Unité d'Océanographie Chimique
de L'Université de Liège

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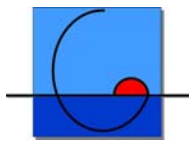
http://www.ulg.ac.be/oceanbio/co2/

- The group as a long lived expertise in **air-sea CO_2 fluxes** and inorganic carbon cycling in **coastal areas**.

In the past 5 years, the group has coordinated/been involved in several EU or national projects:

EUROTROPH (coordination)

Nutrients Cycling and the Trophic Status of Coastal Ecosystems



CARBOOCEAN IP

Marine carbon sources and sinks assessment

BELCANTO

Assessing the sensitivity of the Southern Ocean's biological pump to climate change

CANOPY

CArbon, NitrOgen and Phosphorus cYcling in the North Sea

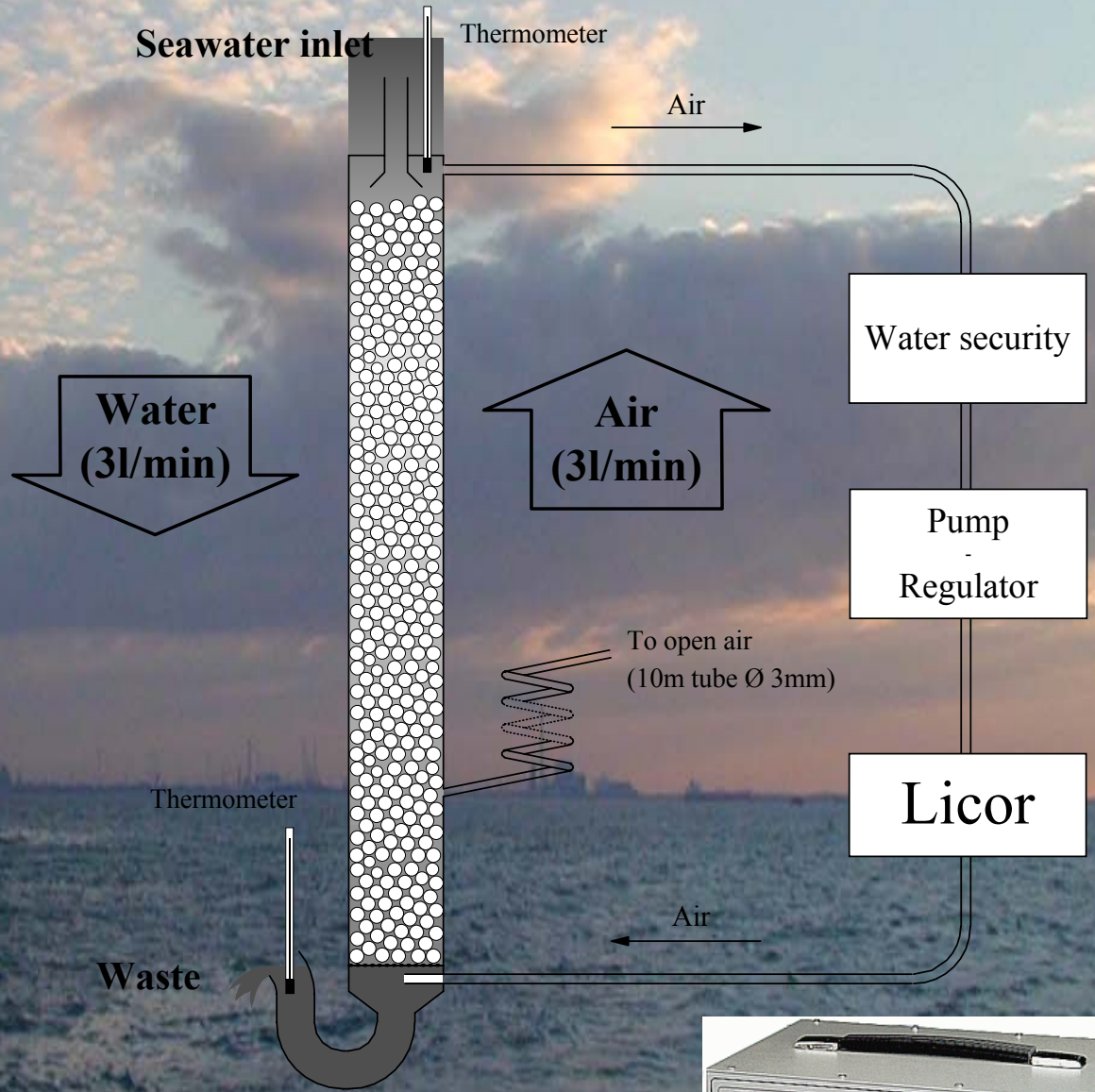
Core parameters:

