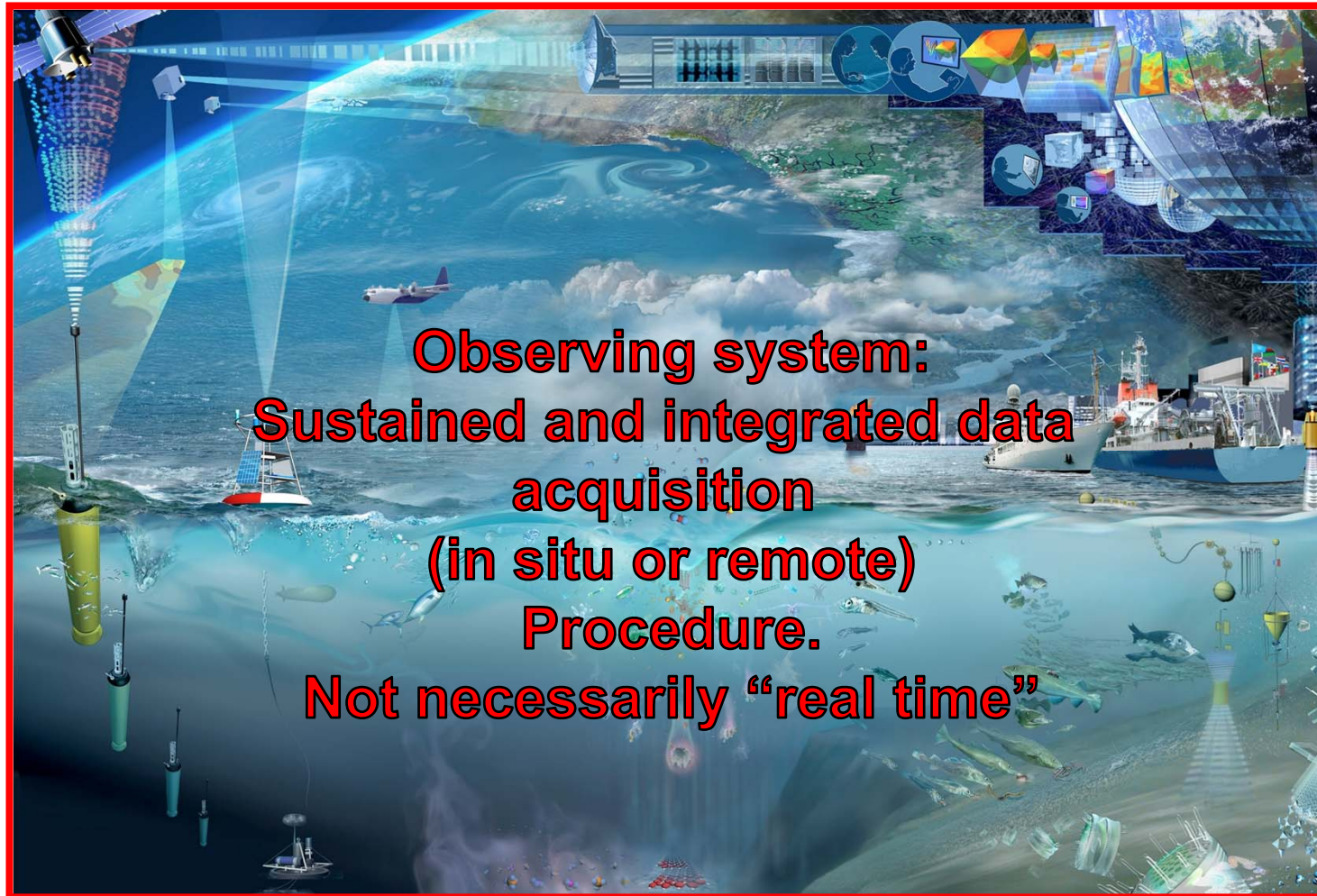


Kostas Nittis Scientific and Strategic Workshop
on a coordinated European observing system strategy



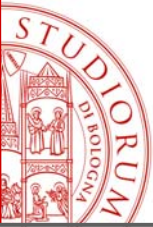
In this talk.....



