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Ocean Carbon Sink Core Measurements Protocols

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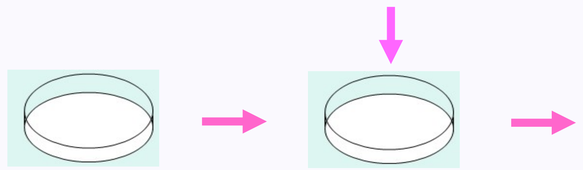
☐ e.g. 2: Availability of labile organic carbon by plate incubation

200ul seawater (5m)



2216E plat without organic carbon

The number of colonies and size After incubation of 7 days

☐ e.g. 3: Availability of labile organic carbon by bioassay

Sea water pass through Millipore AP-25 or AP-15 （In order to exclude big pellet and predator）

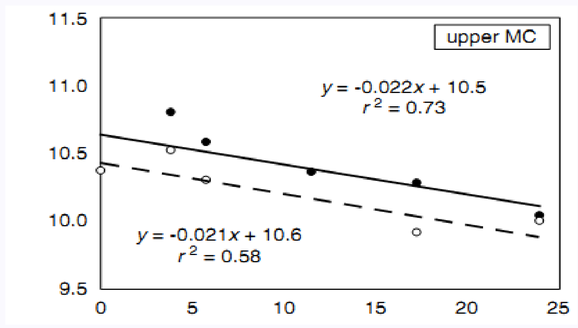
Pass though 0.2um Sterivex filters （In order to get bacteria-free water）

with native bacterial Assemblage (1%)

Incubate in dark

Detect DOC concentration along with time

(Giorflo, 2012, 2007; Pinney, 2000)

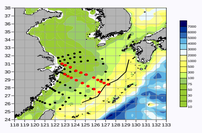


X—Time (days)，Y—DOC Concentrations (mg/L)

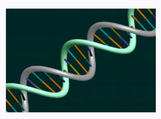
- According to the DOC concentrations versus time, the consumption of DOC is determined using the slopes.
- Thus, the percentage of labile DOC is calculated as the ratio of DOC consumed to the total DOC pool.

(Apple, 2007.ISME)

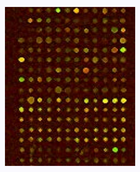
☐ e.g. 4: Profiling microbial potential for carbon sequestration using functional gene microarray



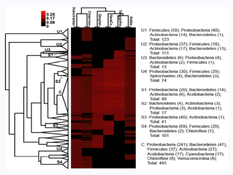
Sampling along environmental gradients



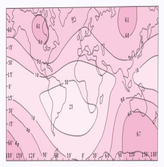
Extracting DNA & RNA



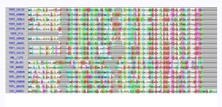
Hybridizing with the probes in a geochip microarray



Analyzing the data quantitatively



Evaluate the microbial potential in carbon cycling processes



Analyzing gene sequences (NCBI)

Designing oligonucleotide probes for functional gene detection and developing a GeoChip microarray

Examples for functional genes

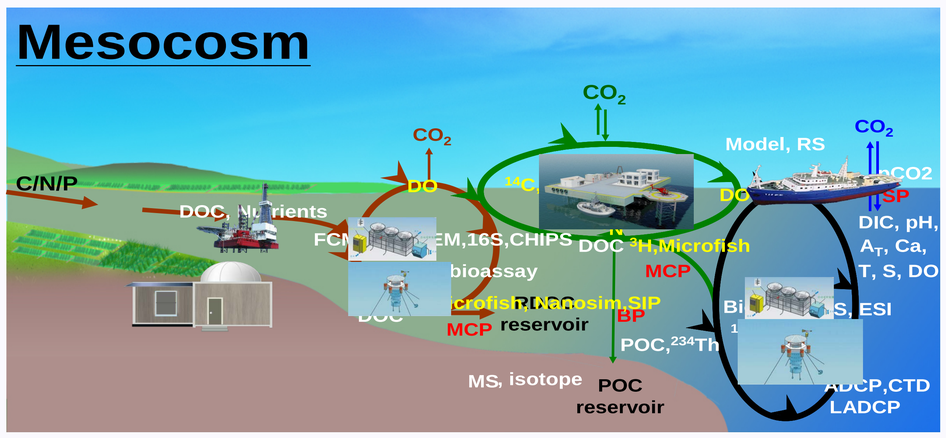
Gene/Category	Uniq Probes	Group Probes	Quasi Probes	Total Probes	Total Covered CDS
Carbon fixation					
Rubisco	136	250	13	398	688
Pcc	55	737	6	797	1534
aclB	26	126	1	153	281
FTHFS	35	87		122	250
CODH	81	204	9	292	645
Subtotal	**333**	**1404**	**29**	**1762**	**3398**
Methane metabolism					
mmoX	10	28		38	65
mcrA	124	108	38	267	989
pmoA	115	63	26	202	623
Subtotal	**249**	**199**	**64**	**507**	**1677**

