

Earth's Toxic Nano-compartments: metal behavior during natural nano-particle maturation

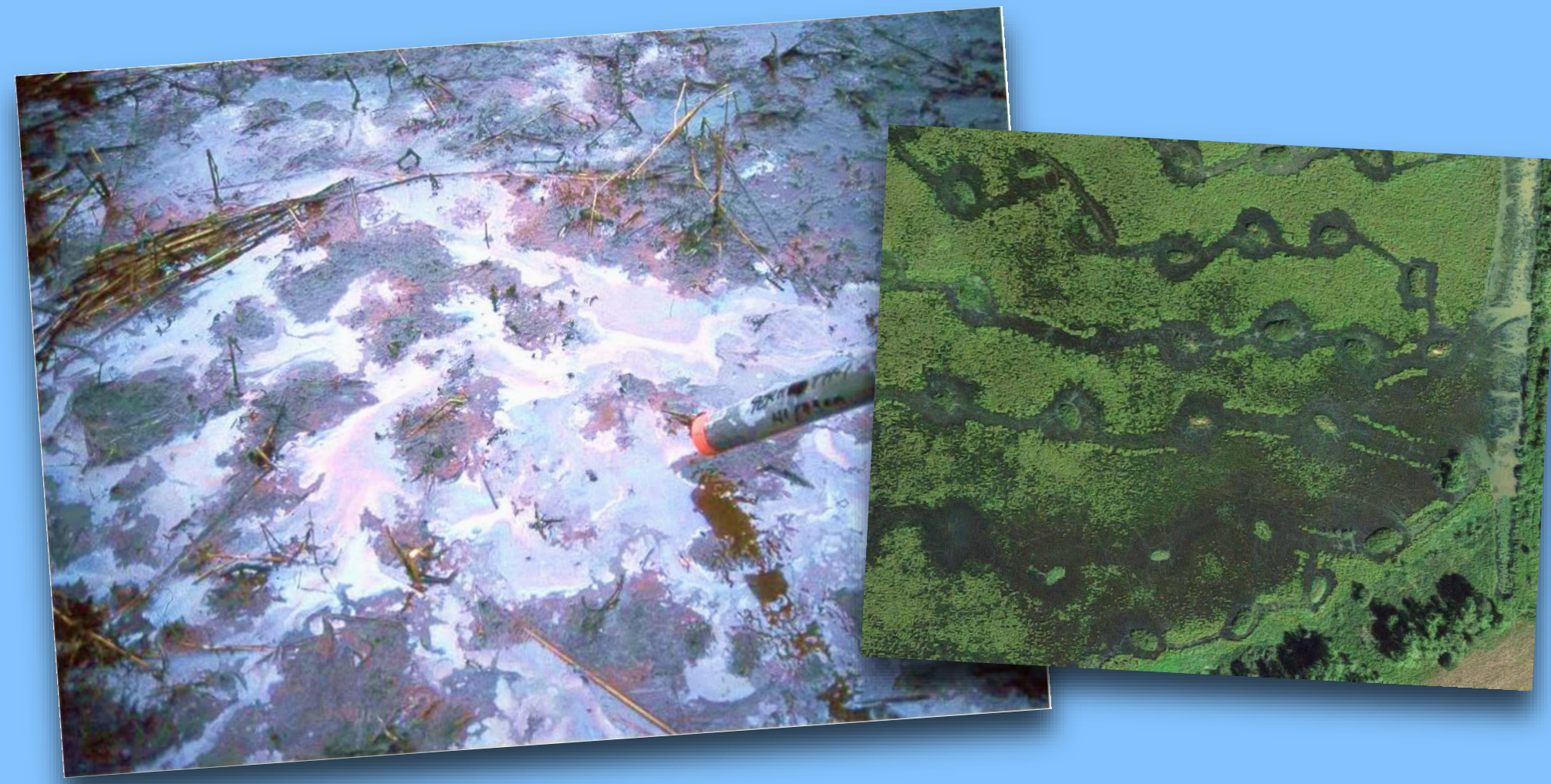
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Question Metal Content and (Order/Crystallinity) Results

