Distribuição de carbono no planeta

Reservatório	gC X 10^{20}
Atmosfera (1973)	0.00675
Oceano	
C inorgânico	0.38
C orgânico	0.01
Detritos	0.0129
Terrestre	
Organismos	0.0164
C orgânico (rocha sedimentar)	68.2
Rochas calcárias	183

Carbono transportado para os oceanos

Fonte	gC ano^{-1} X 10^{14}	%
Prod. primária (fitoplâncton)	200 - 360	98.9
Rios e ribeiros	3 - 3.2	1.1
Águas subterrâneas	0.8	0.3
Voláteis de origem vegetal e aerosois	1.5 - 4	0.6
Hidrocarbonetos (petróleo)	0.046	0.017

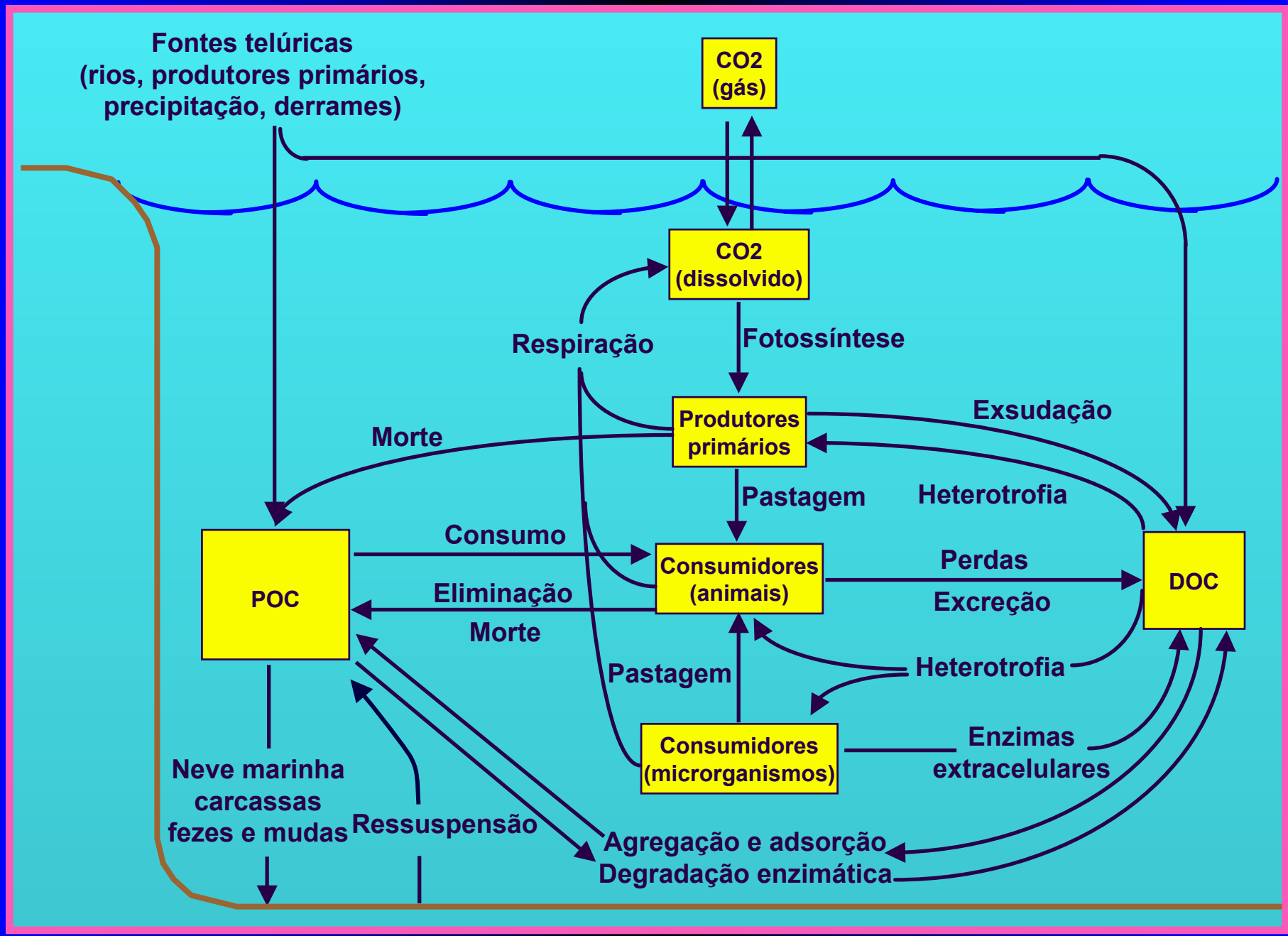
After Handa (1977), Duce & Duursma (1977) & Farrington (1980)
In Valiela, I., Marine Ecological Processes

