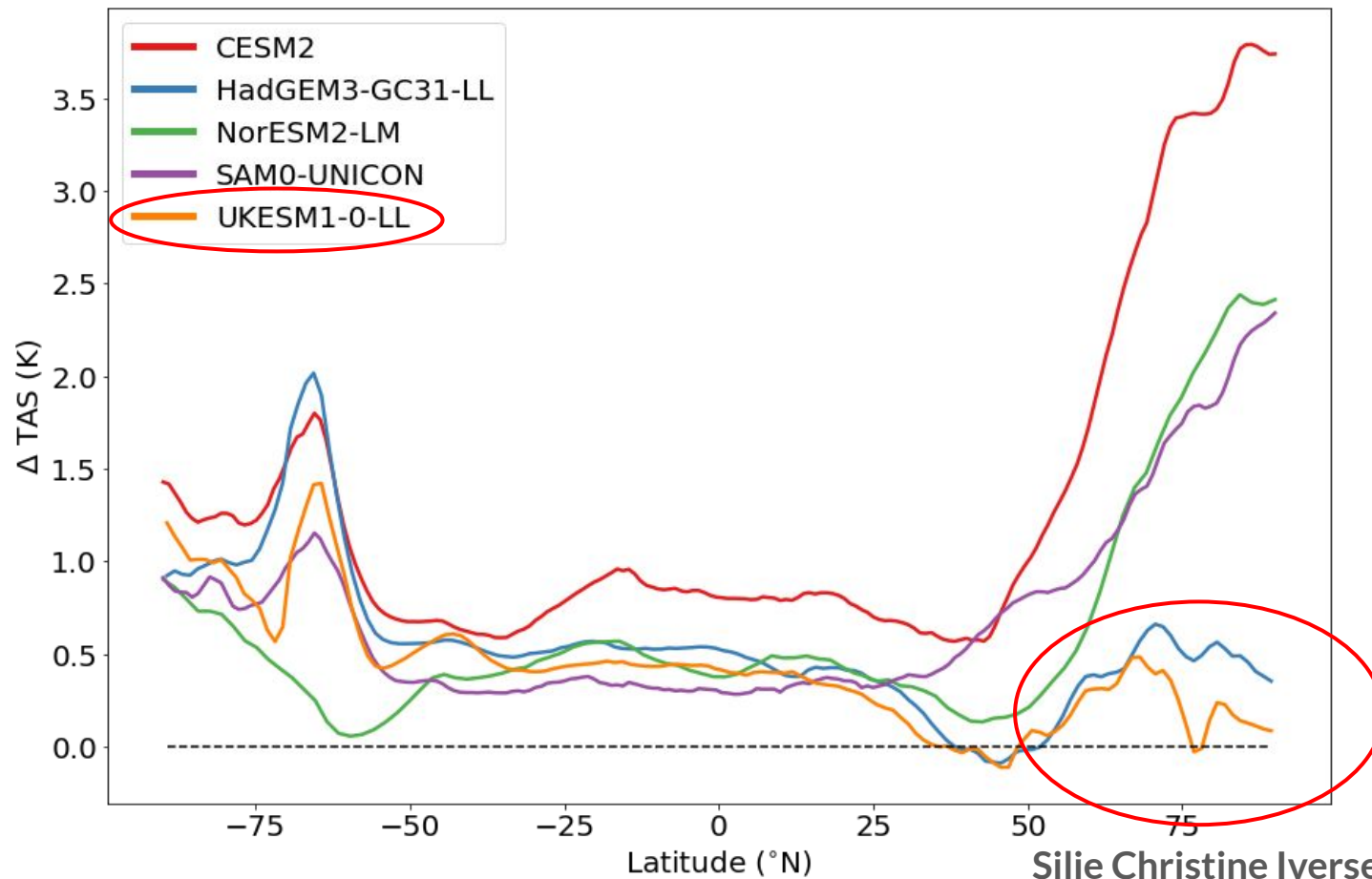# Cloud variation in the Arctic for UKESM-1-0-LL

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Motivation: Why UKESM-1-0-LL?


Silje Christine Iversen , 2019, Abisko

Motivation: Why cloud variation?

- Clouds are very important for the radiative budget
    - Clouds in the arctic has a warming effect throughout winter (less OLR)
- One of the most important cloud characteristics defining the radiative properties is cloud phase composition (T. Nomokonova et al,2019)

(T. Nomokonova et al, (2019), Statistics on clouds and their relation to thermodynamic conditions at Ny-Ålesund, Atmos. Chem. Phys., 19, 4105–4126, 2019)

