Evaluation of potential for reductive dechlorination at CAHs contaminated site and Biostimulation Enhanced Reductive Dechlorination pilot study

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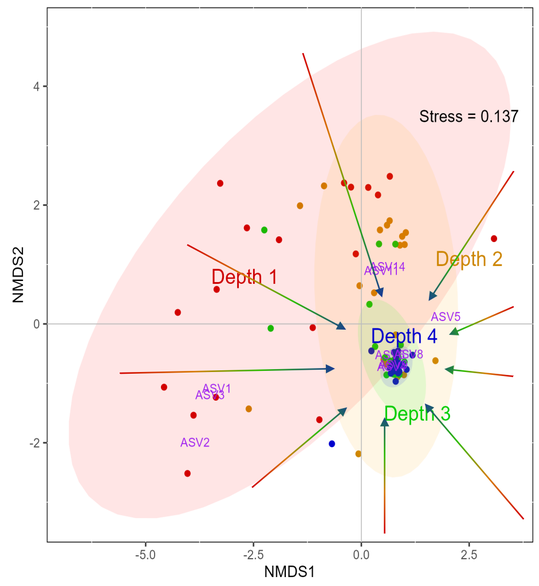
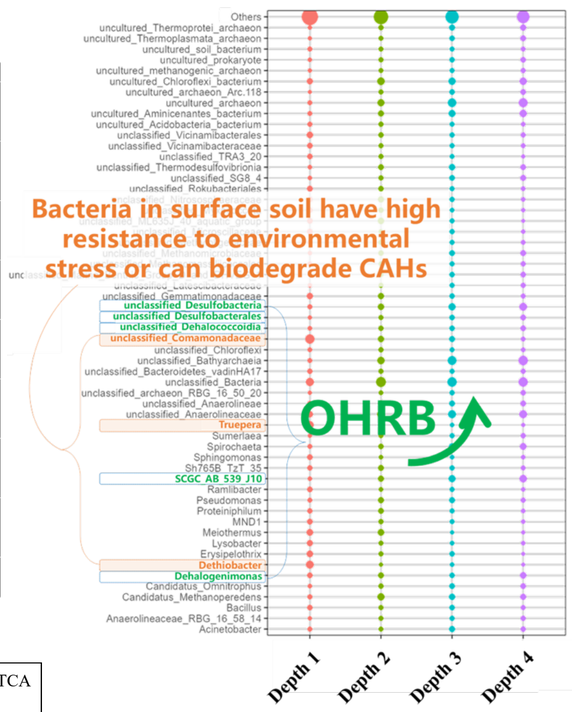
CAHs contamination is common in industrial sites. For contaminated sites with poor permeability, there are urgent to study the microbial community to evaluate the potential of enhanced reductive dechlorination, develop nanoscale durable biostimulant and remediation microbial inoculum.

Survey Overview

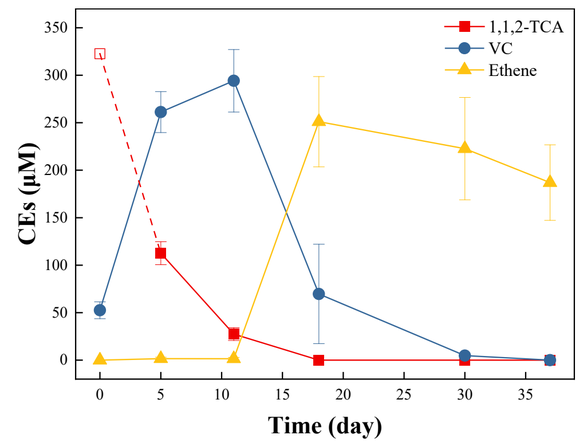
- Soil samples at different depths (0 – 6 m) were collected in the demonstration site and analyzed for physical and chemical properties, contamination and microbial communities.
- The relative abundance of organic halogen respiratory bacteria (especially *Dehalococcoides*) increased gradually with depth.
- reductive dechlorination community reduces CAHs stress and is a key taxa to improve the stability and complexity of soil microbial community.