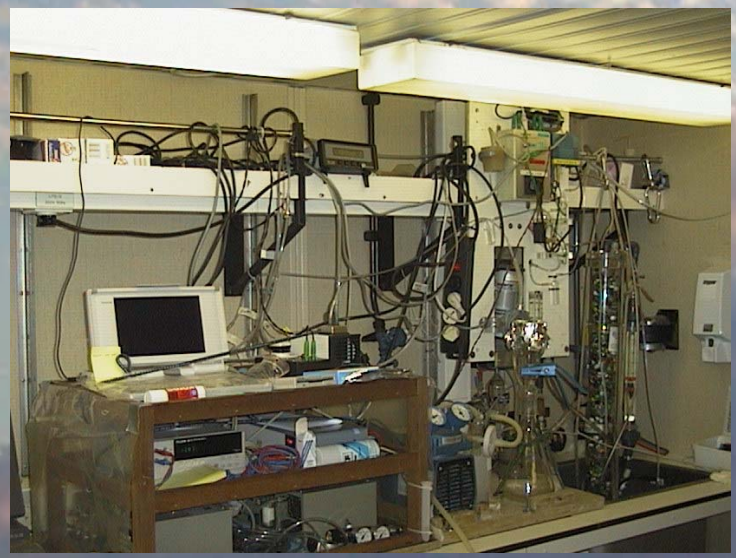
- Underway pCO_2 and pH
- Ponctual Total Alkalinity & pH

  $\Rightarrow$DIC (Dissolved Inorganic Carbon)
- Direct CO_2 fluxes measurement (bell method)

Related Parameters

- Continuous and punctual Salinity
- Continuous and punctual O_2
- Net Community Production (O_2 method)
- Chlorophyll a
- Nutrients (Phosphate, Ammonia, Silicate)
- Bacteria Count



