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ARCTIC RESEARCH PROGRAMME

Understanding Arctic ice clouds

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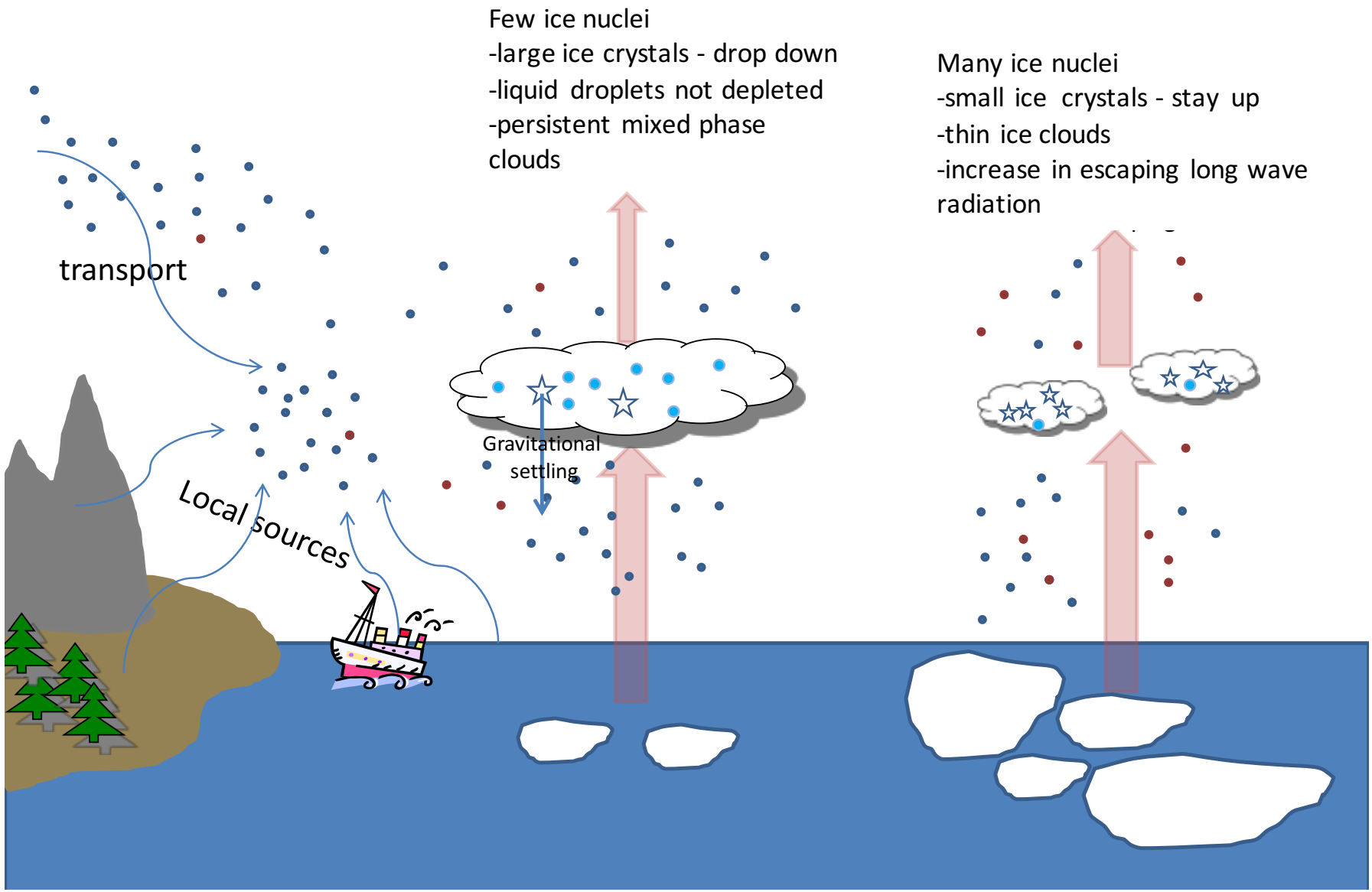
Ice nuclei affect ice formation and cloud properties