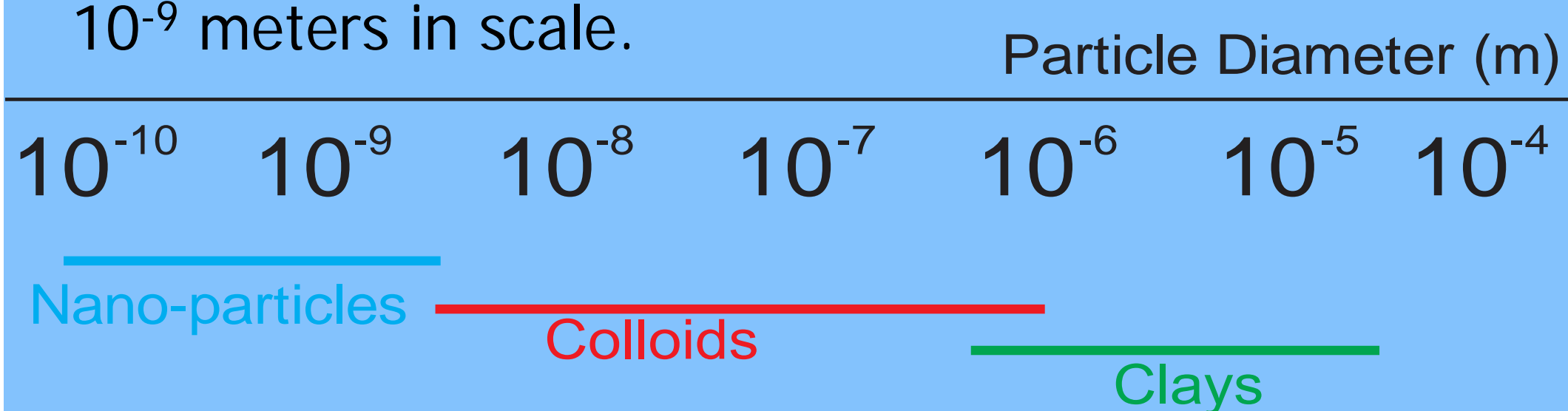
How do nanoparticles in natural, metal rich environments behave in terms of metal content with growth into a more 'crystalline' phase?

Project Overview



- Air, soil, and water samples were collected from metal-rich regions in CA and ID.
- Major portion of total metal content for these samples is in nano-particulate phases.

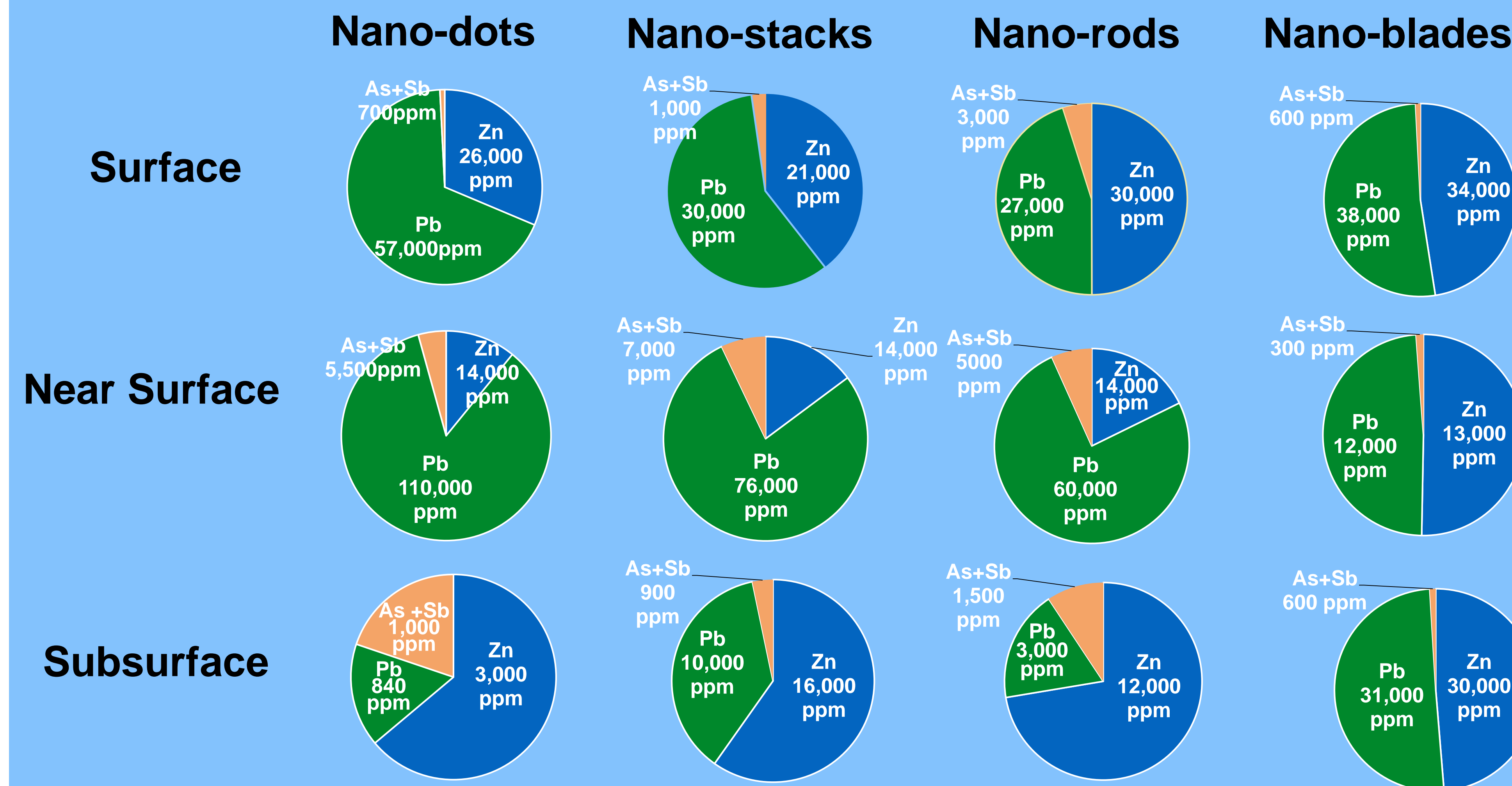
• Nanoparticles: Assemblages of atoms less than 10^{-9} meters in scale.