Distribuição de matéria orgânica particulada (MOP)

	Matéria orgânica particulada (ugC l^{-1})	% do total de MOP			
		Fitoplâncton	Zooplâncton	Bactérias	Detritos
Mar de Azov	750-1500	5-10	3-10	0.3-7	80-92
Mar da Arábia	100-250	1-31			
Mar Negro	200-250	0.2-1	5-20	0.4	78-95
Atlântico tropical					
15o meridiano	450-600	0.5-1.3	0.6		98-99
16o paralelo	100-250	0.6-1.3	0.7		98-99
Afloramento (África do Sul)	70-900	30-43	4-14		9-14
Estuário do Hudson	660-2250	2-72			40-93
New York Bight	200-840	12-51			38-90
Báltico (oeste)	492-505	23-27	33-35		41-43
Baía de Chesapeake	11.5-84	23			77
Canal da Mancha	950-2500	15-17			
Baía de Aberdeen	200-3400	8-10			
Mar de Wadden	1000-4000	10-25			
Baía de Akeshi		9.7	1.7		

Diversos autores, *In* Valiela, I., Marine Ecological Processes

Ciclo do carbono no ambiente marinho

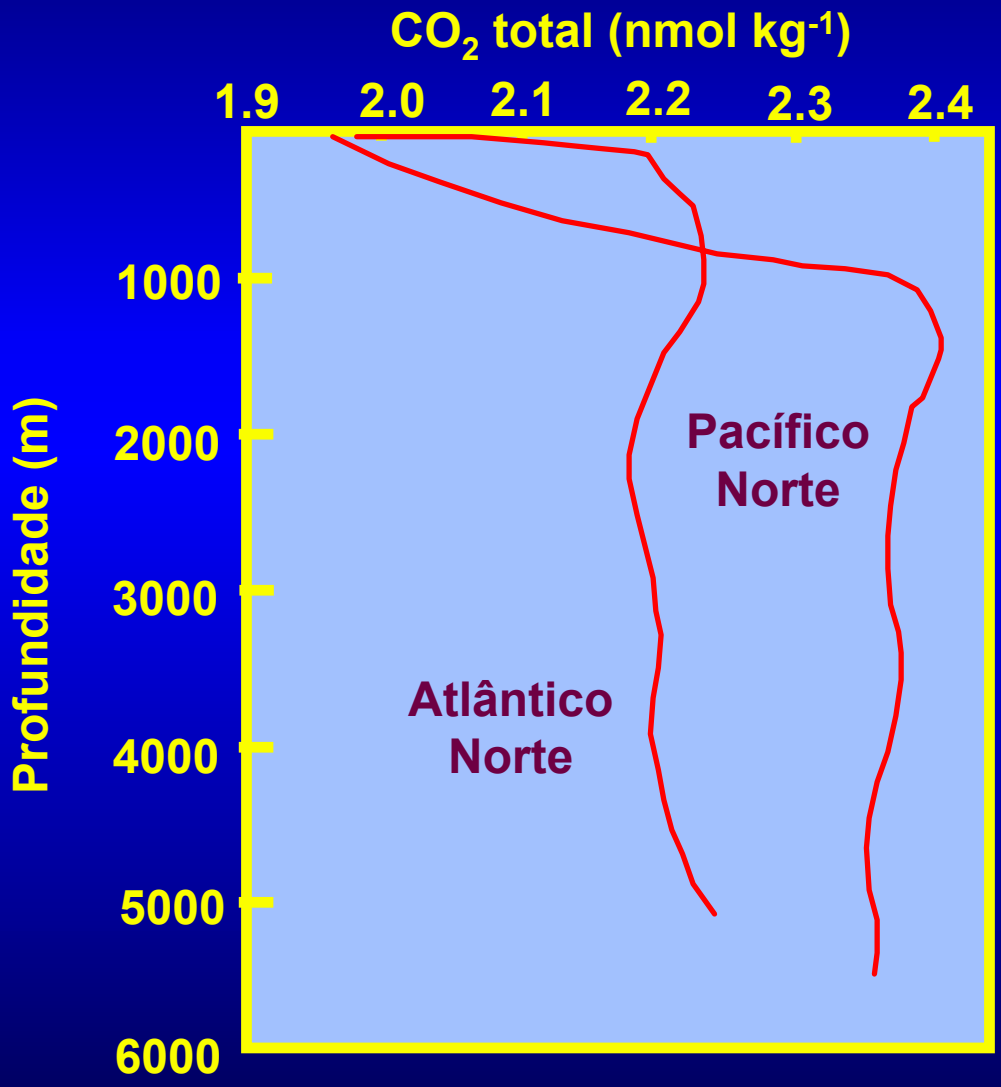


Internal sources of DOC

Sources	Processes	Fluxes
Phytoplankton	Exudation	7-62% of carbon fixed (carbohydrates, aa's, phenolics, etc)
Zooplankton	Excretion	3-10% of photosynthetically fixed carbon (California)
	Sloppy grazing	15-20% of carbon consumed
Detritus	Leaching/decomposition	14-60% of initial weight of dead material

Several authors, *In* Valiela, I., Marine Ecological Processes

Perfis verticais de CO_2 no Atlântico e Pacifico Norte



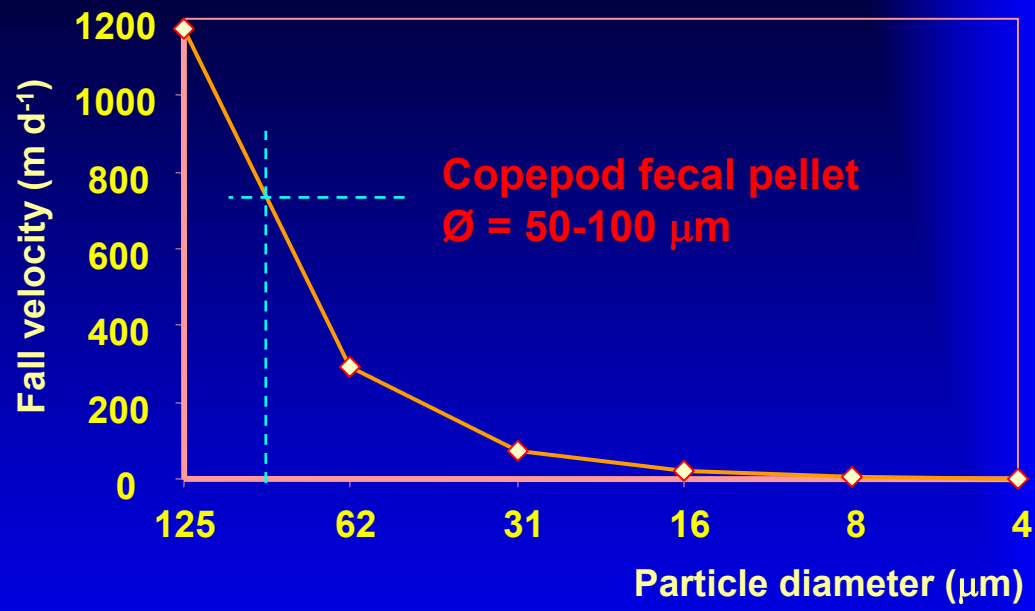
Adaptado dos atlas GEOSECS - vols. 2 & 4