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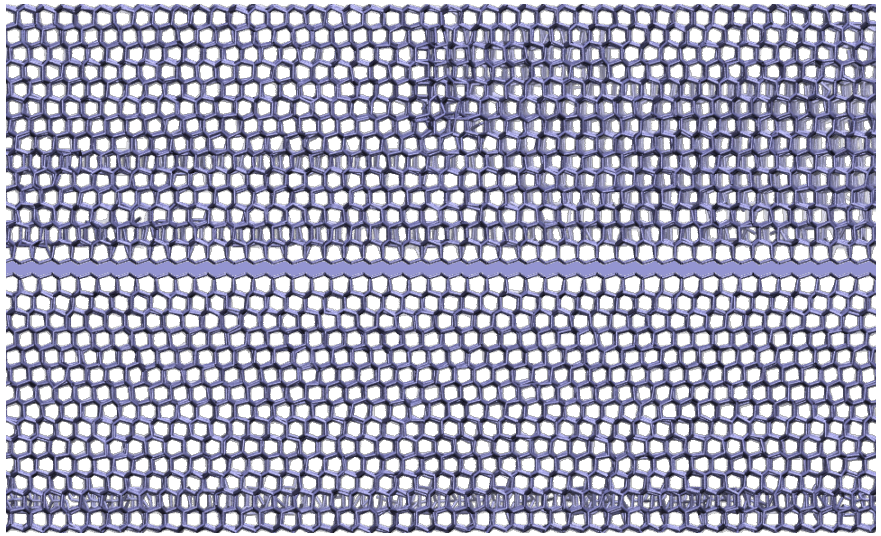
Molecular level modelling

- Molecular Dynamics
- ice-like, silver-iodide, feldspar, black carbon as ice nucleus surfaces

