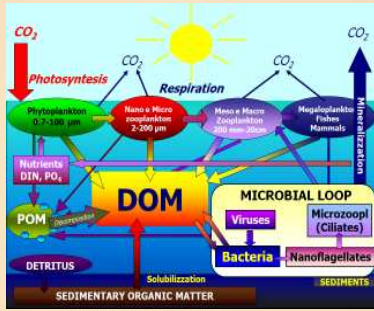


Dissolved organic matter dynamics in the Mediterranean Sea

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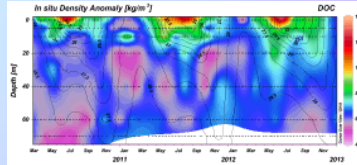
Schematic representation of marine carbon cycle

Marine dissolved organic matter (DOM) is a complex mixture of organic molecules passing through a 0.2 µm filter. DOM represents the largest, the most complex and the less understood reservoir of organic carbon on the Earth. The importance of DOM is connected to its ecological significance and its central role in the marine carbon cycle.

Most of DOM in the oceans is recalcitrant, that means that it can accumulate, representing a dynamically stable reservoir of carbon that under circumstances, not completely understood, may be removed by mineralization and/or other abiotic processes. The labile DOM (LDOM) is the fraction that fuels the microbial loop and cannot accumulate, due to its very fast microbial turnover.

Temporal variability of DOM

Gulf of Naples

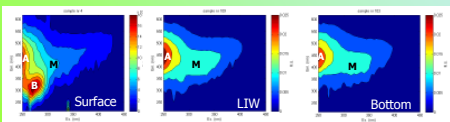


- What are the main processes responsible for DOC and CDOM seasonal and interannual variability?
- How climate change will affect DOM temporal variability and C fluxes?

Spectroscopic characterization

- How is CDOM distributed in open sea waters?
- Are optical properties (Absorption & fluorescence) of CDOM good tracers of different water masses?
- Can we infer information about recalcitrant DOM by optical properties of CDOM?
- What information about CDOM molecular characteristics and transformation processes can we infer by optical properties of CDOM?

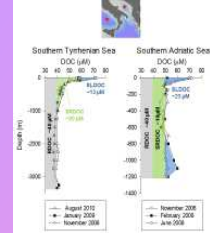
Fluorescence Excitation Emission Matrixes



A → Fulvic-like
B → Protein-like
M → Marine Humic-Like

DOC radiocarbon data

In collaboration with D. Repeta (WHOI, US)



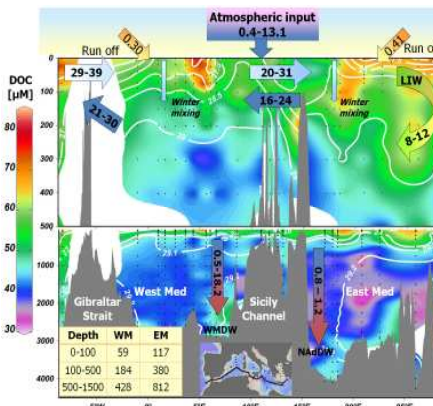
Why does the Mediterranean DOC reach values as low as 34-44 µM, the lowest ones observed in the oceans, even though the residence time of water in the basin is ten times longer than in the oceans (100s vs. 2000s years)?

What is the age of DOC in the Med Sea deep waters?

What is the main source of refractory DOC in the Med Sea?

Why the removal of refractory DOC is faster in the Med Sea than in the oceans?

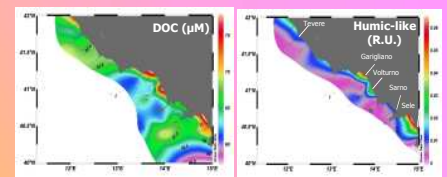
Dissolved organic carbon (DOC) fluxes (10¹² g C y⁻¹) superimposed onto the DOC distribution along a west-east section



1. Why a fraction of DOM cannot be used by microbes on short time scale (months, years)?

2. What is the main mechanism driving the lability of DOM?

DOM dynamics in coastal areas, impacted by river inputs



Are river mouths sources or sinks of CO₂ to the atmosphere?

Are optical properties (Abs, fluorescence) of CDOM good tracers for riverine waters?

What are the main biophysical processes affecting riverine DOM in coastal waters?

What is the impact of changes in river discharge on C fluxes and DOM dynamics in the coastal areas?

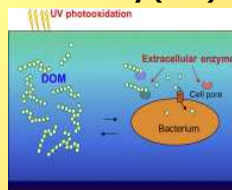


Atmospheric Input of DOM

- What is the DOM flux from the atmosphere?
- What are the main sources of atmospheric DOM?
- What are the main transformation processes affecting atmospheric DOM in the surface oceans?



Microbial Enzymatic Extracellular Activity (EEA)



- Is it possible to improve the precision of EEA measurements?
- Is a change in EEA related to a change in microbial community and/or induced by different kind of DOM?
- Can we infer information about DOM lability by EEA?

Outreach Activity



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