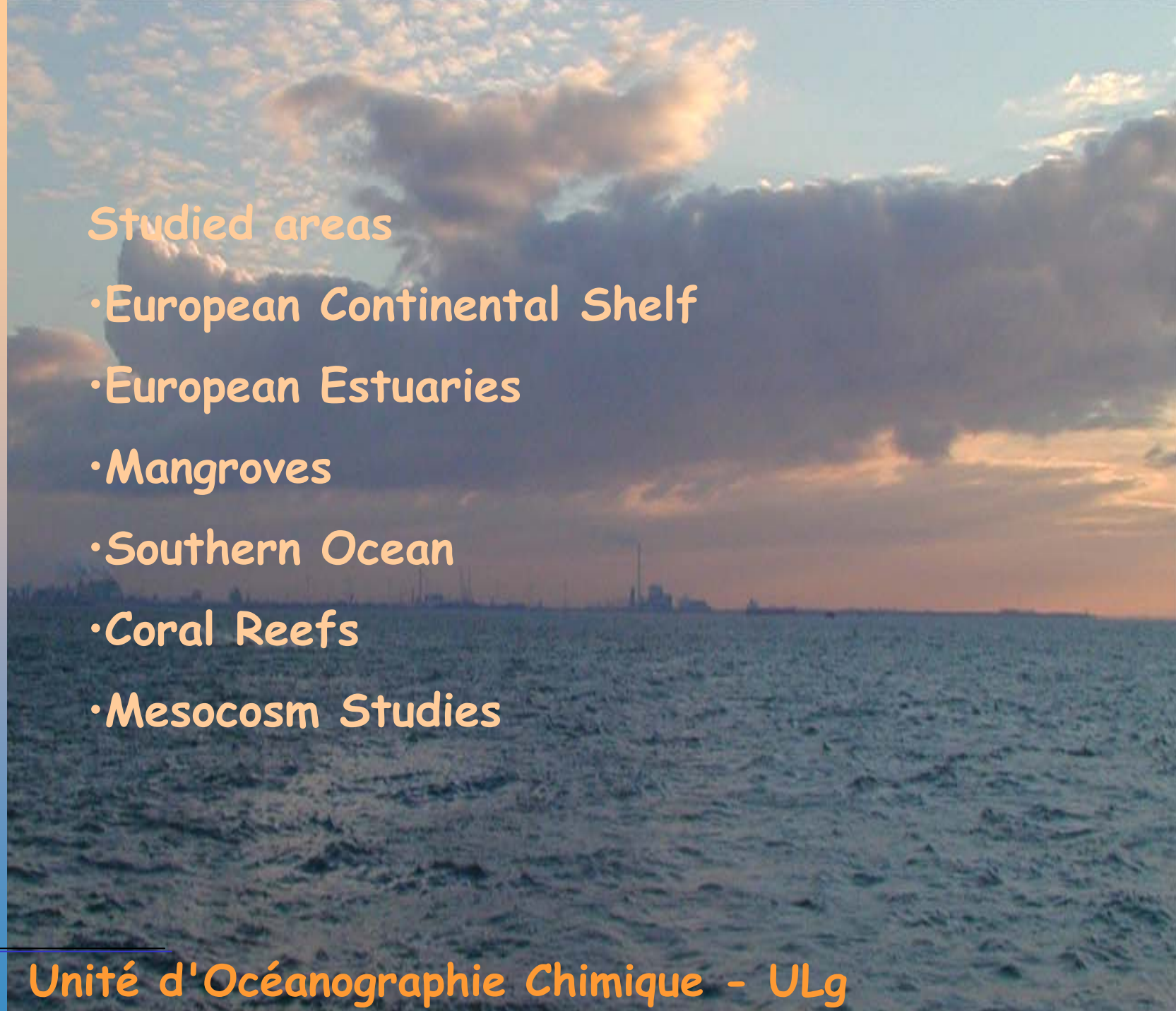


Full continuous pCO_2 and O_2 system

CUBE: Rugged Autonomous system

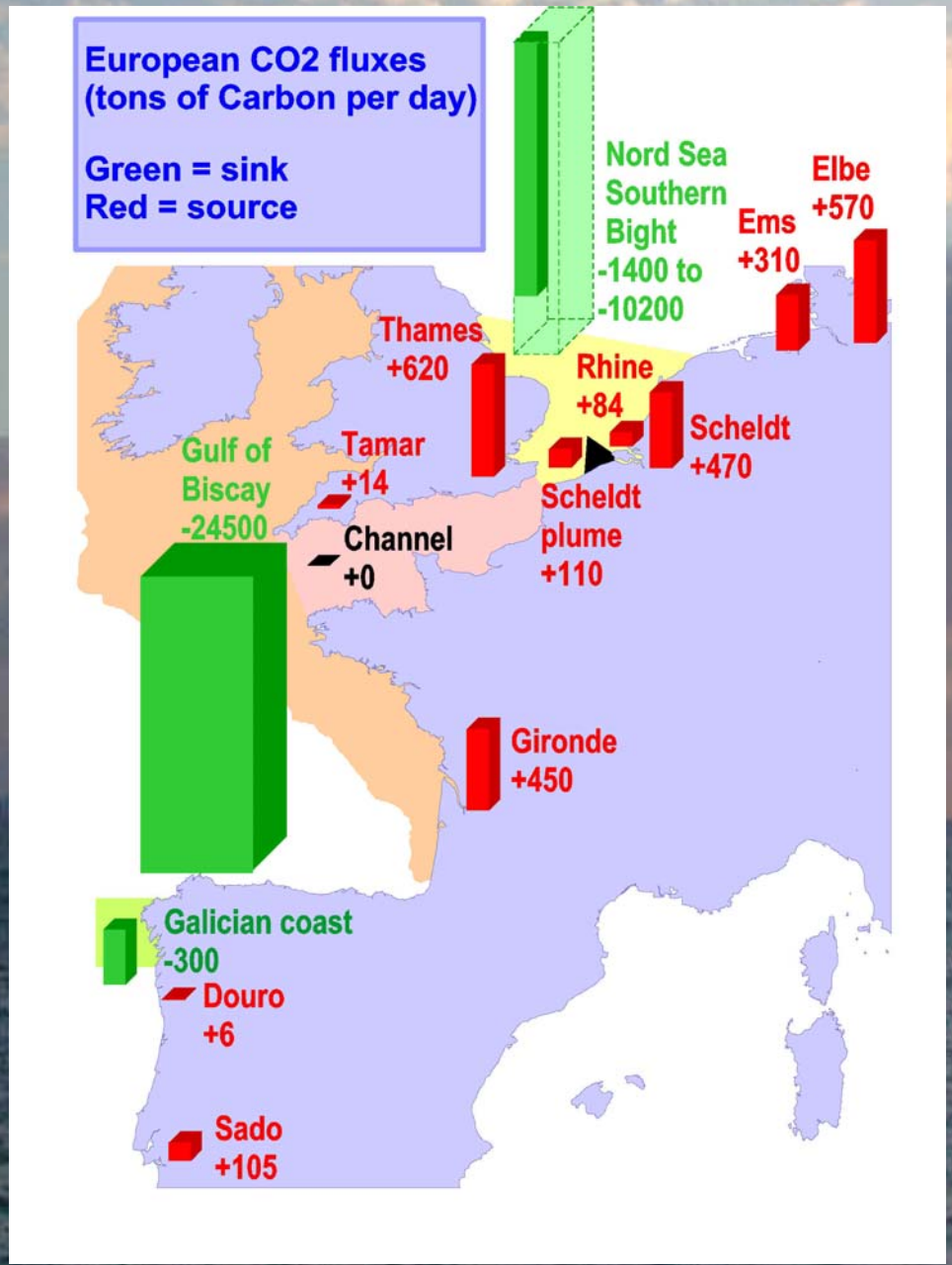
FES: Floating Equilibrator System

Compact transportable system



Studied areas

- European Continental Shelf
- European Estuaries
- Mangroves
- Southern Ocean
- Coral Reefs
- Mesocosm Studies



⇨ European estuaries emit 5 to 10 % of anthropogenic CO_2 emissions for Western Europe *(Science 98)*

⇨ European Continental Shelves is a CO_2 sink equivalent to 45% of the North Atlantic Ocean sink *(Global Biogeochem. Cycles 01)*

⇩

