

Genome Group ID		G01	G02	G03	G04	G05	G06	G07	G08	G09	G10	G11	G12	G13	G14	G15	G16	G17	G18	G19	G20	G21	G22	G23	G24	G25	G26	G27	G28	G29	G30	G31	G32	G33	G34	G35	G36	G37	G38	G39	G40			
Genome Number		12	3	16	3	36	7	1	6	6	4	8	4	1	19	1	1	5	5	61	1	1	1	3	7	2	2	3	8	1	9	6	7	2	1	9	2	5	1	11	2			
C metabolism	Thermophilic specific																																											
	Amino acid utilization	11	3	15	2	36	4	1	6	5	3	8	4	1	19	1	1	5	5	61	1	1	1	3	6	2	2	3	8		9		7	2	1	9	2	4	1	10	1			
	Aromatics degradation	9	1	8	2	20	1		6	2	3	7	4		4			1	5	46	1		1	2		2	1	3	6		4		2	2	1	1	1	3	1	2	1			
	Complex carbon degradation	7	1	10	2	29	3	1		1		3	1		4	1	1	3	3	27	1	1	1	3		2					2	1		4			3			1	10	1		
	Fermentation	11	3	7	3	35	7	1	6	6	2	8	4	1	19	1	1	5	5	44	1	1	1	3	7	2	2	3	8	1	7	3	6	2	1	9	2	1	1	10	2			
	C: metabolism Aerobic CO oxidation	9	1	3	1	8	2	1				4			9					23			1			1		1	1		1					1	1		1	1	1			
	C: metabolism Formaldehyde oxidation			10																32																								
	C: metabolism Formate oxidation	7	1	4	1	21	3	1		4		7	4		1					32		1	1	3	4	2	1	1	6		2		2			1	5	2		1	4	2		
	C: metabolism Methanol oxidation	4		8					1											14																								
	C: metabolism Methyl amine -> formaldehyde			3																1																								
	Methane oxidation			4		2									3				1	12						1		1				2	1	1							1	1		
	Methane production																																											
	Carbon fixation 3 Hydroxypropionate cycle	1		4		3						3								22						1												2						
	Carbon fixation 3HP/4HB	2	3	2	1	2				1		3								1			1	1			2															1		
	Carbon fixation CBB cycle - Rubisco			10																29																								
	Carbon fixation Reverse TCA cycle						1		6						7															2	3			1										
	Carbon fixation Wood-Ljungdahl pathway	1	2		1	3	1			5	2	7	3		8	1	1	1	3			1		2	2				2	3			2		5			6	1			7		
N metabolism	Nitrogen cycling Ammonia oxidation																																											
	Nitrogen cycling Anammox																																											
	Nitrogen cycling N ₂ fixation								4		1	5	3		2					8						1		1		5					3									
	Nitrogen cycling Nitrate reduction	5		6	1	7	1		5	2	1	4	2		2					3	33	1			2		2	1		2		1			2		1			2				
	Nitrogen cycling Nitric oxide reduction	8		4	1	15	5		5			3	1		1					1	23	1		1	3		2	1	1	4		5		2		1	2					2		
	Nitrogen cycling Nitrite oxidation	6			1	2						1			3					1	3							2	1	1			1	6		1			1	3	1	1		
	Nitrogen cycling Nitrite reduction	4	1	4		4	4		3	3		1	2							3	25						1		2	3	1	1	1	1					1	3		1		
	Nitrogen cycling Nitrite reduction to ammonia	3		8	2	21	4		2		6	4			8					2	39	1	1	1	3		1	2	1	8		4		2		1	3	1	4		3	1		
	Nitrogen cycling Nitrous oxide reduction	2			2	9			3	1						3					1																							
S metabolism	Sulfur cycling Sulfate reduction	8	1	12	2	24	1		5	2	3	8	2		5		1			5	49			1	3	1	2	2	2	6		7	1	3		2	1	4		4	1	8		
	Sulfur cycling Sulfide oxidation			1	5		4	1		6			1		1					3	23																							
	Sulfur cycling Sulfite reduction (Asr)																																											
	Sulfur cycling Sulfite reduction (Dsr)																																											
	Sulfur cycling Sulfur oxidation	6		13	3	13	1	1			3	4	8	4	1	13		1	1	4	41	1	1			3	2	2	2	2	6	1	7			7	2	1	2	1	4	1	2	2
	Sulfur cycling Sulfur reduction																																											
	Sulfur cycling Thiosulfate disproportionation																																											
Sulfur cycling Thiosulfate oxidation	2		1					6												26																								
Other metabolisms	Hydrogenases	4	3	5	1	8	2		6	5	2	7	3		11	1	1	1	3	22		1	1	3	2	2		2	8		3	1	5				6	1			7	1		
	Urea utilization	2		5										1						24							1	1		2												1		
	Halogenated compound utilization	4	1	3		4					2		1							25				1			2		1										1	1	1	6		
	Perchlorate reduction	2		2		5	1		3	2	1		1		1					3	7	1			2			2	1		1										1			
	Chlorite reduction	3		1	1	3			5			4	1							8								2	1		2					2								
	As cycling Arsenate reduction	10	1	12	3	34	7	1	5	6	2	7	3	1	18	1	1	3	2	45	1	1	1	3	6	2	2	1	6		5		4	2	1	8		3	1	9	1			
	As cycling Arsenite oxidation			2	1								1							1	5																							
	Selenate reduction	1	1		2	13	2	1		4		2			10				1	2										1					2		1	3				4		
	Nitrite hydration			1																6																								
	Metal reduction	10			2	1	2					3	3		3					2	21			1	3		2	2	1	2							1			1	1		2	

Genome group map:

G01	Acidobacteriota	G11	Desulfobacterota	G21	KSB1	G31	Patescibacteria
G02	Actinobacteriota	G12	Desulfuromonadota	G22	Latescibacterota	G32	Planctomycetota
G03	Alphaproteobacteria	G13	Edwardsbacteria	G23	MBNT15	G33	SAR324
G04	Bacteria UKC	G14	Elusimicrobiota	G24	Margulisbacteria	G34	Schekmanbacteria
G05	Bacteroidota	G15	Fibrobacterota	G25	Methylomirabilota	G35	Spirochaetota
G06	Bdellovibrionota	G16	Firestonebacteria	G26	Myxococcota	G36	Thermoplasmata
G07	Caldatribacteriota	G17	Firmicutes	G27	Nitrospiniota	G37	UBA10199
G08	Campylobacteriota	G18	GWC2-55-46	G28	Nitrospirota	G38	UBP10
G09	Chloroflexota	G19	Gammaproteobacteria	G29	O2-12-FULL-43-9	G39	Verrucomicrobiota
G10	Cyanobacteriota	G20	Gemmatimonadota	G30	Omnitrophota	G40	Zixibacteria

Supplementary Figure S6. Metabolic profile diagram of a subsurface microbial community from Rifle, Colorado, USA. The dereplicated genomes from the Rifle subsurface were assigned with genome taxonomy by GTDB-Tk, and were clustered into 40 microbial groups. The metabolic functional traits were summarized and represented accordingly.