Al nanoclusters: A new method for As removal from water

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In the groundwater of the Pannonian Basin geogenic arsenic concentrations of 0.5 µg/L – 210 µg/L have been measured. Al_{30} nanoclusters with the formula $Al_{30}O_8(OH)_{56}(H_2O)_{24}^{18+}$ [1] were tested as adsorbers for arsenate and arsenite in batch and column experiments at five different concentrations: 0.27 µM, 0.67 µM, 1.33 µM, 2.4 µM, and 3.47 µM. The effect of silicate, pH, and the added amount of Al_{30} was investigated in batch experiments with water of average groundwater composition of the Pannonian Basin (pH ≈ 8). Reaction mixtures were shaken horizontally in PET bottles for 30 minutes. Precipitates were then removed by filtration (0.2 µm) and remaining dissolved As was measured by HG-AFS.

Preliminary batch experiments showed that 99 % of As(V) was removed over the tested arsenic concentration range by addition of 70 µM Al_{30} (maximum As:Al_{30} ratio = 1:20). In contrast, As(III) adsorption reached only 40 % and removal greatly varied with initial As(III) concentrations. Adsorption generally decreased with decreasing Al_{30} concentration and increasing pH. The final pH of the samples was in a range of 5.8 - 8.5. First observations of decreasing Si concentration with increasing Al_{30} content in the filtered water solution suggest that Si is a competitor for sorption sites on the aluminium nanoclusters.

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[1] Allouche *et al.* (2000), *Angew. Chem. Int. Ed.* **39** 3 511-514.

Effect of marine biogenic organic aerosols on cloud properties: Modeling study

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Marine Isoprene and POM Emissions

A physically-based parameterization for the emission of marine isoprene and primary organic matter (POM) was developed to estimate the global oceanic sources of organic carbon (OC). Marine isoprene production is based on the lab measurements from different phytoplankton species and a range of light conditions. Total primary sources of oceanic sub- and super-micron OC were estimated using empirical relationships for the fluxes of water soluble and insoluble OM and [Chl *a*] [1].

	Global marine emissions (Tg C yr^{-1})
Isoprene	0.92
Sub-micron POM	1.26
Super-micron POM	19.01

Tabe 1: Global marine emissions of isoprene and POM.

Effect of Marine OC Aerosols on Shallow Clouds

Marine OC emissions were implemented into the CAM/ MIRAGE model. Abdul-Razzak and Ghan [2] and Fountoukis and Nenes [3] aerosol activation parameterizations were used to explore the effects of marine OC on properties of shallow clouds. This study shows that marine OC can have a sizeable effect on model-predicted cloud radiative forcing.

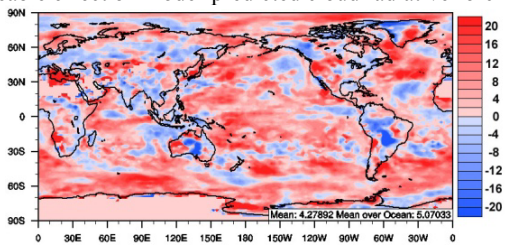

Figure 1: Relative difference (%) for the 5-year mean in-cloud droplet number concentration at ~ 95mb level between the model runs with and without marine OC.

[1] Gantt *et al.* (2009), *ACPD*, ***9***, 2933–2965. [2] Abdul-Razzak & Ghan (2000), JGR, **105**, 6837–6844. [3] Fountoukis & Nenes (2005), JGR, **110**, D11212.