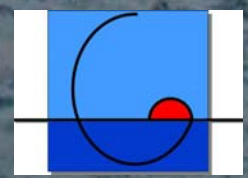
Significant importance of the European coastal area in term of CO_2 fluxes

Undergoing projects in the european Area

- Automated continuous monitoring of partial pressure of CO_2 (pCO_2) and related parameters in the Scheldt (Antwerpen)

- Interannual V.O.S. survey of pCO_2 in the Southern Bight of the North Sea onboard the *R.V. Belgica*

- Inorganic carbon dynamics in the framework of the SSTC project CANOPY (CArbon, NitrOgen and Phosphorus cYcling in the North Sea)

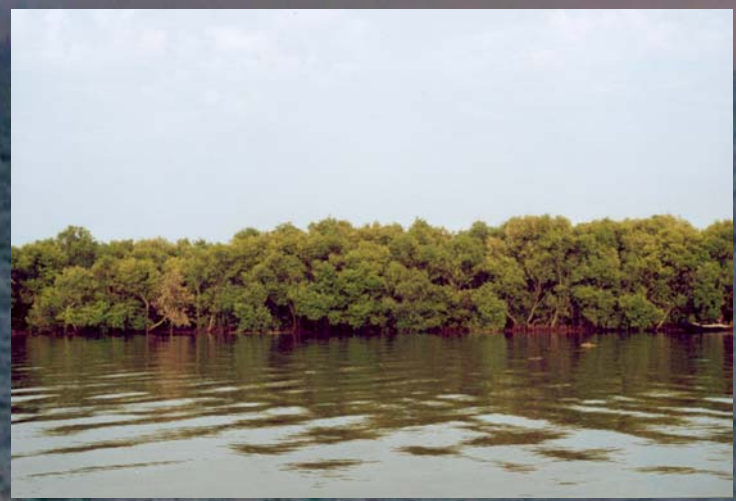


- Marine carbon sources and sinks assessment (CARBOOCEAN IP)

