

AeroCom Trajectory Experiment

(GCMTraj)

Experiment status

AeroCom meeting 2020

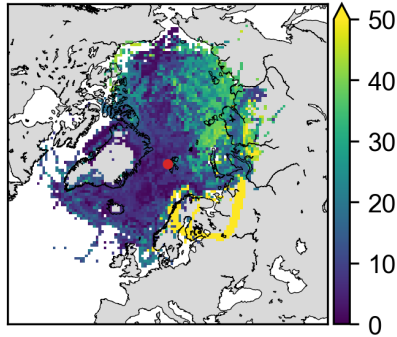
Paul Kim, D. G. Partridge,

J. M. Haywood, A. Jones, A. Ekman, B. Heinold, S. Krishnan, Z. Kipling, T. Kuhn, U. Lohmann, D. Neubauer, J. Schacht, P. Stier, H. Struthers, T. Takemura, J. Teixeira, P. Tunved, H. Wang, D. Watson-Parris, Y. Yang, J. Zhu

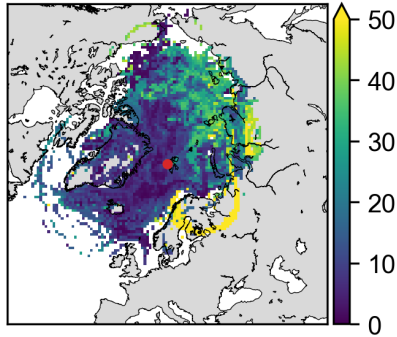
ArcticTraj-DE recap

Number concentration ($D_p = 250-630\text{nm}$) cm^{-3}

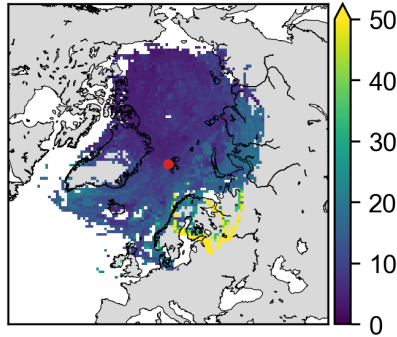
ERA-Interim



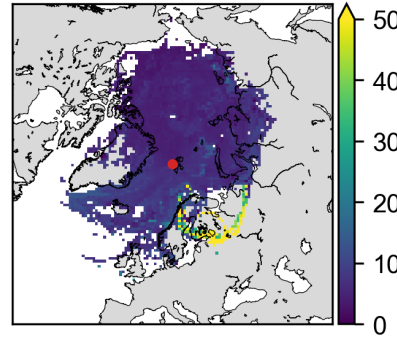
ERA5



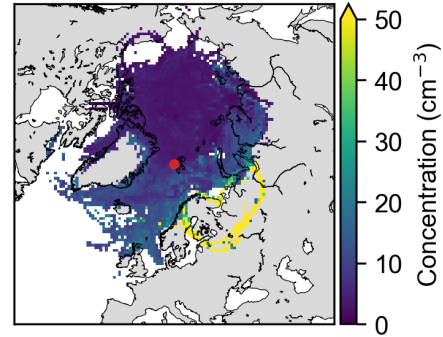
HadGEM3-UKCA



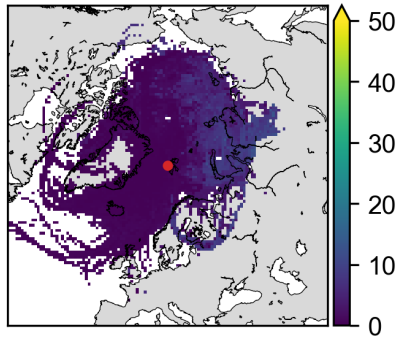
UKESM1.0



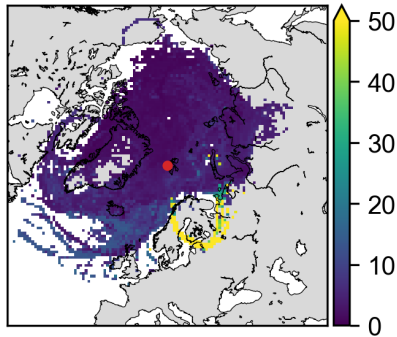
CAM5.3(+)



