Microscopy Analysis of Fine Mineral Dust Particles in Soils from the Atacama Desert

A. Laskin,[1] R. Moffet,[2] J. Fast,[1] M. Gilles[2]

[1]*Pacific Northwest National Laboratory*
[2]*Lawrence Berkeley National Laboratory*

Atmospheric Science Program (ASP)

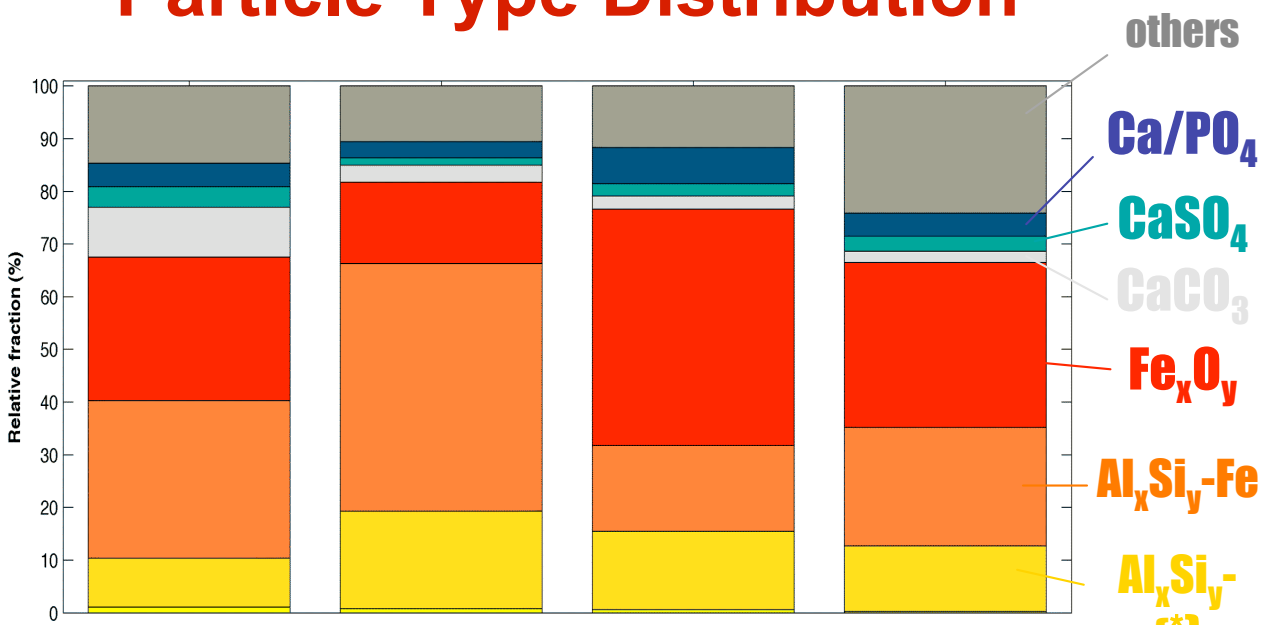
Mars-Like Soils in the Atacama Desert, Chile, and the Dry Limit of Microbial Life

Rafael Navarro-González, *et al.*
Science **302**, 1018 (2003);
DOI: 10.1126/science.1089143

Beyond Dry Limit...

Atacama Soil Samples

Particle Type Distribution

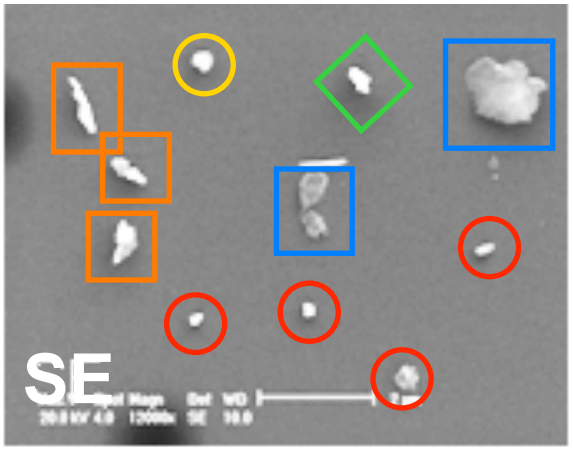


CCSEM/EDX analysis of individual particles

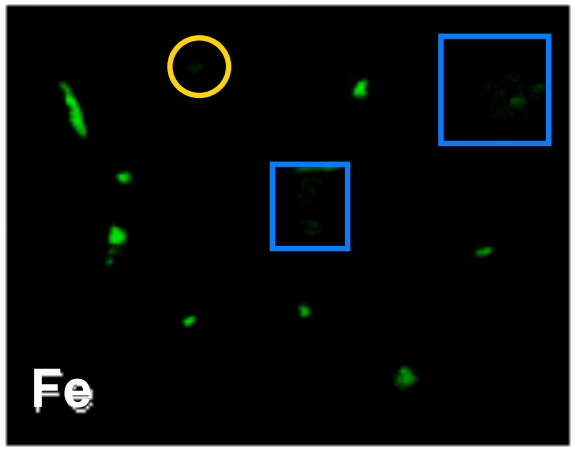
Sample "E"

