atlantic Ocean

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Ice cloud formation potential by free tropospheric particles from long-range transport over the Northern Atlantic Ocean

S. China & P. Alpert et al., JGR, accepted



- Particles chemically complex.
- Particles associated with organic material.

- Particles initiate immersion freezing & deposition ice nucleation.
- Derived water activity based J_{het} and n_s parameterizations.