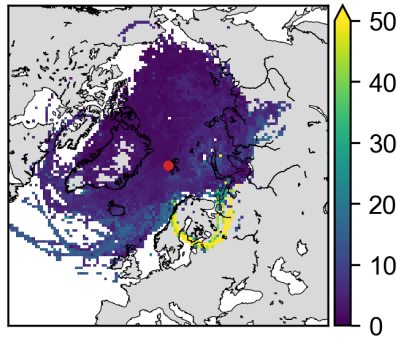
ECHAM6.3-HAM-P3



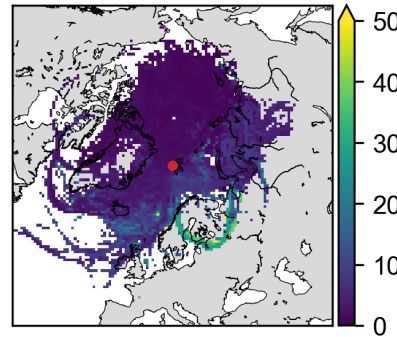
ECHAM6.3-HAM2.2



ECHAM-HAM-ECLIPSE



ECHAM6.3-SALSA2.0



Which aerosol life cycle processes drive these differences?

Experiment status

Two stages

ArcticTraj-DE

DE: "Development Experiment"

6 months (summer 2006)
1 station (Zeppelin)

COMPLETED

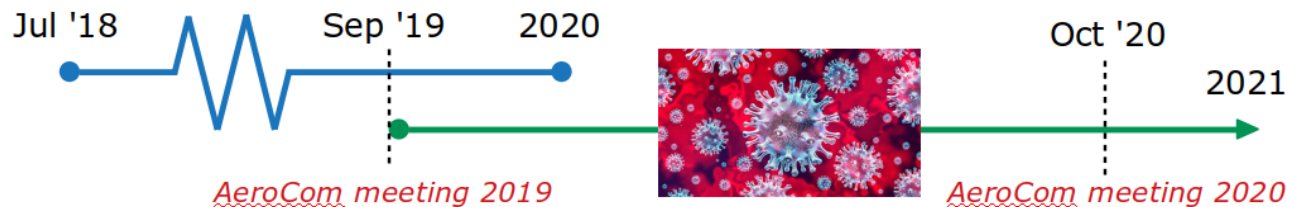
GlobalTraj-CE

CE: "Core experiment"