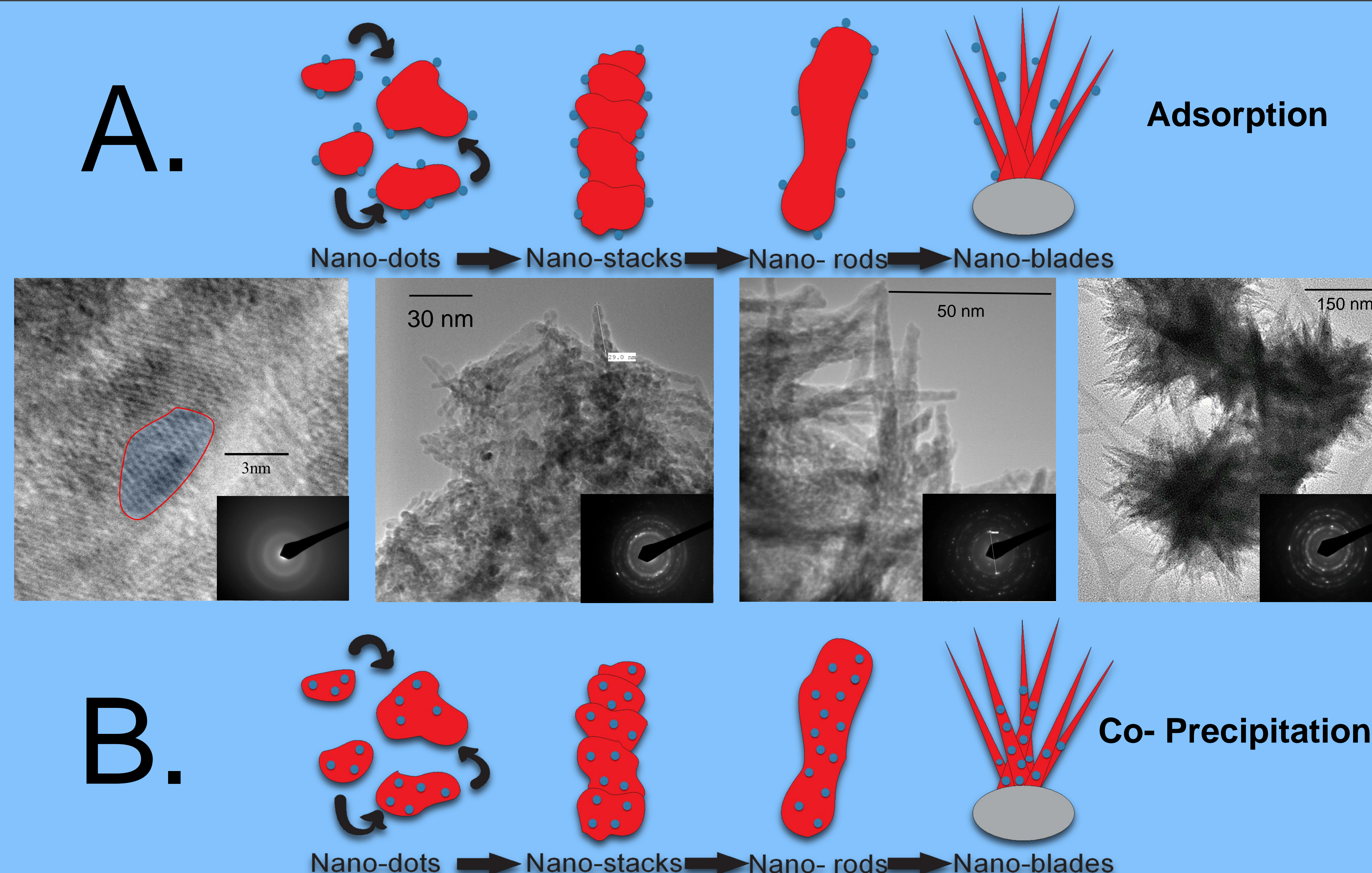
- Data: analyses and growth of nanoparticles into four main phases; nano-dots, nano-stacks, nano-rods and nano-blades.