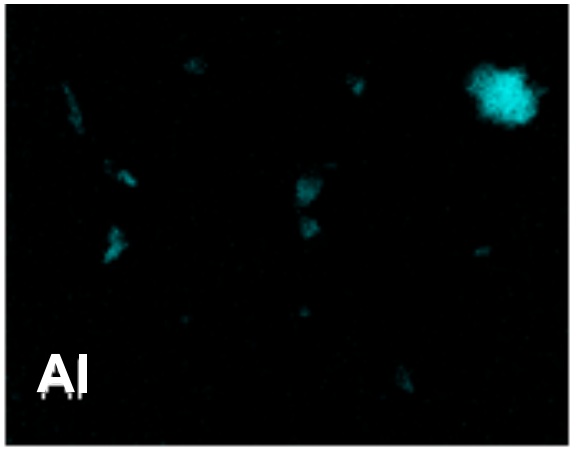
320-560 nm 180-320 nm 100-180 nm 56-100 nm

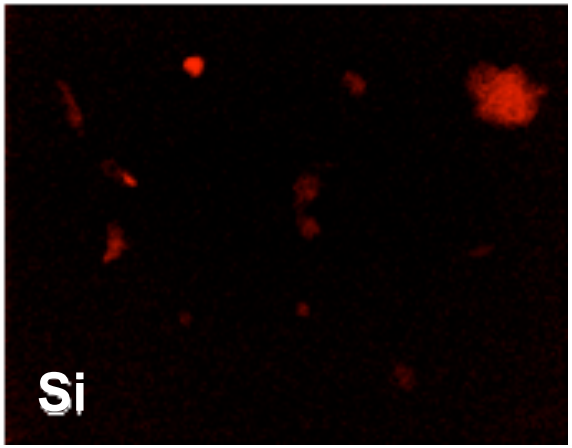
Sample "E"

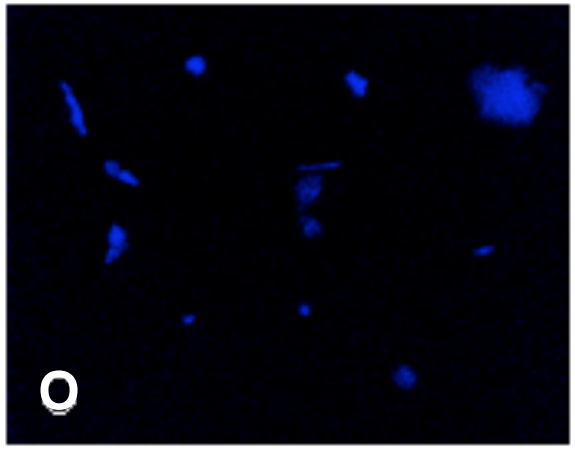


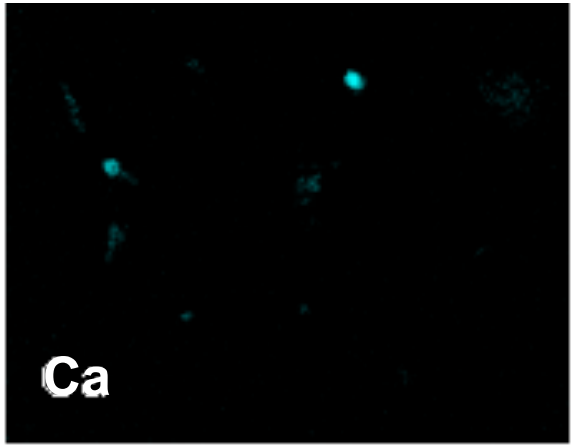
- Fe_xO_y
- Al/Si - Fe
- Al/Si - other
- $CaSO_4$
- SiO_2

