A new sea spray aerosol source function (OSSA) and application to estimate direct and indirect radiative effects using ECHAM

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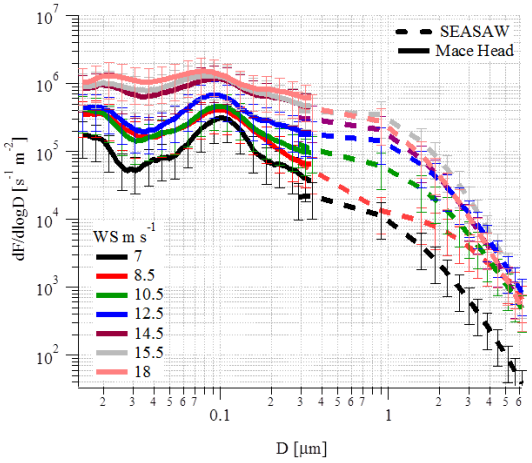
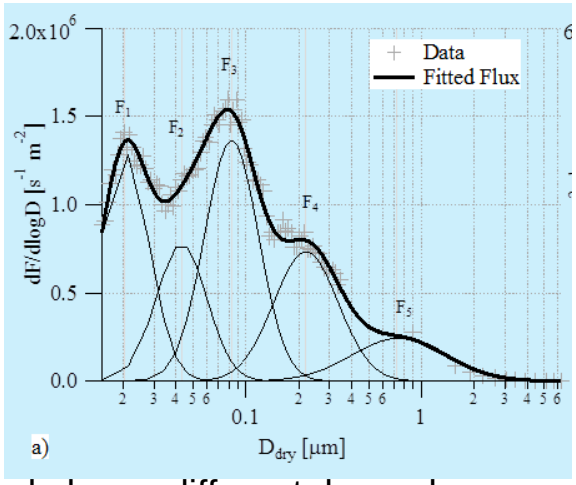
The OSSA Sea Spray Aerosol Source Function

1. Two independent data sets, obtained using different physical principles, one at the coastal site Mace Head, the other one on the open North Atlantic Ocean (SOLAS SEASAW cruise), were combined to determine size-dependent (3 nm – 6 µm dry diam) sea spray aerosol fluxes for a large range of wind speeds (3-26 ms^{-1})



2. The combined flux size distributions were parameterized as a source function described by the sum of 5 Log normal modes in terms of the Reynolds number Re_{Hw} which accounts for effects of:
   - ✓ Wind speed and history
   - ✓ Wave state
   - ✓ SST
   - ✓ Salinity

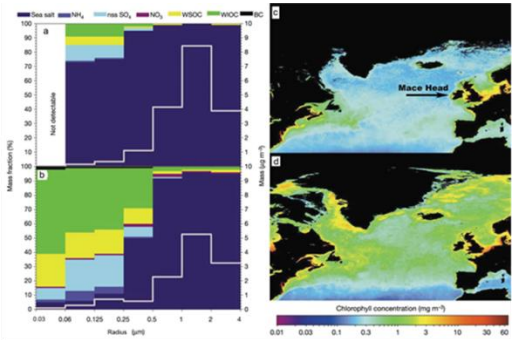


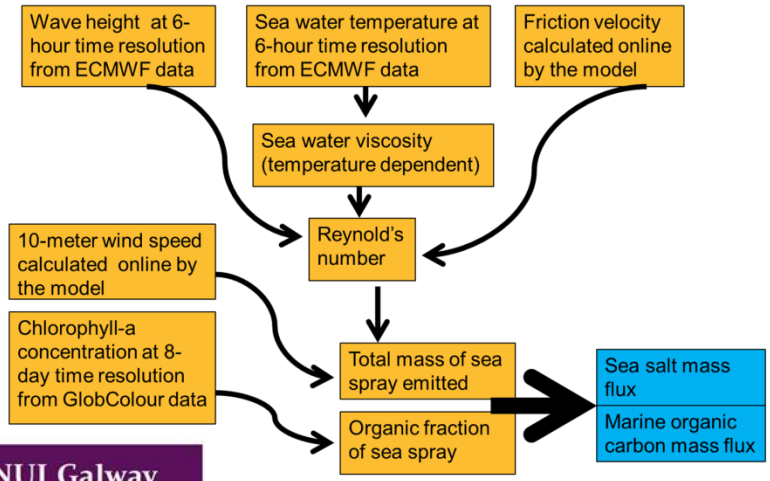
Note that each mode has a different dependence on Re_{Hw}

Ovadnevaite et al., ACPD, 13, 23139-23171, doi:10.5194/acpd-13-23139-2013,

Implementation in ECHAM5-HAM / SALSA: direct and indirect effects of sea spray aerosol

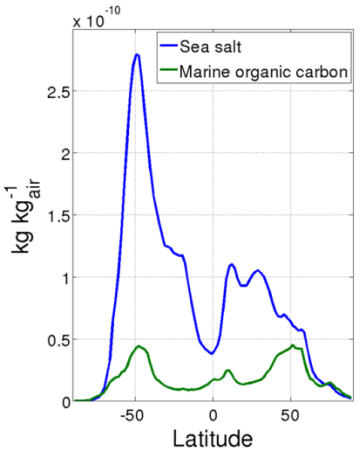
Accounting for Organic Matter in sea spray aerosol:



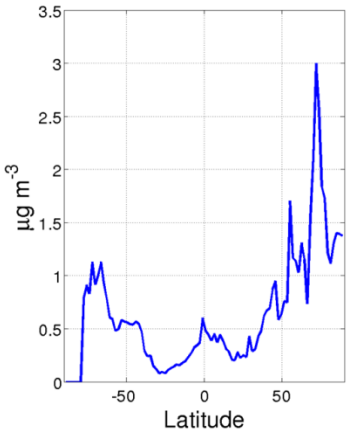


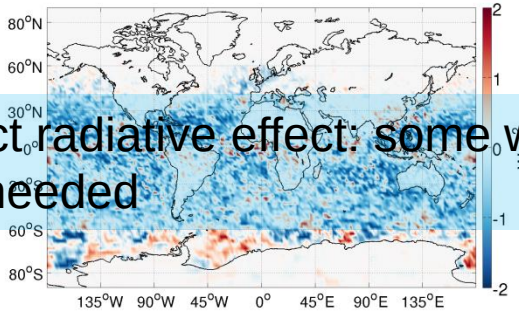
Preliminary results (Jan 2005)

Sea spray concentration (30-700 nm in diameter) at the lowest model level



Chll-a concentration in surface water





Direct radiative effect: some work still needed

OSSA is supported by the ESA STSE program

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Sea Spray Aerosol workshop

30 Sep & 01 October, 2013

Harbour Hotel, Galway, Ireland

NUI Galway
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TNO