Coral reefs

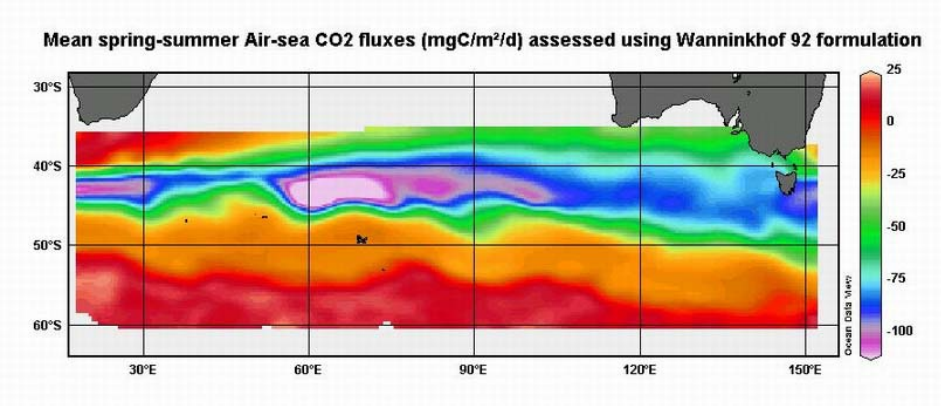
⇨ Coral reefs acts as a source of CO_2 for the atmosphere *(Science 1996)*

Mangroves



⇨ The global emission of mangrove waters could be about 5 MtC.year^{-1} which represent a significant flux for the tropical area *(GRL 2003)*

Underway pCO_2 extrapolated using remote sensing



⇨ Spring and summer CO_2 fluxes of the Indian sector of the Southern Ocean represents a sink of about 250 million tons of carbon per year.

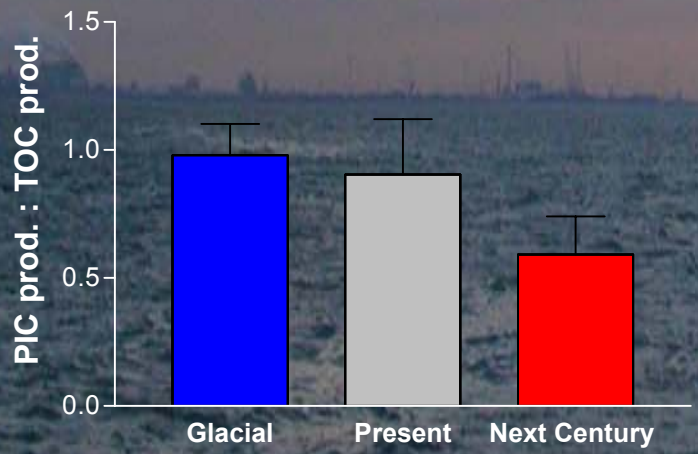
Biogeochemistry of sea ice

⇨Precipitation of $CaCO_3$ during the sea ice formation could lead to CO_2 oversaturation under sea-ice

⇨Biogeochemical process within sea ice can drive direct CO_2 fluxes from the ice to the atmosphere

Impact of atmospheric pCO_2 changes on phytoplanktonic communities

⇨ Enhanced pCO_2 concentration leads to a decrease of Calcification by Coccolithophorid *Emiliania huxleyi.*