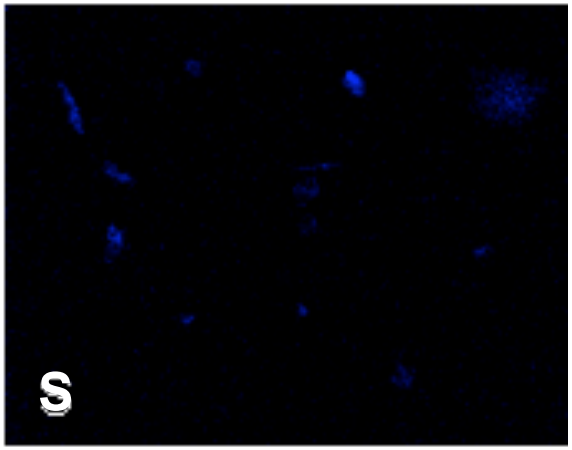






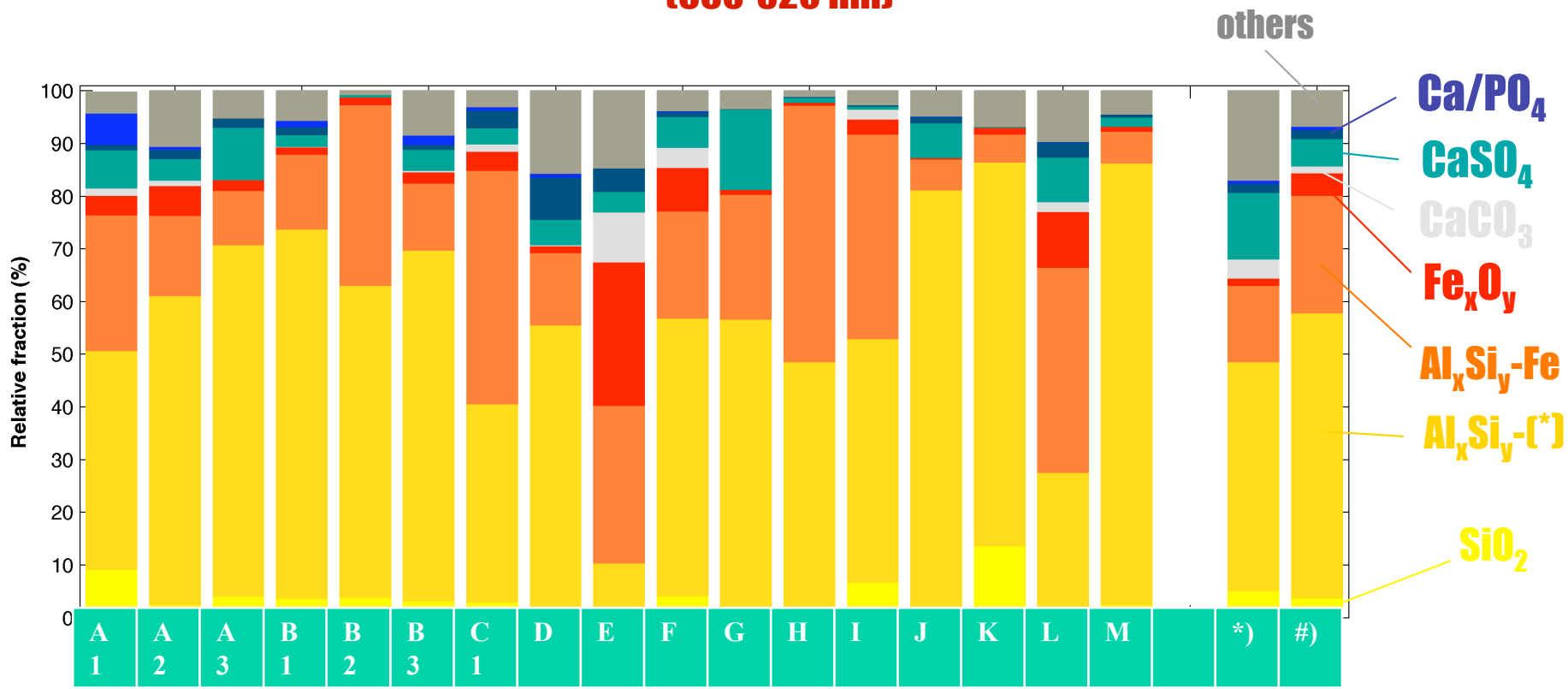






Particle Type Distribution in Different Atacama Samples

(560-320 nm)