Methods

- Transmission Electron Microscopy- High resolution imaging of nanoparticles.
- Energy Dispersive Spectroscopy- Chemical Analyses.
- Electron Diffraction- Crystallinity of materials.



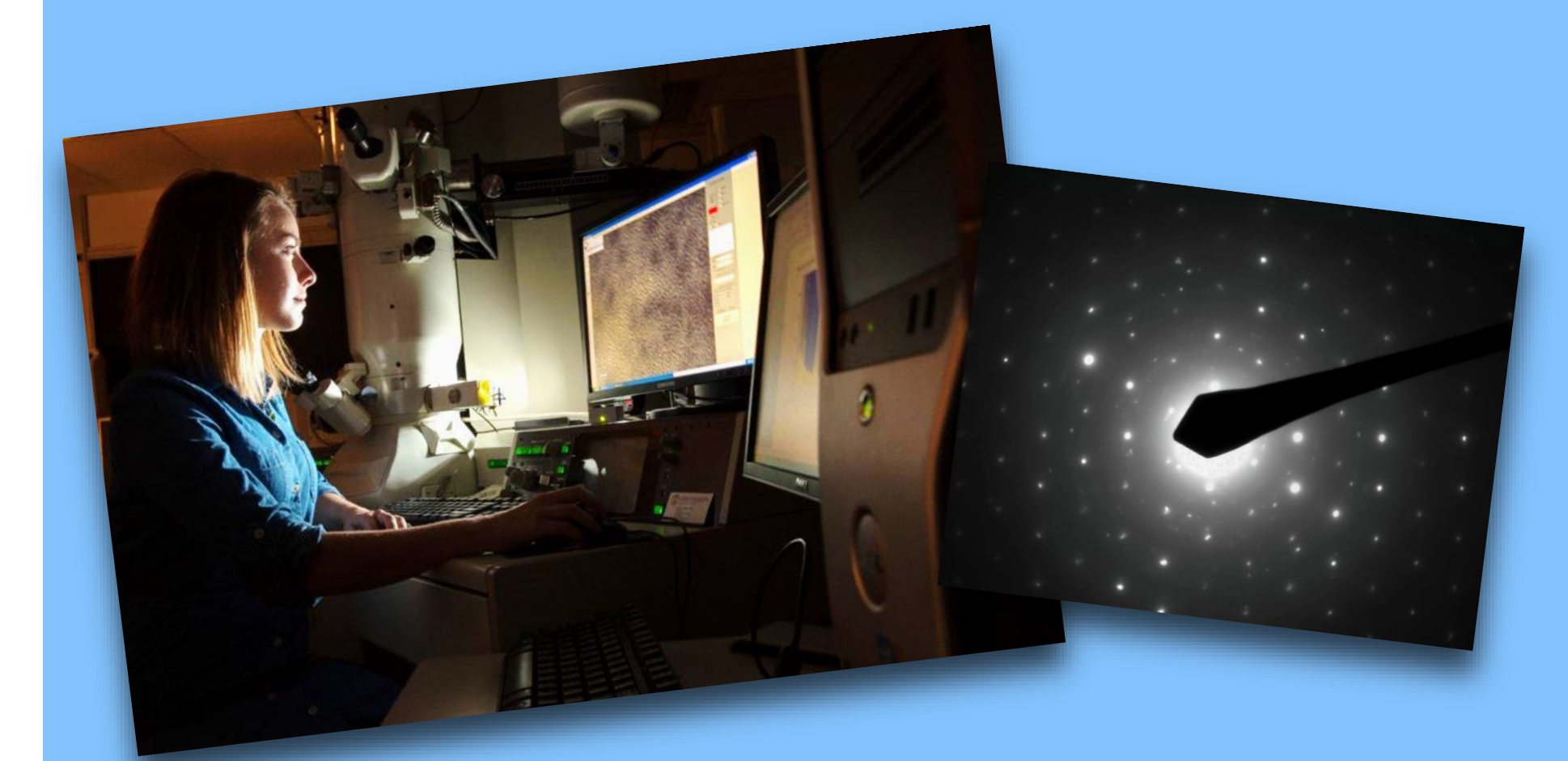
Growth Model



- Metal contents are highly variable in all samples.
- Surface and Subsurface samples best fit co-precipitation model for all metals.
- Near surface model behavior for Pb is consistent with a loosely bound adsorption model (Is this effect real?)

Conclusions

- Nanoparticles in natural systems have large metal concentrations resulting in nanoparticles being important metal transport agents in diverse environments.
- Nanoparticle maturation does not systematically result in reductions in metal loads.
- Need more data!



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