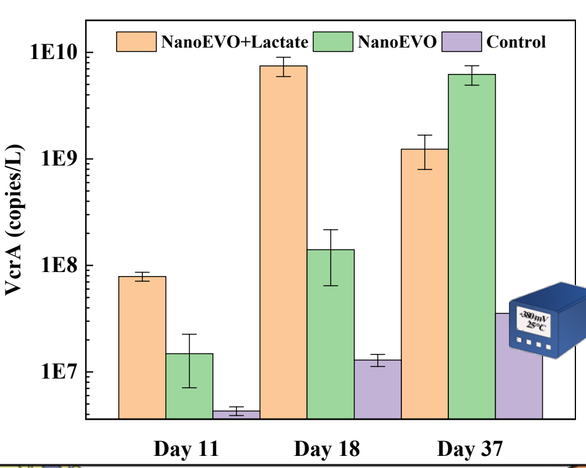


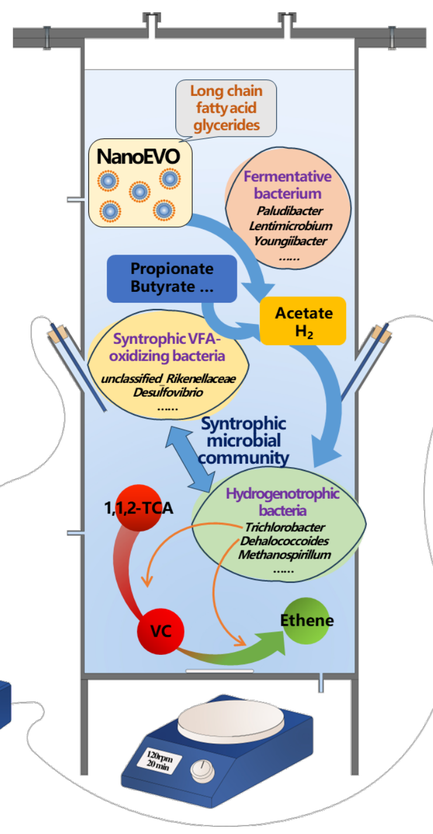


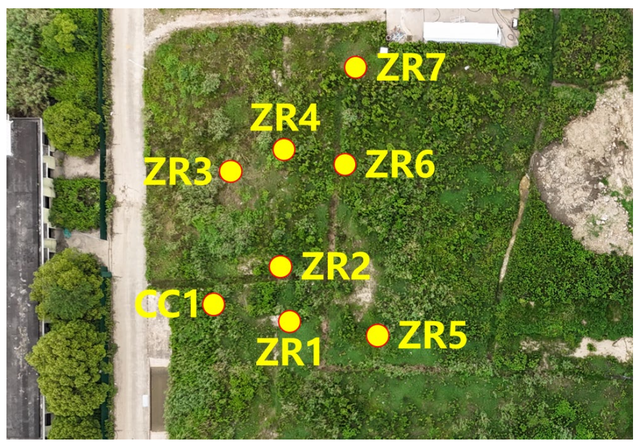
ERD Research Overview

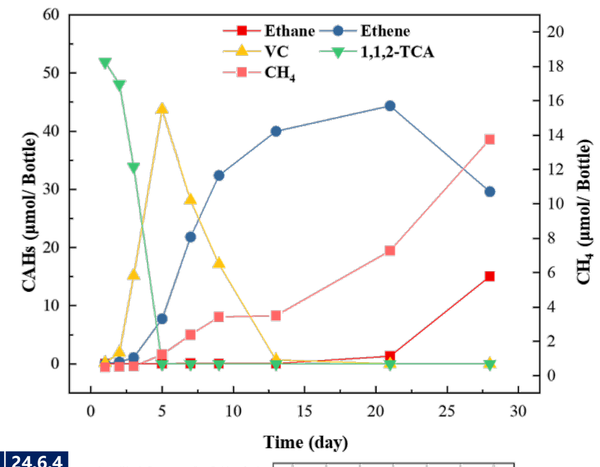
- Under the amendment of NanoEVO-based biostimulant, 1, 1,2-TCA in groundwater of ZJG contaminated site was completely dechlorinated to ethene via VC. During VC dechlorination, the abundance of *Dehalococcoides* and *vcr*A increased by 10^2 and 10^3, respectively.
- Reductive dechlorination consortium—**ZJGTCA** could completely dechlorinate 143 mg/L 1,1,2-TCA to ethene in 13 days, and the relative abundance of *Dehalococcoides* reached 47%. The simplified dechlorination community composed of four bacteria in ZJGTCA includes multiple functions such as de novo synthesis cobalamin, syntrophic-VFAs oxidation, acetate and H_2 generation.
- In 3-month pilot study of contaminated sites, a decrease in maternal CAHs and an increase in metabolites were detected.



