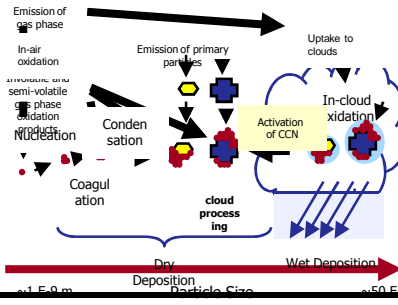


Graham Mann, Ken Carslaw, Dominick Spracklen, Hannele Korhonen, Francois Benduhn, Joonas Merikanto, Paul Manktelow, Dave Ridley, Matt Woodhouse, Maria Frontoso, Martyn Chipperfield

1. UK Chemistry & Aerosol model has modal GLOMAP aerosol scheme

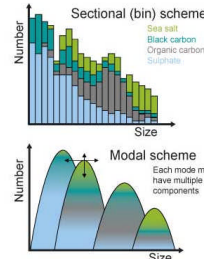
UKCA uses GLOMAP aerosol microphysics to control variation in particle size & composition



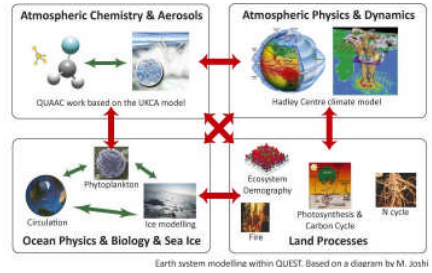
Global Model of Aerosol Processes (GLOMAP)

Developed in Leeds since 2003 to model global aerosol distribution with size-resolved representation of microphysics & chemistry. Resolves processes that grow aerosol from nm to CCN sizes. Simulate potential climate impacts with maximum degree of realism.

Analysed meteorology used to drive model enabling testing of controlling processes and field