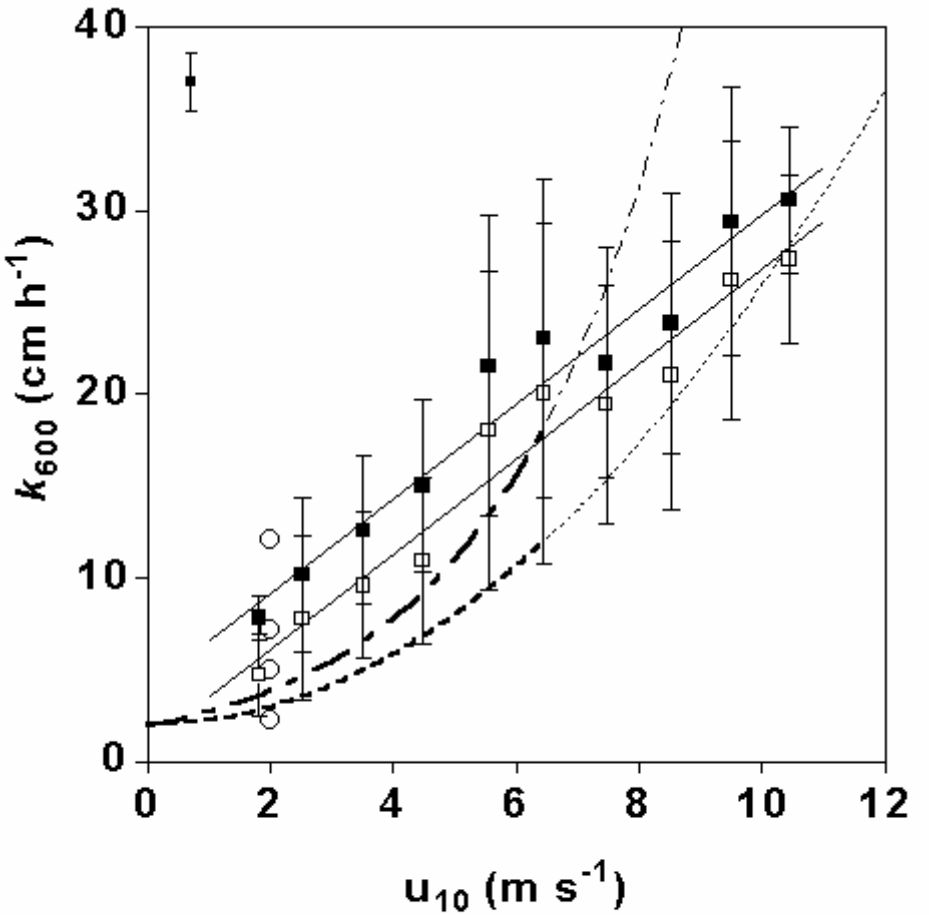


Inorganic prod°:Organic prod°
(Emiliania huxleyi)

⇨Overall carbon export by *Emiliania huxleyi* community could be enhanced at high pCO_2

(Delille et al. 2005)

Air-sea gas transfer



⇨In estuaries, air-sea CO_2 transfer can be strongly affected by water currents

⇨ Air-sea exchange coefficient is site dependent (Limnol. Oceanog. 2004, Estuaries 2004)

Welcome to the Chemical Oceanography Unit

Department of Astrophysics Geophysics and Oceanography (AGO)
Member of the interfacultary research network *MARE*
University of Liège, Institut de Physique (B5), B-4000 Sart Tilman, Belgium (Fax +32 4 3662355)

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site maintained by:
Alberto V. Borges
Bruno Delille

The Unit works in the framework of the following projects:

- Towards an integrated marine Carbon sources and sinks assessment CARBO-OCEAN
- Assessing the sensitivity of the Southern Ocean's Biological Pump to Climate Change BELCANTO
- CArbon, NitrOgen and Phosphorus cYcling in the North Sea CANOPY
- Carbon cycling in the upper Scheldt estuary
- Carbon cycling in Mangroves and Tropical Estuaries
- Pelagic Ecosystem CO2 Enrichment Study PEECE
- Nutrients Cycling and the Trophic Status of Coastal Ecosystems EUROTROPH
- BIOGas transfer in ESTuaries BIOGEST
- Ocean Margin EXchange OMEX
- Carbon cycling in Coral Reefs

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