Methods: Radar-observation

- Observations from CLOUDNET @ Ny-Ålesund and Summit observatories
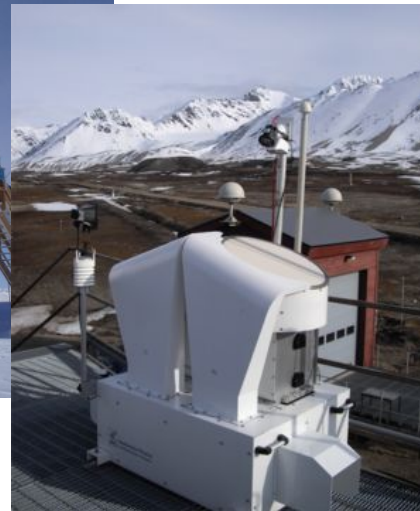
Methods: Radar-observation

- Output from Radar-observation is categorical:
    - 0: Clear sky, 1: Cloud droplets only, 2: Drizzle or rain, 3: Drizzle/rain & cloud droplets, 4: Ice, 5: Ice & supercooled droplets, 6: Melting ice ,7: Melting ice & cloud droplets, 8: Aerosol, 9: Insects, 10: Aerosol & insects
    - I use these to categorize both column at each timestep, and vertical levels for all timesteps as:
   - 0: Clear sky, 1: Water cloud, 2: Ice cloud, 3: Mixed cloud

Methods: Cloud-variables from UKESM-1-0-LL

- CL - Cloud-cover (one value for each model-level at each model-cell)
- cli - Cloud Ice Mass fraction
- clw - Cloud Ice Mass fraction

I will use these variables to classify the phase of clouds represented at model heights and columns (Same as for the observational data). Ratio between cli and clw (clw = 0 is ice, cli = 0 is water, obviously)

Results: Cloud variation from observations
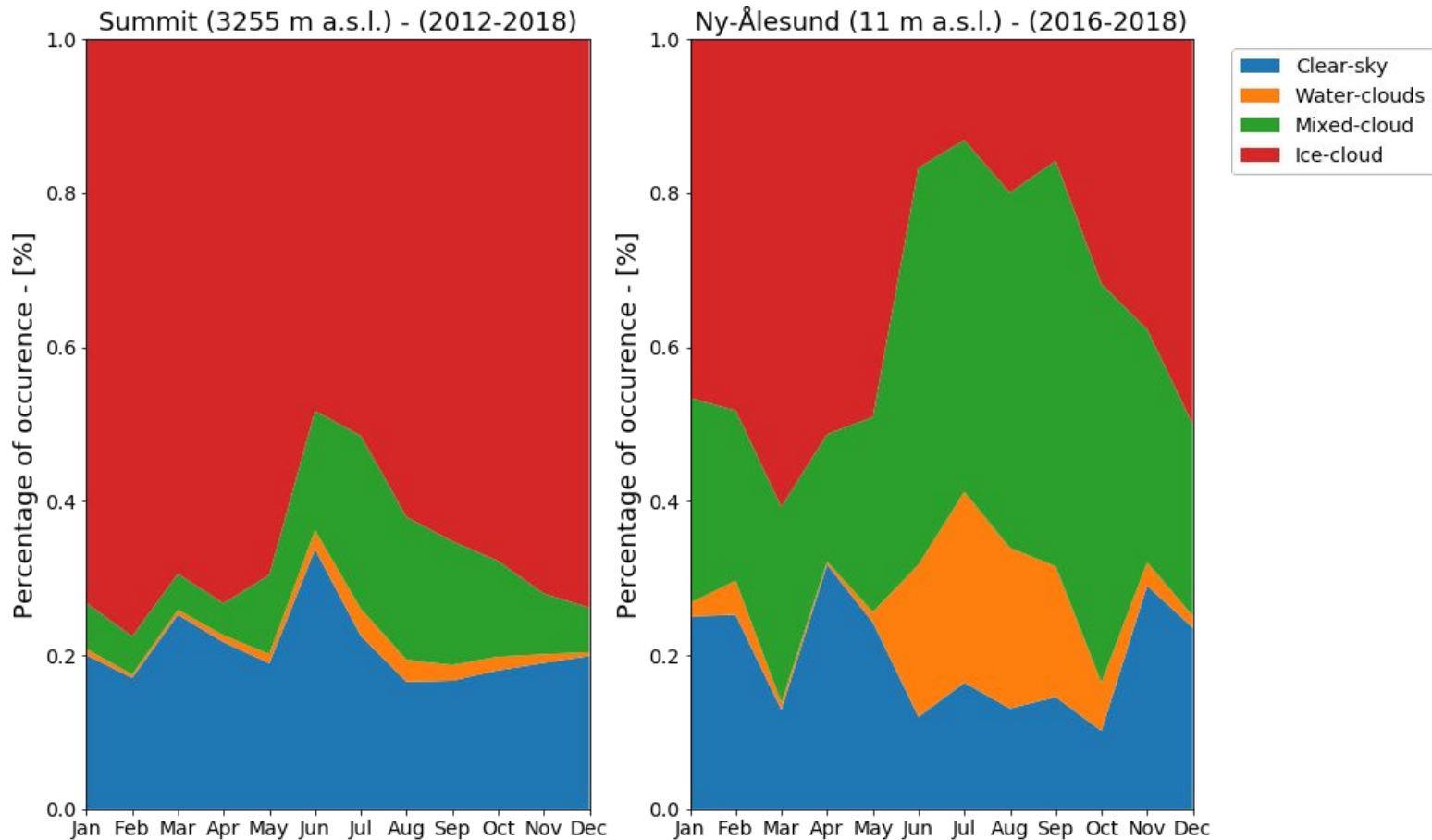
Results: (To be produced)

