Magnetic Remediation of Biogenic Metals from Aqueous System 'A proposed method of biogenic iron removal from our water systems'

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Inspired by a NASA project on bacterial microgravity (Doyle, H. Wachtel and P. Todd, 1999), we used an innovative method called "Magnetic Remediation of Biogenic Iron Minerals by an Applied Magnetic Field". The purpose is to isolate the biogenic iron minerals produced by micoorganisms present in water/sediment systems, by imposing to them an induced (calculated) magnetic field. The main goal is to reorient the bacteria trajectory in the medium, then to precipitate their biogenic products before sedimentation in either aerobic or anaerobic systems.

Time	**JL-2** 10(7)/mL	**JL-S** 10(7)/mL	**JL-T** 10(7)/mL
2 Hour	19	19	19
10 Hours	48	46	65
24 Hours	98	44	66
36 Hours	100	46	63
48 Hours	95	38	56

Figure 1: These are results obtained for a constant magnetic induction of 20 (10)(-6) Emu.

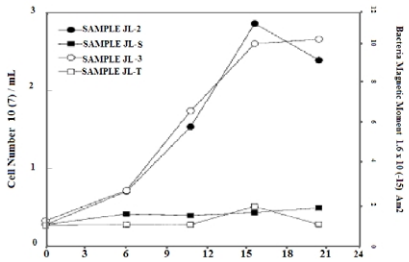

Figure 2: Graph showing the different variations of MTB and Biogenic iron accumulation during (24 hours) experiment, from jars samples JL-1, JL-2, JL-S, AND JL-T.

Discussion

The rate of accumulation of MTB can provide a useful data for environmental studies, switching magnetic susceptibility/moment behavior and time-dependent phenomena. We use current computer modelling to monitor these relationships using calculations and quantitative predictions based on those data as describe by Dunlop, 1990. One potential payoff of these models will be to predict the cells accumulation dependent behavior of magnetic moment, coercivity, and susceptibility for the different biogenic iron from microorganisms.

Conclusion

These findings, along with our results with MTB accumulation produced by magnetic field, indicate that factors such field intensity and MTB concentrations in aqueous medium have an important influence on rates of microbial accumulation.

Manganese in the marginal seas

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In the marginal seas where a significant amount of material is supplied from suboxic coastal sediments, manganese plays an important role in the geochemical cycle of trace metals. We studied manganese distributions and its speciation in the marginal seas such as the Okinawa trough, Sulu Sea, Celebes Sea, and Philippine Sea. Manganese in seawater was determined with a newly developed method using a chelating resin (MAF-IDA) concentration and subsequent chemiluminescence detection. Comparing these results with those of the previous method (electorochemical concentration: Nakayama et al., 1989), the chemical reactivity of manganese in seawater was evaluated.

Figure 1 shows the distribution of manganese in the Okinawa Trough where hydrothermal activity was observed. The ratios of manganese in unfiltered samples to that in filtered samples ("dissolved manganese") are also shown. The manganese concentrations in the unfiltered samples determined by the new method are higher than those by the previous method, which indicates that a labile fraction of particulate manganese was concentrated by the new MAF-IDA column. The difference between the manganese concentrations with both methods corresponds to the labile particulate fraction. This fraction is a possible tracer to reveal the oxidizing process of manganese from the reducing conditions, such as hydrothermal vents and suboxic coastal sediments.

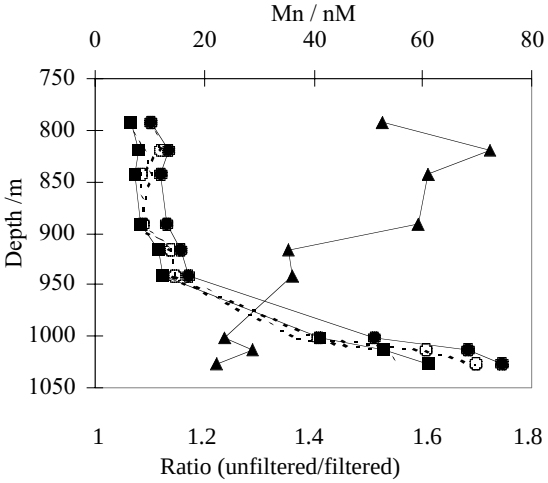

Figure 1 The distribution of manganese and the ratios of manganese in unfiltered samples to that in filtered samples in the Okinawa Trough: 'filled circle', new method (unfiltered sample); 'filled square', new method (filtered sample); 'open circle', previous method (unfiltered sample); 'open square', previous method (filtered sample), 'filled triangle', ratio (new method).