Sediment traps
Different designs, same idea

http://jpac.whoi.edu/atsea/instrument.html

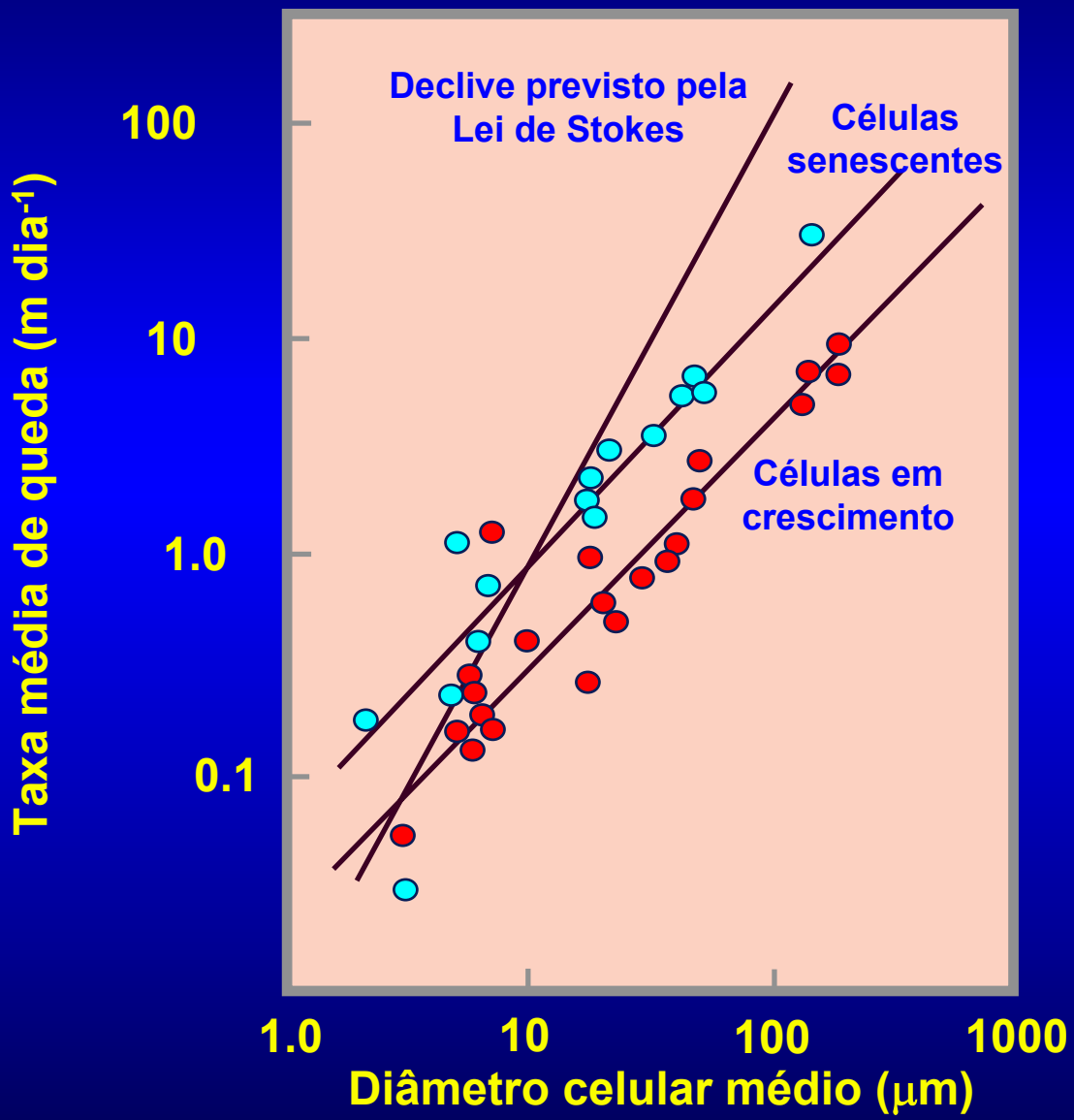
Sediment traps
Key points

- Capture larger particles (faecal pellets, etc) which fall at a rate of hundreds of metres per day
- Should not be placed too near the bottom (resuspension) or too near the surface (mixing)
- May be scavenged by deep-sea organisms
- "Inhibitors" may be added to reduce this effect



