Cloud-aerosol interactions in operational NWP: Presently simple, but the future is complicated

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Met Office high resolution (dx=1.5, 4.0 km) operational forecasts over the UK and the wider North Atlantic (dx=12km) now couple a simple aerosol tracer to the warm cloud microphysics representation. The first part of the talk will review the performance of this implementation and briefly consider the effects on fog. More complex aerosol representations are now available within the MetOffice model and the second part of the talk will introduce our progress in coupling a new multimoment, multispecies microphysics to such representations. Our eventual goal is to determine what level of complexity is required in the representation of cloud-aerosol interactions to deliver improvements in NWP.

Determination of $\delta^{11}B$ ratios in marine biogenic carbonates via LA-MC-ICP-MS

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A new in-situ method using LA-MC-ICP-MS for the determination of stable boron isotope ratios ($\delta^{11}B$) in carbonates was developed and recently published.[1] Data were acquired via a standard sample standard bracketing procedure typically providing a reproducibilty of 0.5 ‰ (SD) for samples containing 35 ppm of boron. A single ablation interval consumed about 5 μg of the sample corresponding to about 0.2 ng of boron.

The major analytical finding was the similar instrumental fractionation behaviour of carbonates, silicates and sea salt with respect to boron isotopes. As no matrix induced offset was detectable between these distinct materials we propose the use of NIST glasses as internal standards for boron isotope ratio measurements via LA-MC-ICP-MS. This finding overcomes the problem of a missing matrix matched carbonate standard for in-situ boron isotope studies.

As a first test application a set of coral samples from a culturing experiment was analysed. $\delta^{11}B$ values range from 19.5 – 25 ‰ depending on the pH of the water used in the particular treatment being in good agreement with the results of earlier studies. Further results from cultured marine calcifiers (e.g. bivalves and coralline red algae) will be presented.

[1] Fietzke *et al*. (2010) *J. Anal. At. Spectrom.* **25**, 1953-1957, doi: 10.1039/c0ja00036a