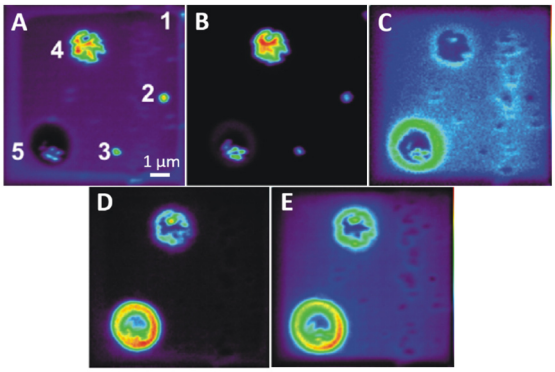
Source Tracking of Aerosols
with CAMECA NanoSIMS 50L

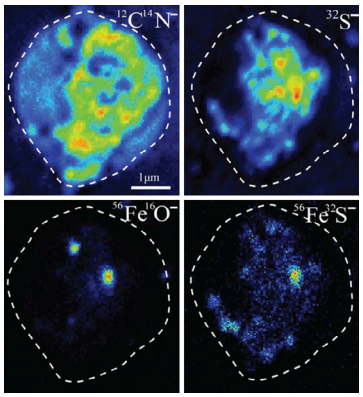
Salty origin of fresh water

Cloud droplets above the Amazonian rain forest form mostly around organic aerosols, but the source of the aerosols has been a mystery...

NanoSIMS was used to determine the composition of 0.1 to 1 µm particles, revealing oxygen (A), sulfur (B), chlorine (C), carbon (D) and nitrogen (E) distributions in Secondary Organic aerosol, expressed in mole fraction C:N:O:S:Cl= 0.01:0.09:0.62:0.17:0.02.

Pöhlker et al., Science (2012)





Aerosols as source of bioavailable Fe in oceans

Produced by dissolution of airborne particle surface with atmospheric acids, the coating of Fe-rich sulfate around aerosol becomes a source of bioavailable Fe for the oceans.

NanoSIMS quantified imaging confirmed the presence of Fe-rich sulfate coating in individual particles collected in the atmosphere of the Yellow Sea: $^{56}Fe^{16}O^-$ map reveals the presence of unsoluble Fe oxide, $^{56}Fe^{16}S^-$ the association of Fe and soluble sulfate coating, $^{12}C^{14}N^-$ the presence of nitrogen and $^{32}S^-$ the localization of sulfur alone.

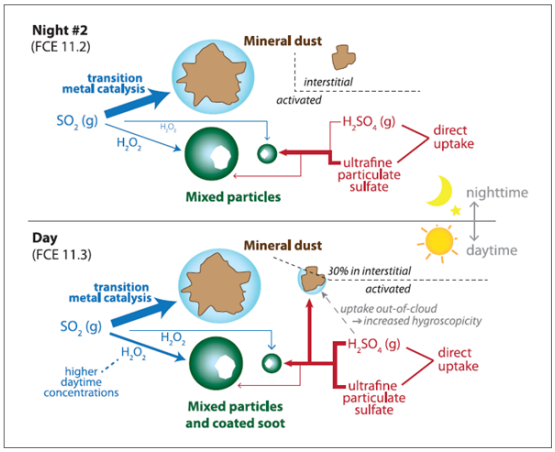
Li et al., Science Advances (2017)

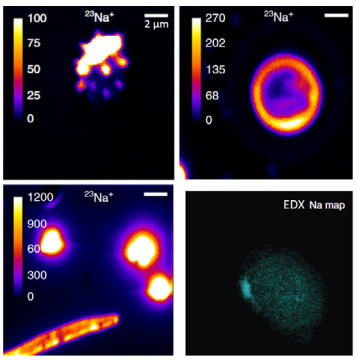
Sulfur oxidation pathway in atmosphere

Global sulfate production plays a key role in aerosol radiative forcing. Scientists report that the oxidation of sulfur dioxide gas catalyzed by natural transition metal ions is the dominant pathway for sulfate production in clouds.

NanoSIMS was used to measure the sulfur isotopic composition expressed as $\delta^{34}S$ of aerosols. Incorporating $\delta^{34}S$ of aerosol in a mass balance model reveals the proportion of activated particles over interstitial particles in the sulfur cycle of clouds.

Harris et al., Science (2013)



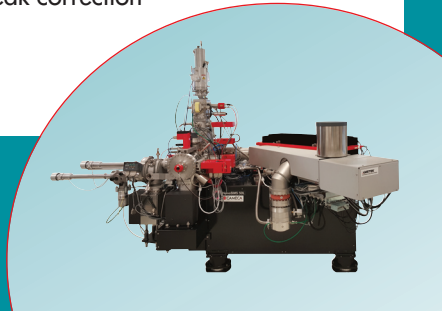


Fungal spores as Na source in Amazon

Contrary to common assumptions that Na-containing aerosols originate primarily from marine sources, scientists showed that fungal spores emitted by the forest biosphere heavily contribute to sodium salt particles in the central Amazon basin. Models estimate them as a major contributor of the Na budget in the range of 51 to 84%.

NanoSIMS revealed that the micrometer-sized biological particles contain Na, detected as $^{23}Na^+$, otherwise difficult to measure with EDX for peak correction with Cu interference.

China et al., Nature Communications (2018)



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