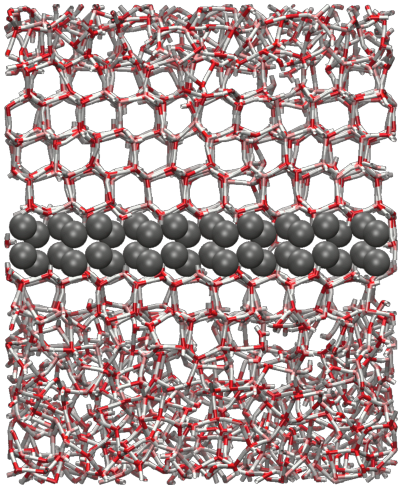
Monatomic water (mW) potential

~ 100 000 'H_2O' molecules



TIP4P/2005 all-atom potential

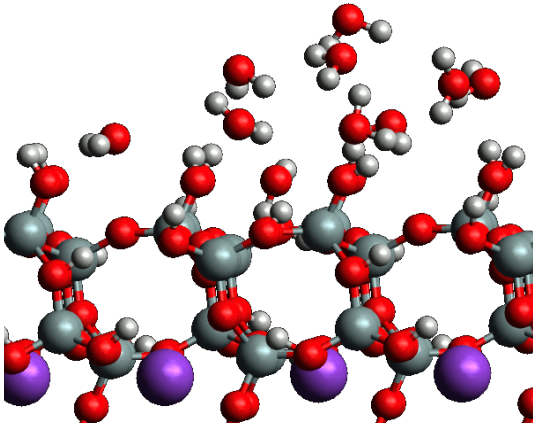
~ 1000 H_2O molecules



Quantum chemistry

"a few" H_2O molecules

or no time evolution



Laboratory studies and ground based observations

ice nuclei characterization & method development

ice nucleus activation

ice nucleus separation

analysis

Atmospheric aerosol

ICE-CVI

AEROSOL MASS SPECTRO METER

LASER INDUCED FLUORECENCE/ BREAKDOWN SPECTROSCOPY

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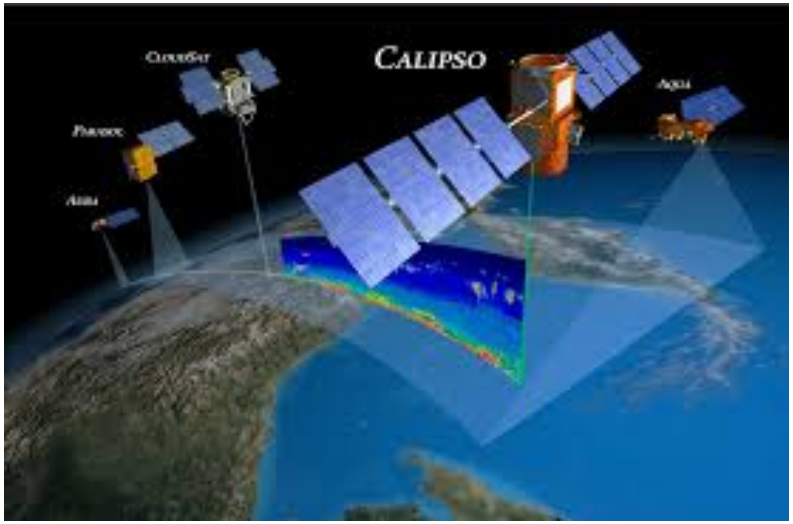
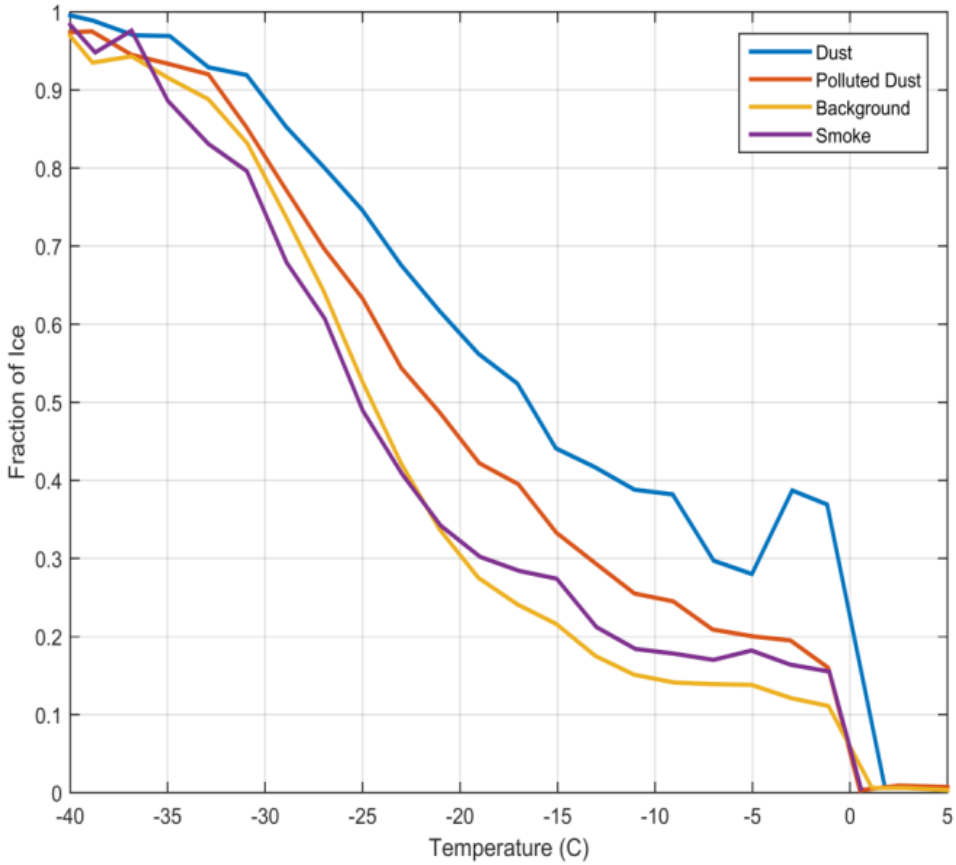
Satellite observations

Earth orbiting Lidar Calipso

-cloud phase (ice, water, mixture of both)

-aerosol type (dust, polluted dust, smoke…)





In the presence of dust aerosols, clouds freeze at temperatures 5-10 degrees warmer than without dust