Gene/Category	Uniq Probes	Group Probes	Quasi Probes	Total Probes	Total Covered CDS
Carbon deg					
amyA	321	865	14	1196	1796
endochitinase	308	481	15	798	1389
AceB	91	697	10	795	1189
phenol_oxidase	393	210	42	629	737
AceA	97	488	8	592	991
acetylglucosaminidase	173	385	6	562	801
ara	81	460	2	543	829
eda	127	354	5	486	672
npIT	102	292	4	398	706
xylA	61	278	2	341	576
vanA	30	269	2	301	515
cellobiase	53	197	3	253	376
pulA	46	199	2	246	474
exoglucanase	119	92	9	216	306
endoglucanase	99	88	5	192	472
mannanase	57	125	1	183	205
ara_fungi	92	69	0	161	166
xylanase	72	81	0	153	250
glucoamylase	48	98	3	149	224
glx	87	59	1	147	147
exochitinase	54	83	1	138	186
nmp	86	34	16	134	128
lip	70	30	7	107	111
Others	112	198	3	313	421
Subtotal	**2779**	**6132**	**161**	**9033**	**13667**

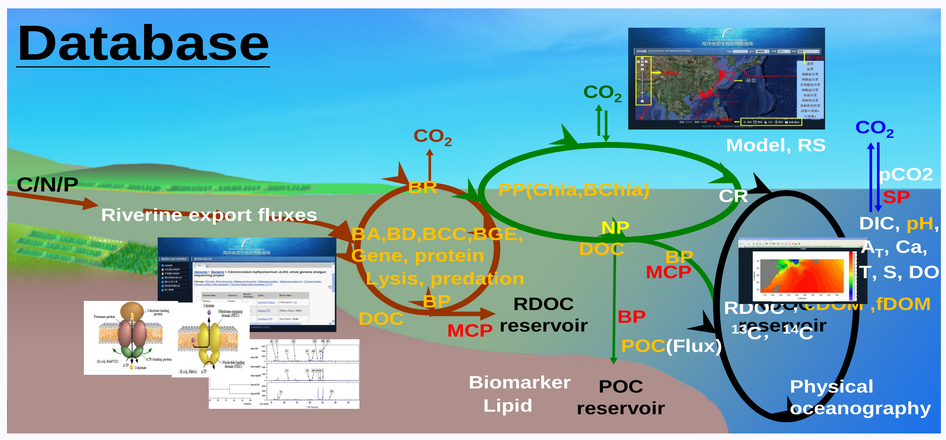
☐ e.g. 5: Key measurements of DIC parameters

- •T
- •S
- •DO
- •Ca
- •pH
- •DIC (TCO_2)
- •TAlk
- •pCO_2 / fCO_2
- • $K_H^{CO}2$
- • $K_1^{H}2CO3$
- • $K_2^{HCO}3^-$
- • $K_H^{O}2$

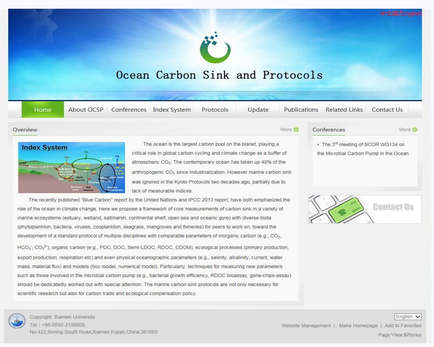
☐ e.g. 6: Mesocosm studies for a comprehensive understanding what possible influential factors will produce a positive or negative reaction of ocean carbon sink



☐ Finally, a series of databases will be built to collect and compare data from various sea areas and environments, to calculate the ocean carbon reservoir, including RDOC reservoirs and POC reservoirs, and to estimate the uptake capacity of the ocean for the "extra" CO_2 that has been emitted to the atmosphere.



Website



We welcome contributions to the ocean carbon sink protocols.

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http://121.192.178.38:8080/ocsp/index_en.jsp