- Imagine a plot of seasonality of clouds in different bands (0-1000m, 1000m-2000m, ...), both for model and observation
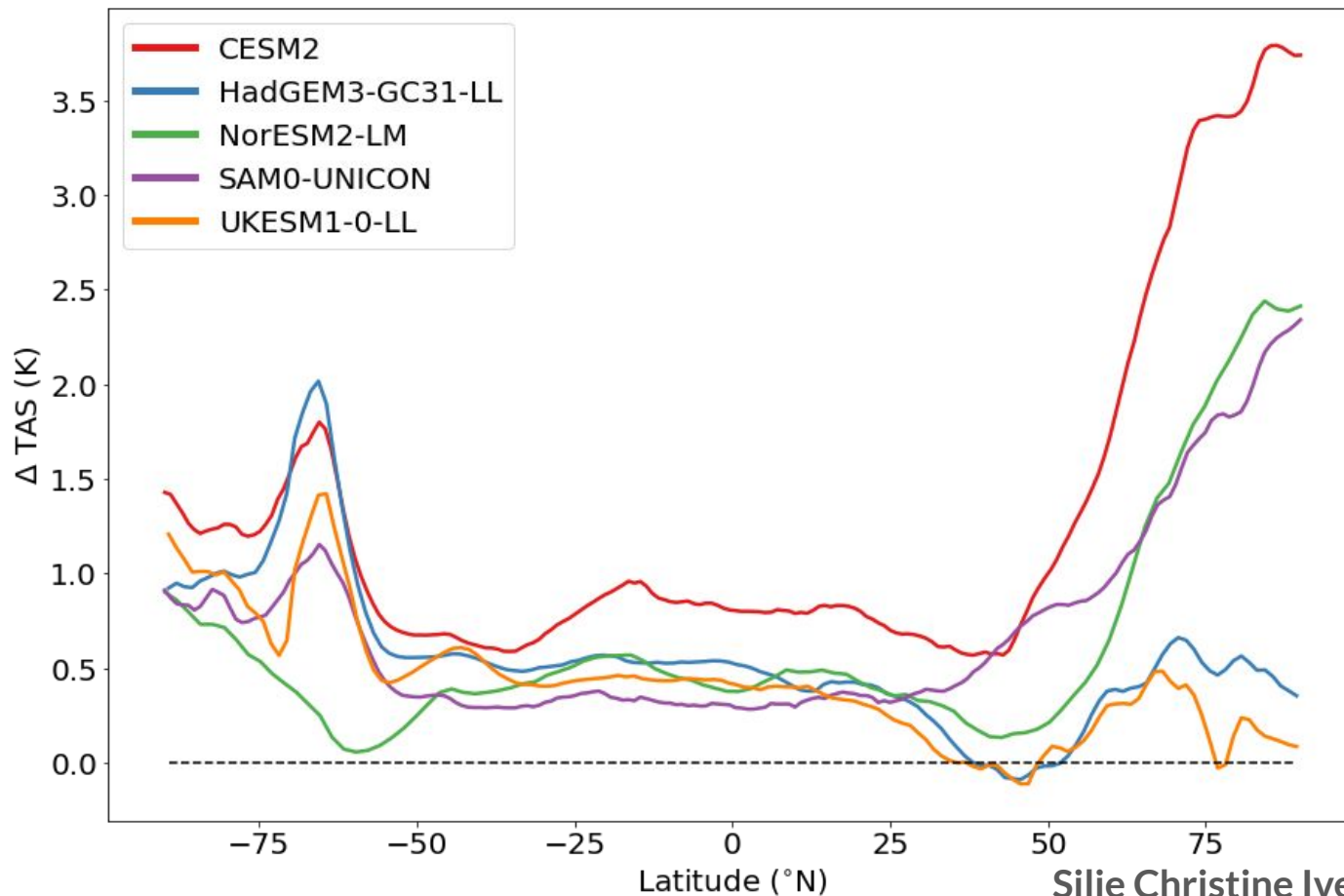- Imagine also plots of seasonality of "phase" for whole column (Like figure on last slide, but for models)

Outlook: Implement classification of models

- Title says it all, fix my implementation of cloud-phase classification
- Produce plots that should be on my results page

Outlook: Why not CESM, NorESM2-LM?

Silje Christine Iversen , 2019, Abisko