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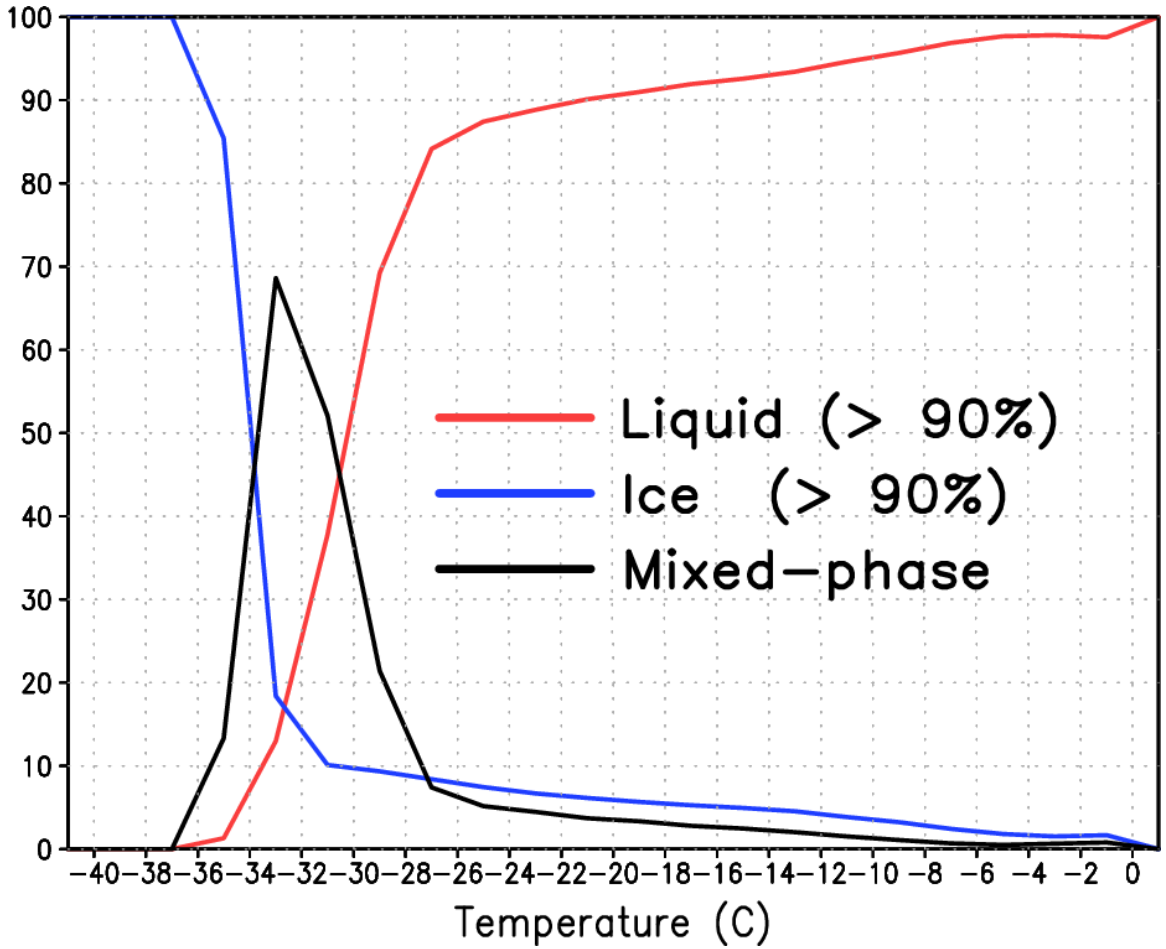
Atmospheric models

Comparison of observations to ECHAM-HAMMOZ-SALSA atmospheric model:
predicts freezing only at very cold temperatures

- Cloud microphysics/dynamics incorrect?
- Inefficient transport of dust into Arctic? Missing dust sources?
- Some other aerosol than dust causing the freezing?



More details in the posters …

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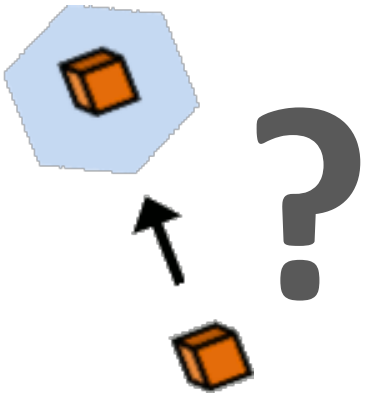
Ice Clouds and Ice Nucleation in the Arctic (ICINA):

- AEROSOL EFFECT ON THE PHASE OF ARCTIC CLOUDS
- EXPERIMENTAL ICE NUCLEATION RESEARCH ON ICE NUCLEI COUNTER ‘SPIN’
- MOLECULAR LEVEL THEORY AND EXPERIMENTAL VALIDATION



? FROM AEROSOLS TO ICE IN CLOUDS