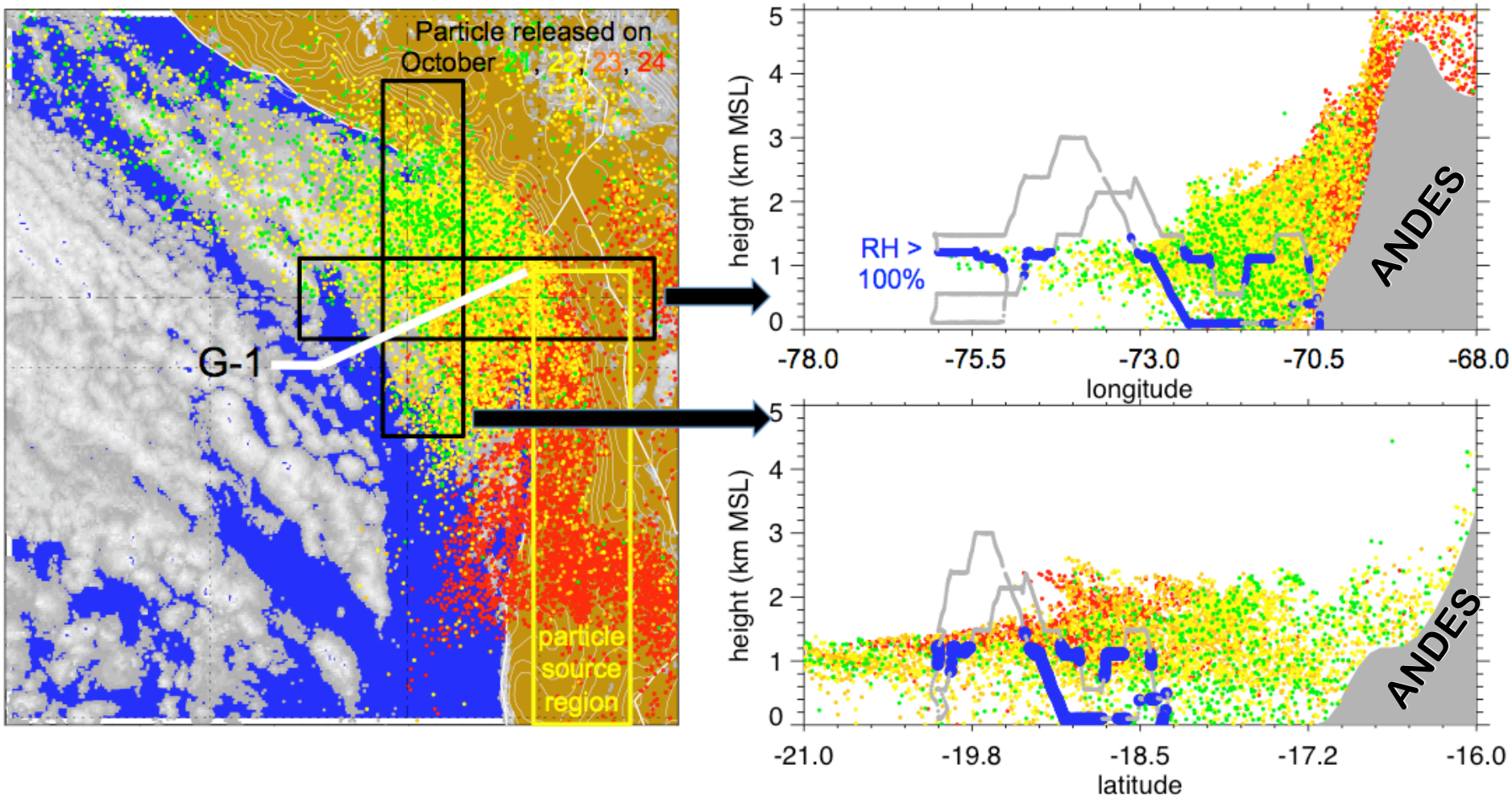
*) CAR

#) Sample average

Fine Fe-containing particles are abundant…!

G-1 Flight October 25, 2008 13-17 UTC

Observed Clouds and Simulated Dust at 13 UTC



SUMMARY

- **Atacama soils contain unusually fine particles**
- **Neglected aspect in VOCALS science plan**
- **Fe containing dust – Nutrient to phytoplankton - is of particular interest**

ONGOING WORK

- Analysis of Fe(II)/Fe(III) partitioning in Fe-containing particles. Phase Speciation for Major Particle Types
- Search of mineral dust particles in flight samples
- Mixing of dust with anthropogenic sulfates (Cu smelters)
- Processing of mixed dust/sulfate particles by clouds, etc.