5 years (2009-2013 inc.)
10 global stations

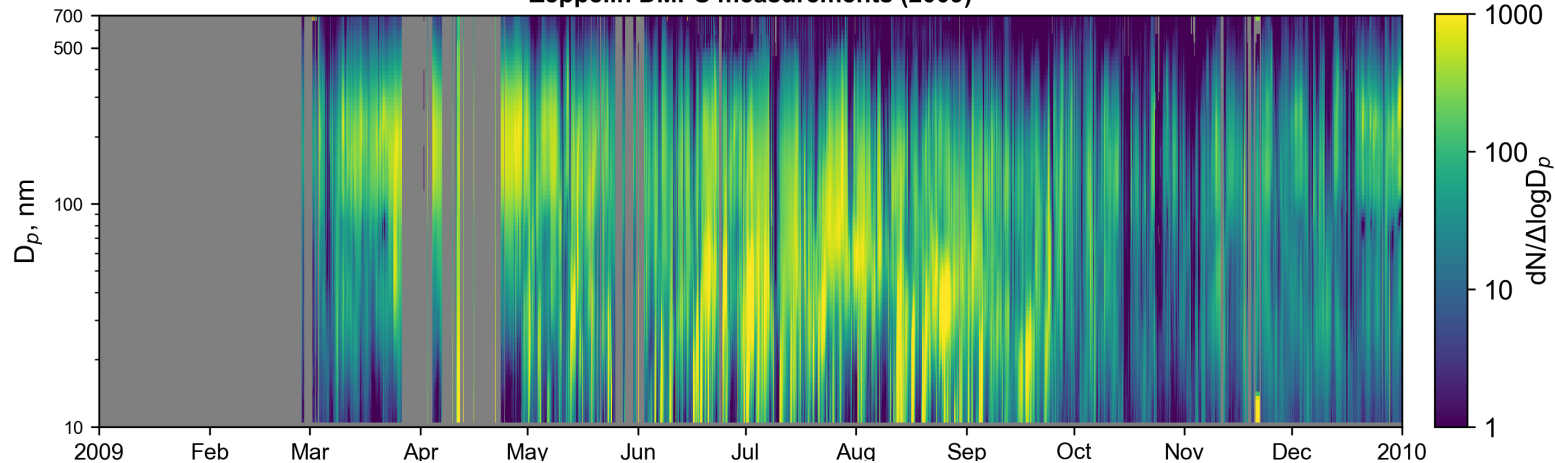
ONGOING

Timeline



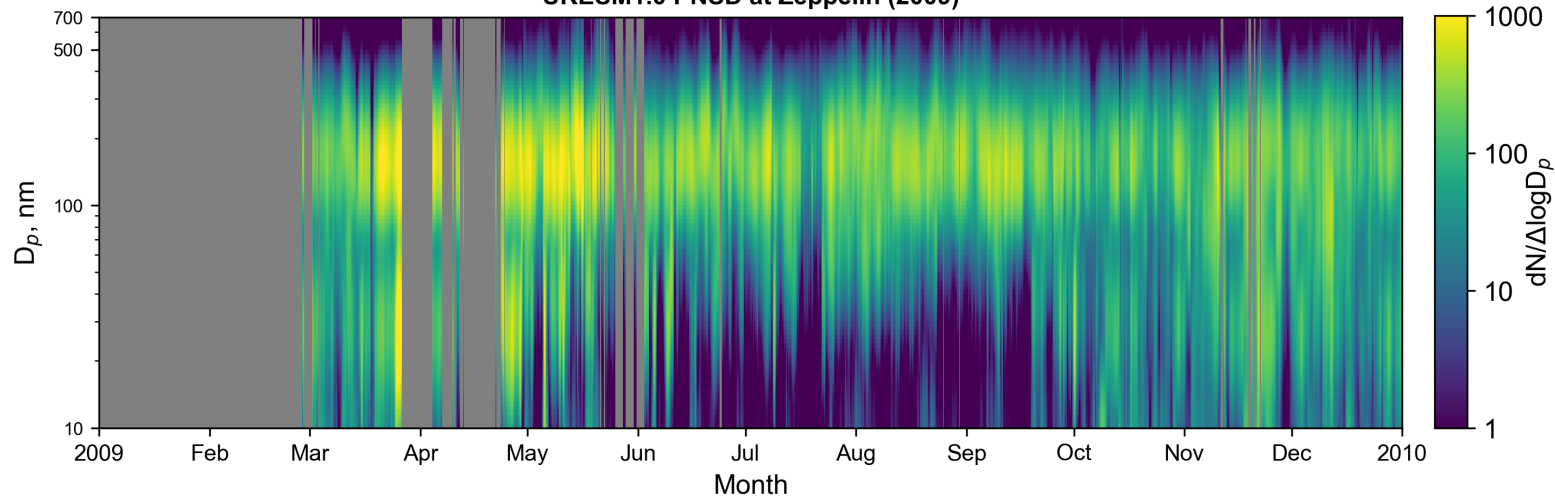
Life cycle analysis example: experienced precipitation

Zeppelin DMPS measurements (2009)



