# Dust-iron modifications by natural *Trichodesmium*

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Atmospheric dust deposition is considered a major source of new iron to remote ocean regions. Nonetheless, the low solubility of dust-iron severely limits its use by most marine phytoplankton. Recently, we reported that the globally important $N_2$ fixing cyanobacterium, *Trichodesmium,* has unique adaptations for capturing and storing dust in the colony core, and that it can accelerate dust-iron dissolution rate. Here using X-ray synchrotron spectroscopy and microscopy, we further examined the interactions between *Trichodesmium* and particulate iron *in situ* and searched for bio-mediated changes in dust particles incubated with natural *Trichodesmium* colonies. Targeting individual particles for Fe L-edge XANES spectra, we examined the redox state of seawater Fe particles and those in association with the organisms. Examining ambient Gulf of Eilat *Trichodesmium*, we found many Fe-rich particles on the colonies, some of which were reduced to a different degree. The Fe(II)-rich particles on the colonies were distinct from those in seawater that were predominately oxidized. Incubating *Trichodesmium* with dust for 24 hrs, we documented gradual centering of Fe-rich particles (Fig. 1) and prevalence of reduced Fe particles. In the absence of the organism, the dust –iron was oxidized completely within few hours. At current we investigate whether the bio-mediated redox transformations documented here, result in increased dust-iron availability to *Trichodesmium*.

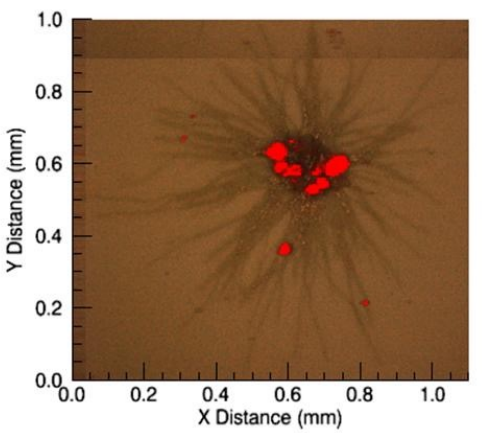


**Fig.1:** False color X-ray spectroscopy Fe map overlaid on a microscopic image of natural *Trichodesmium* colony, which was incubated with dust for 4 hrs. The red dots are Fe-rich dust particles that the colony captured and shuffled to its center.