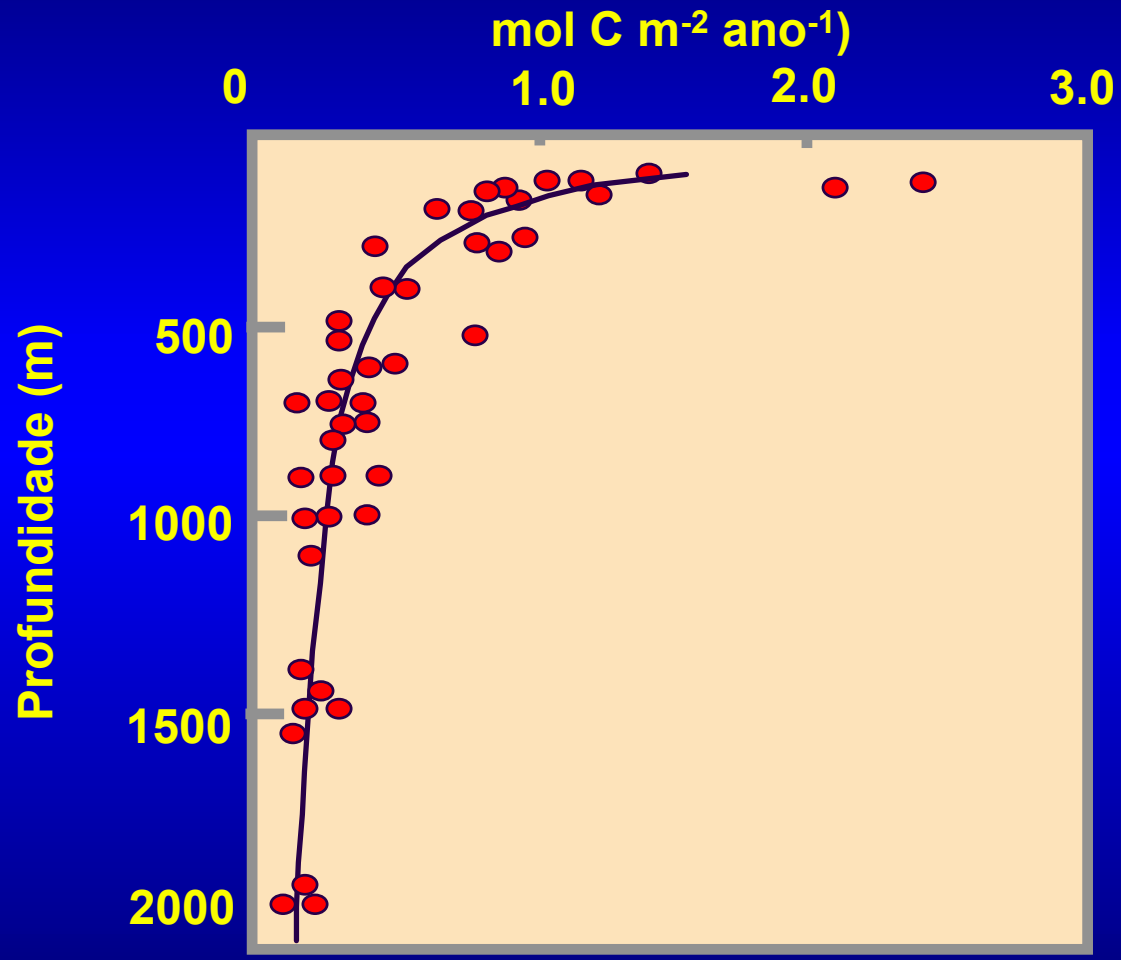
- Isotopic markers may be used to identify particle sources, using fallout tracers and other approaches

Relação entre a taxa de queda e o diâmetro celular



Smayda, T.J., 1970 - Oceanogr. Mar. Biol. Ann. Rev. 8, 353-414

Fluxo de carbono no Pacífico Nordeste



Resultados de 6 estações, obtidos através de armadilhas de sedimentos (trapping)
Martin et al., 1987, Deep Sea Res. 34, 267-285

Sedimentação de POC

Ecossistema	Fluxo de POC da superfície ($mgC\ m^{-2}\ dia^{-1}$)	% produção primária (%)	% respiração bêntica (%)
Produtividade baixa			
Atlântico equatorial	6.8	0.8 (5000m)	133-667
Atlântico NO	5.5-16.5	4-6 (~3000m)	-
Giros oligotróficos	1.6	6.2	-
Produtividade alta			
Afloramento do Perú	533	10 (50m)	-
New York Bight	299	59	-
Águas costeiras	37-168	30-46	-