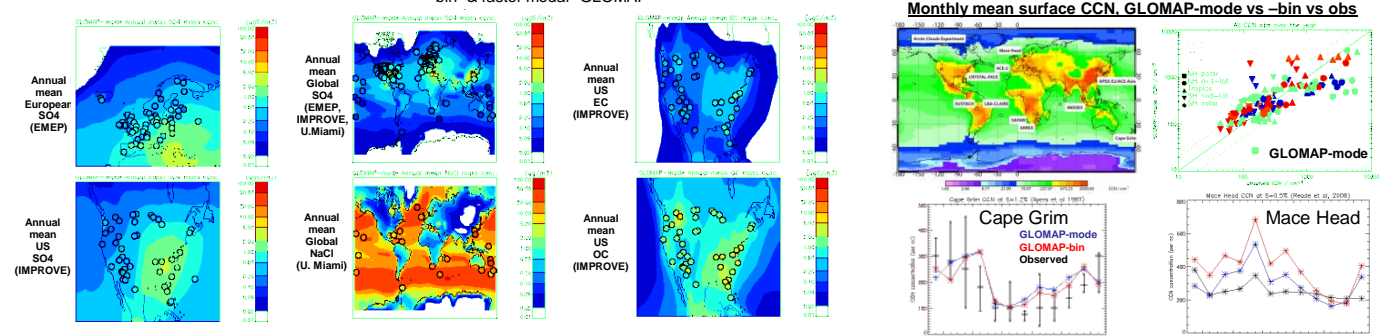


UKCA in QUEST & HadGEM Earth System models

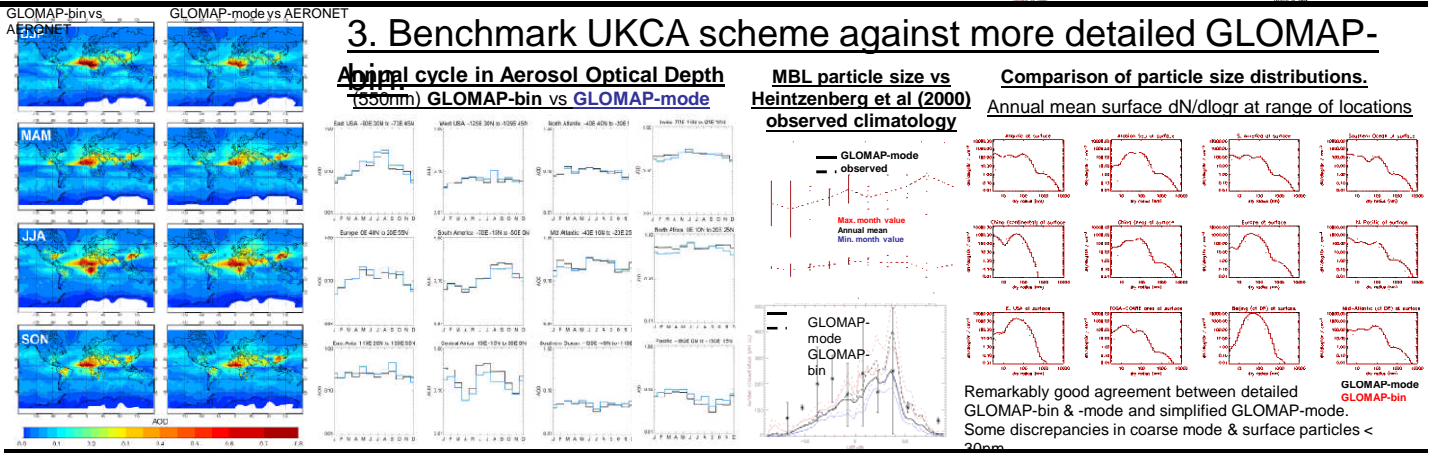


UKCA uses GLOMAP-mode aerosol scheme coupled to chemistry and climate. It is a core component of the QUEST & HadGEM Earth System models

2. Evaluate UKCA vs observations in TOMCAT chemistry transport model



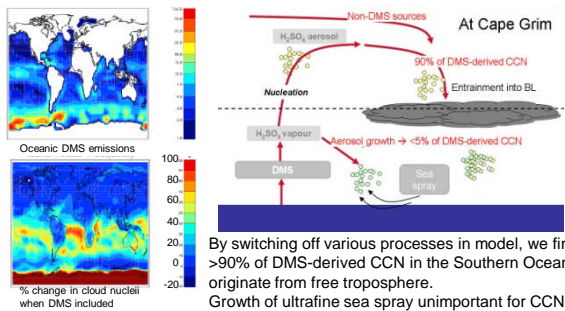
3. Benchmark UKCA scheme against more detailed GLOMAP-



4. Wide range of applications of GLOMAP and UKCA

CLAW: What are controlling factors for DMS impact on remote CCN

Suggested biogenic climate feedback via DMS-aerosol-cloud. Climate impact of marine biota not well understood 20 years later. Sensitivity studies in GLOMAP reveal role of DMS in climate.

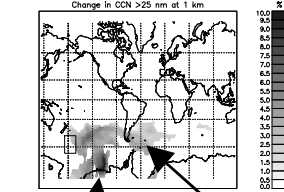


Korhonen et al (2008, JGR)

DMS effect on CCN concentrations very spatially inhomogeneous. Low increase in CCN in 50-65S despite highest DMS emissions. Highest increase in CCN in 30-50S (>+50 cm⁻³, +70-100%)

Test geo-engineering ideas

e.g. fertilization giving DMS impact on CCN. 5 x DMS in perturbed patch experiment. Matches SOFEX observed change in seawater [DMS] following fertilization.

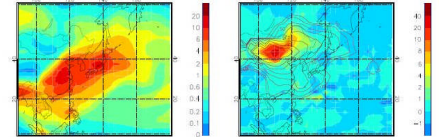


Growth of existing particles near patch. Entrainment of new particles into BL far from patch due to nucleation, growth.

Find effect on CCN concentrations much smaller than suggested, but potential cloud effects non-local to patch and widespread.

Dust-sulphate interactions over E. Asia

Dust loading (μg m⁻³) and % sulphate on dust



Impact of the ACE-Asia "perfect dust storm" on SO₄ aerosol mass much smaller than estimated from previous modelling studies. Dust uptake gets saturated at a few % SO₄ in polluted regions.

Regional CCN potential from SO₂ differs hugely