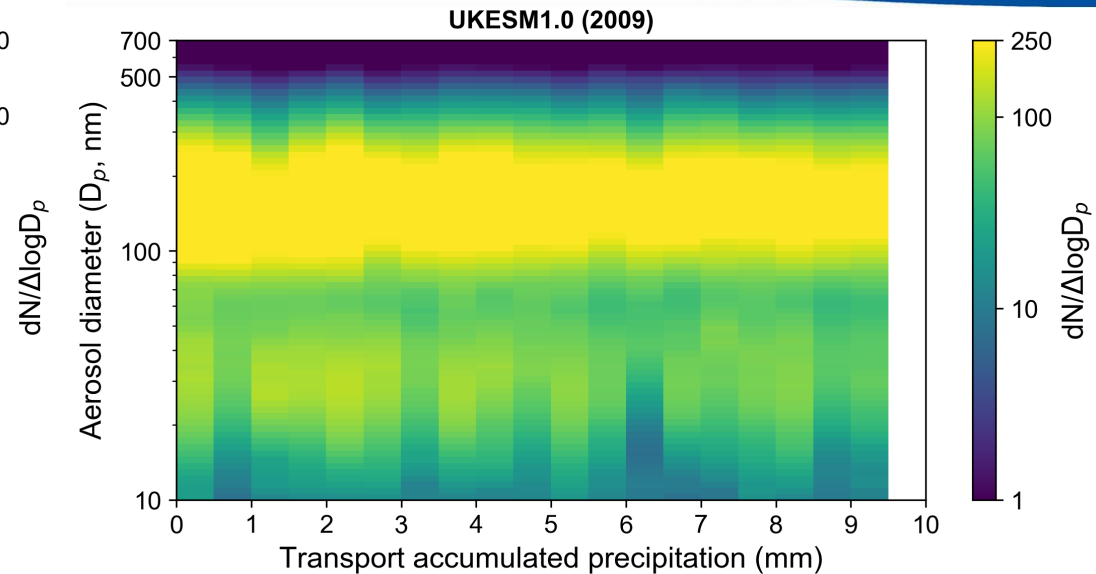
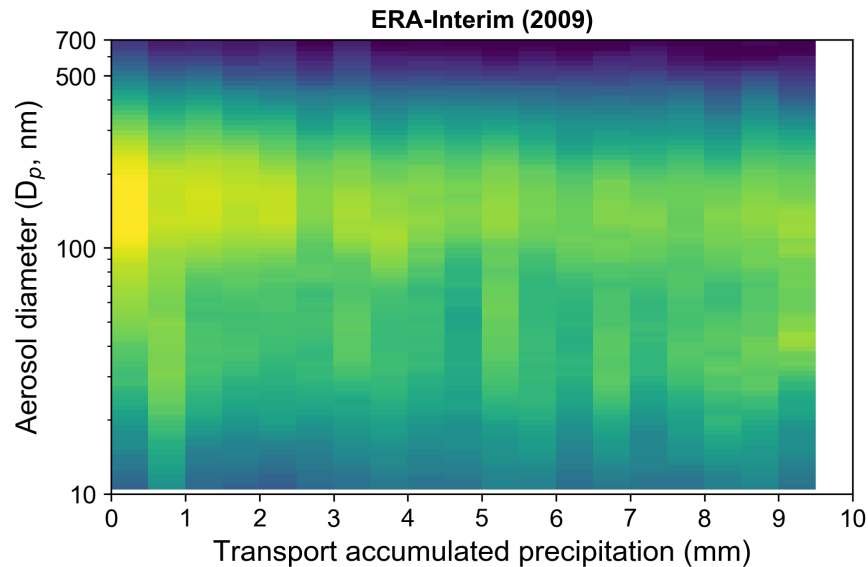
Overestimation of concentration of larger sizes throughout the year.

UKESM1.0 PNSD at Zeppelin (2009)



Missing nucleation/Aitken aerosol concentrations in summer.

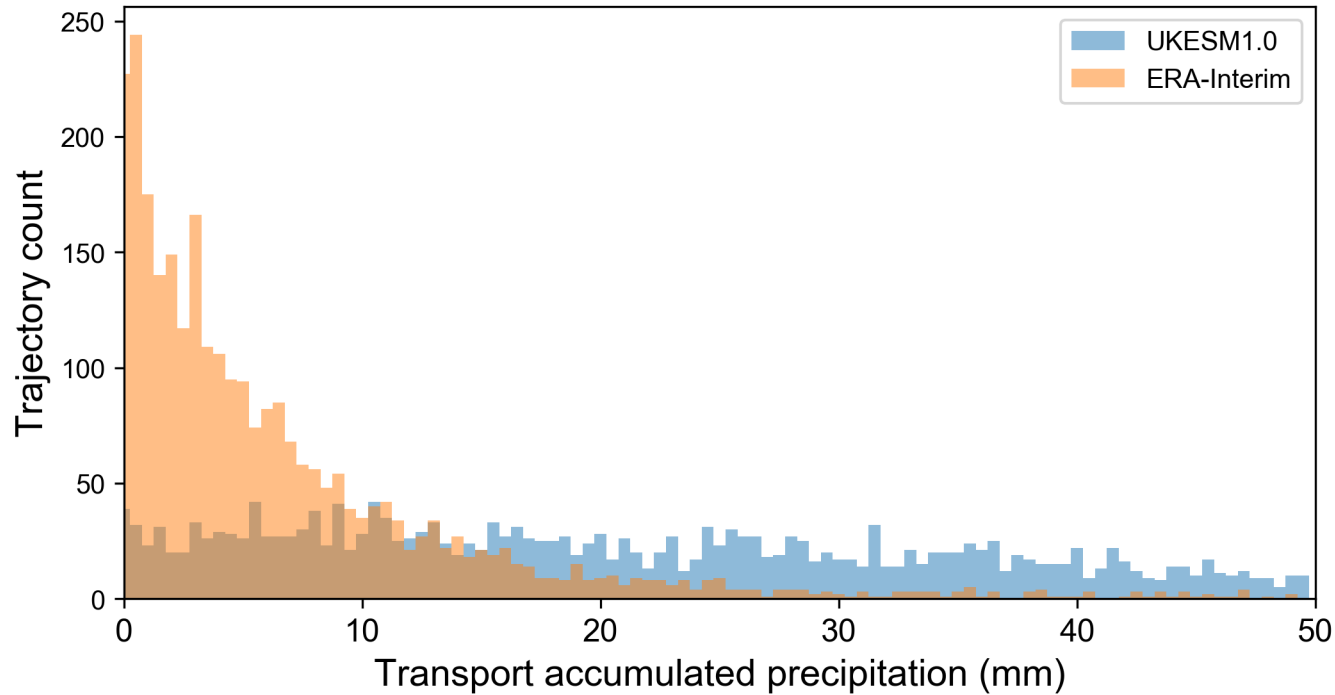
Life cycle analysis example: experienced precipitation