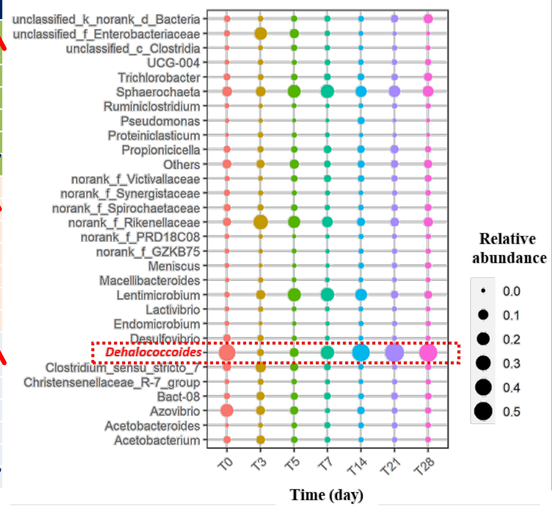


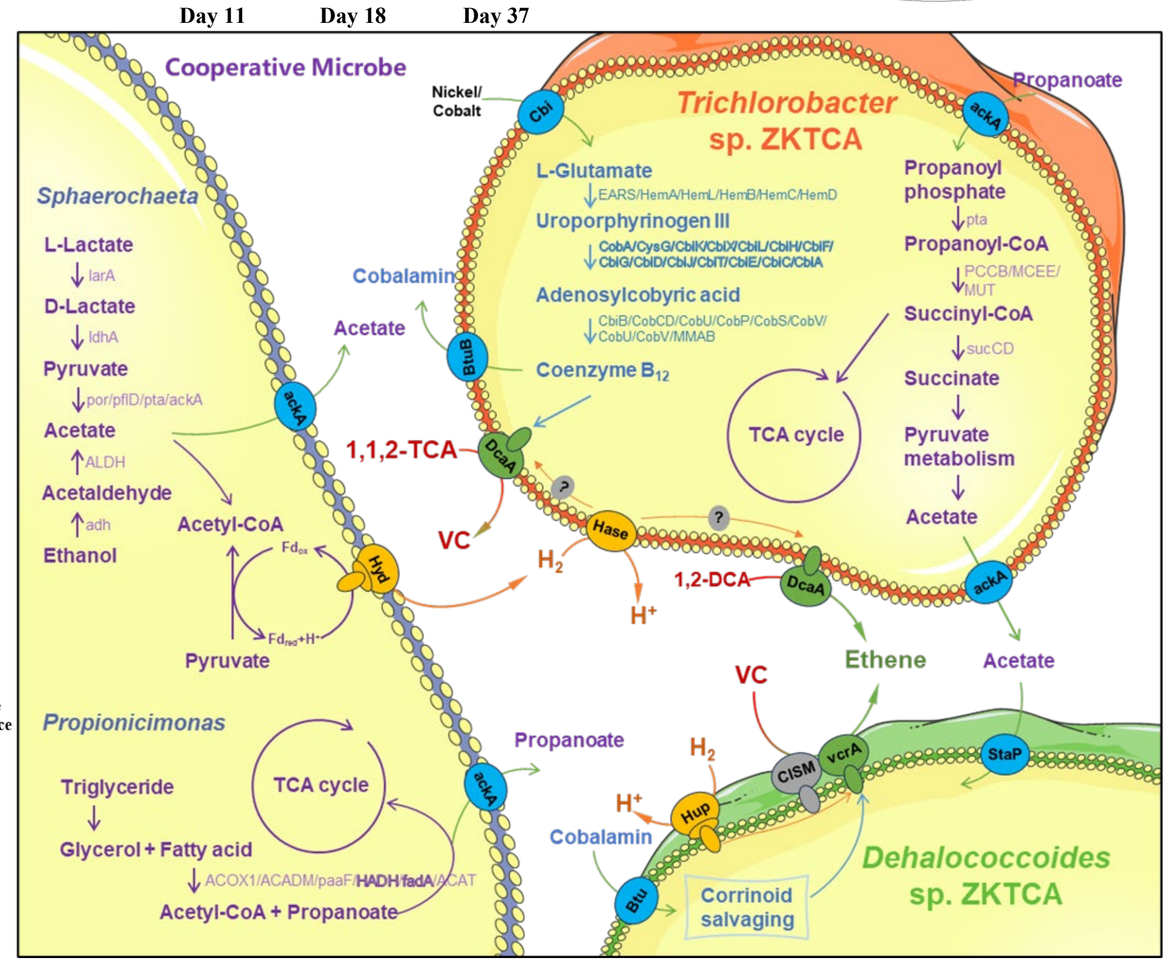






Site	Contamination	Unit	24.3.15	24.4.9	24.4.23	24.5.1	24.5.23	24.6.4
ZR1	Cl^-	mg/L	976	2280	1340	1260	1640	2030
	VC	μg/L	15200	273000	126000	52100	77800	149000
	1,1-DCE		3520	34400	9910	4980	6770	11700
	trans-1,2-DCE		257	1490	712	296	419	725
	1,2-DCA		23.8	158	51.2	37.6	49.3	59.1
	TCE		1450	20900	2690	4.6	10.4	43.4
	1,1,2-TCA		30300	327000	1520	291	145	ND
ZR4	Cl^-	mg/L	387	495	466	431	344	533
	VC	μg/L	5.7	63.7	131	10.8	7.9	7.2
	1,1-DCE		7.9	9.1	3.2	0.9	0.6	0.9
	trans-1,2-DCE		1.5	1.5	1.8	1.7	1.6	2
	1,2-DCA		ND	ND	ND	0.5	0.6	0.5
	TCE		7.1	10.6	0.9	0.5	ND	1.4
	1,1,2-TCA		50.7	35.3	ND	3	0.7	12.1
ZR7	Cl^-	mg/L	1360	1020	739	958	854	1070
	VC	μg/L	630	74.1	122	71.1	36.3	4.5
	1,1-DCE		57.2	16	19.3	12	4.1	1
	trans-1,2-DCE		1.6	0.6	0.4	0.3	ND	0.5
	1,2-DCA		8	1.3	2.7	2.4	3.1	4
	TCE		4.9	4.6	2.4	3.1	0.9	0.6
	1,1,2-TCA		3.5	23.2	16	10.9	2.3	6





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