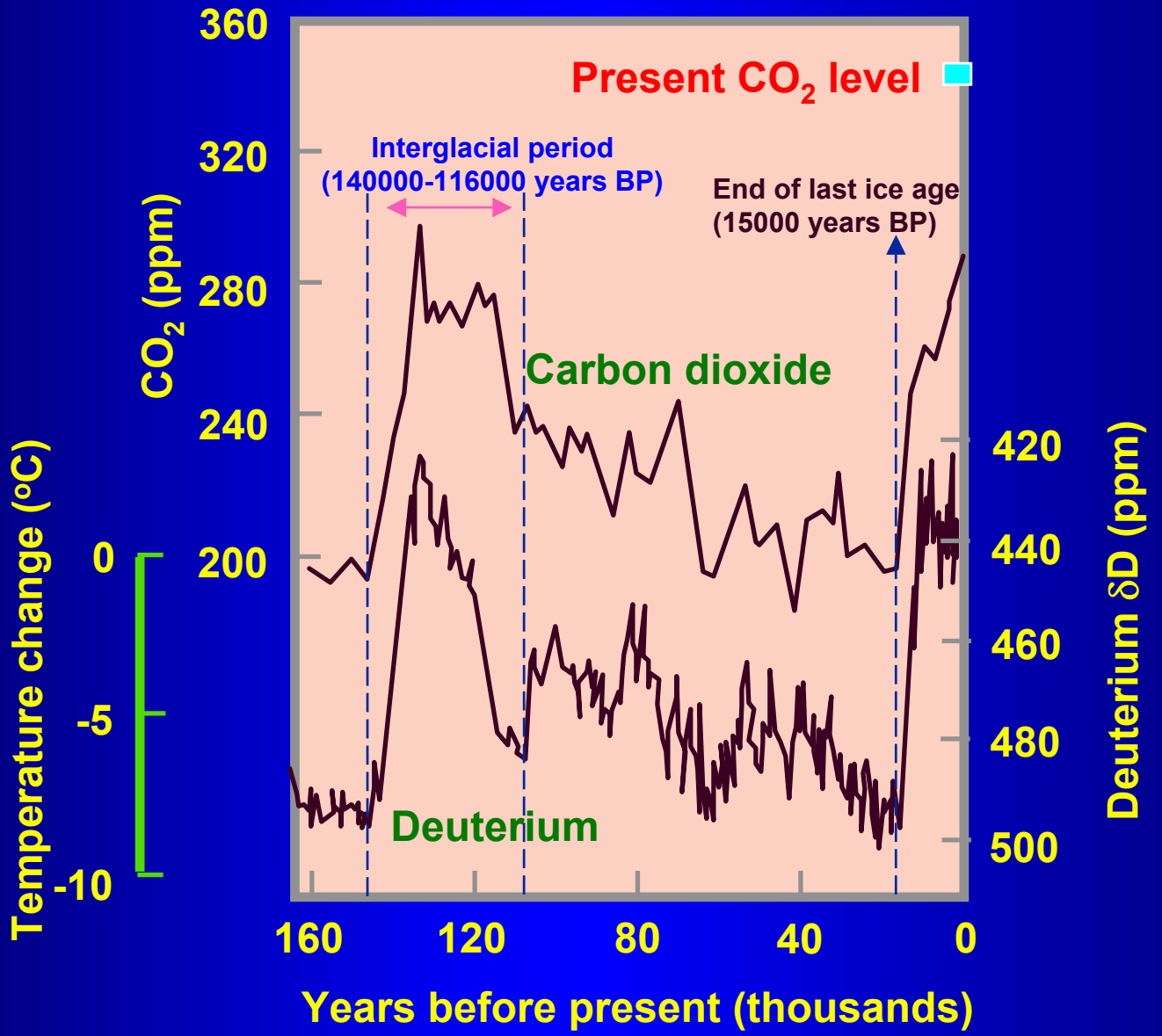
Diversos autores, In Valiela, I., Marine Ecological Processes, 1984 - Springer-Verlag

Aquatic photosynthesis and sedimentation of organic carbon

Region	Area (km2)	Net primary production ($x10^{12}$ kgC yr^{-1})	Sediment organic carbon sink ($x10^{12}$ kgC yr^{-1})
Open ocean	3.1×10^8	18.6	0.19
Continental shelf	2.7×10^7	5.40	0
Continental slope	3.2×10^7	2.24	0.50
Fresh water marshes	1.6×10^6	1.51	0.15
Estuaries and deltas	1.4×10^6	0.92	0.20
Salt marshes	3.5×10^5	0.49	0.05
Rivers and lakes	2.0×10^6	0.40	0.13
Coral reefs	1.1×10^5	0.30	0.01
Seaweed beds	2.0×10^4	0.03	0
Total	**3.75×10^8**	**29.89 (C input)**	**1.23 (C output)**

Walsh & Dieterle, 1988 - *In* Scales and Global Change, Wiley, New York

CO_2 content and δD in Vostok ice core 2200m deep - 160000 years before present (BP)



Barnola *et al.*, 1987. Nature, 329:408-412

Balanço global de carbono