ERA-Interim + DMPS observations: as the arriving air mass experiences more precipitation, the larger aerosols are getting removed.

UKESM: over estimation of larger sizes is also highlighted here (matching colourbar limits) however the precipitation during transport seems to have little effect on removal of larger particles.

Life cycle analysis example: experienced precipitation

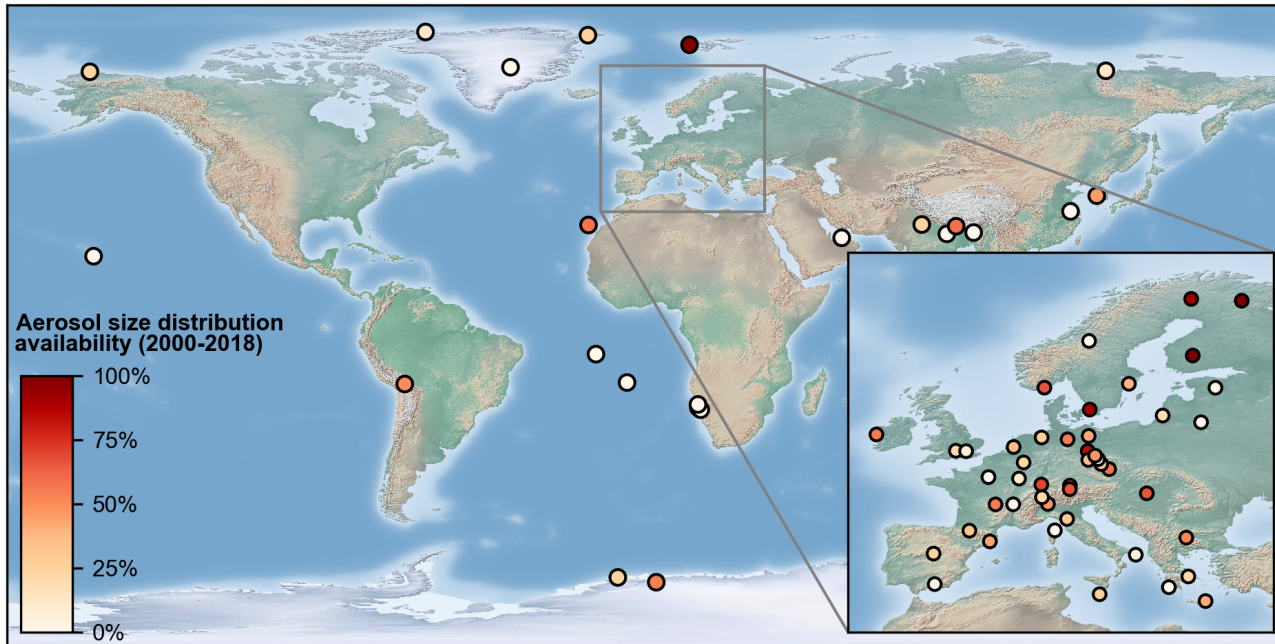


On average, UKESM trajectories experience more precipitation compared to ERA-Interim trajectories.

Statistics to be improved with the full 5 years of data.

Only one piece of the puzzle! Many more processes to look at.

GlobalTraj-CE station selection



Pick **five** stations in order of preference to be analysed in the core experiment (subject to data availability).

Participants can enter their preferences via this Google form (link will be emailed):

<https://forms.gle/EqMpALo8GFBh63KYA>

Email: p.s.kim@exeter.ac.uk

Thank you for listening

Email: p.s.kim@exeter.ac.uk