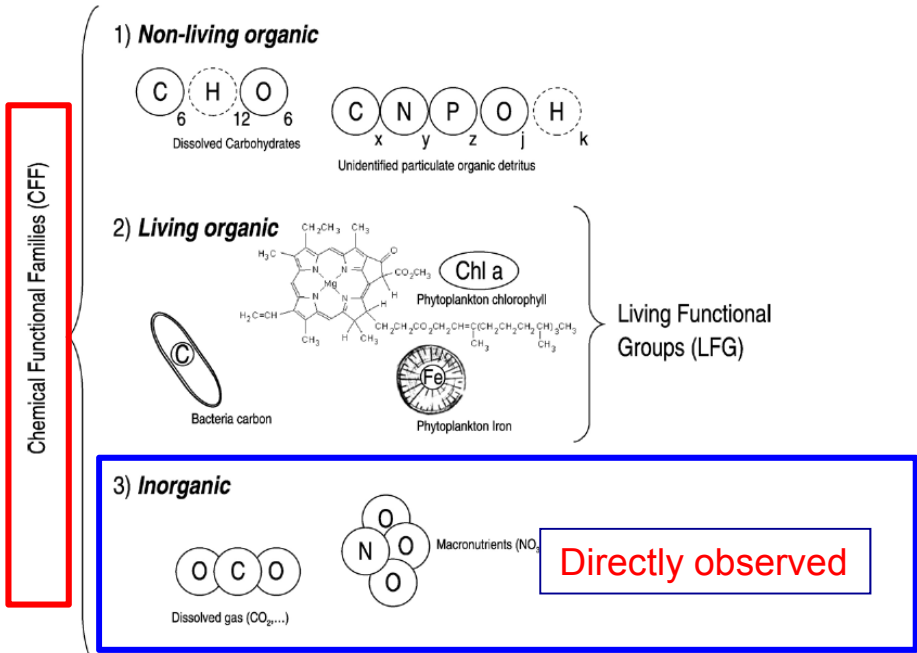
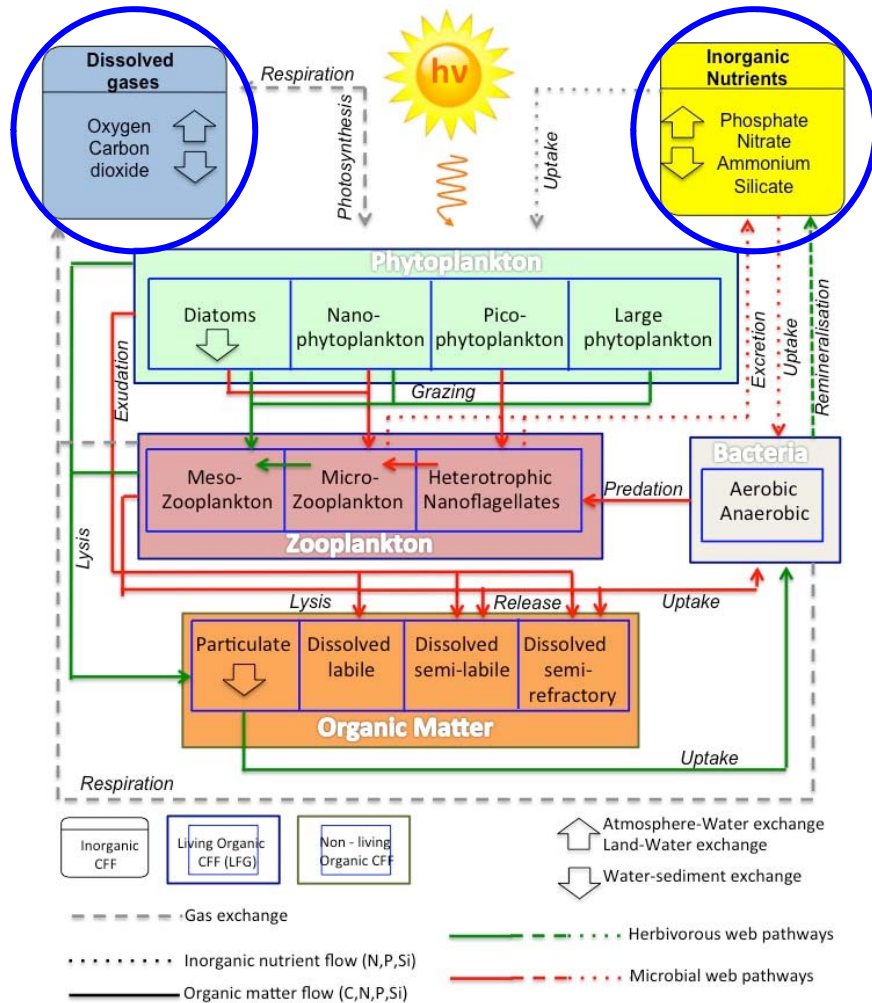


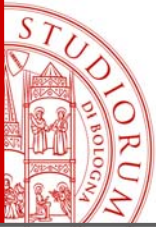
Outlook



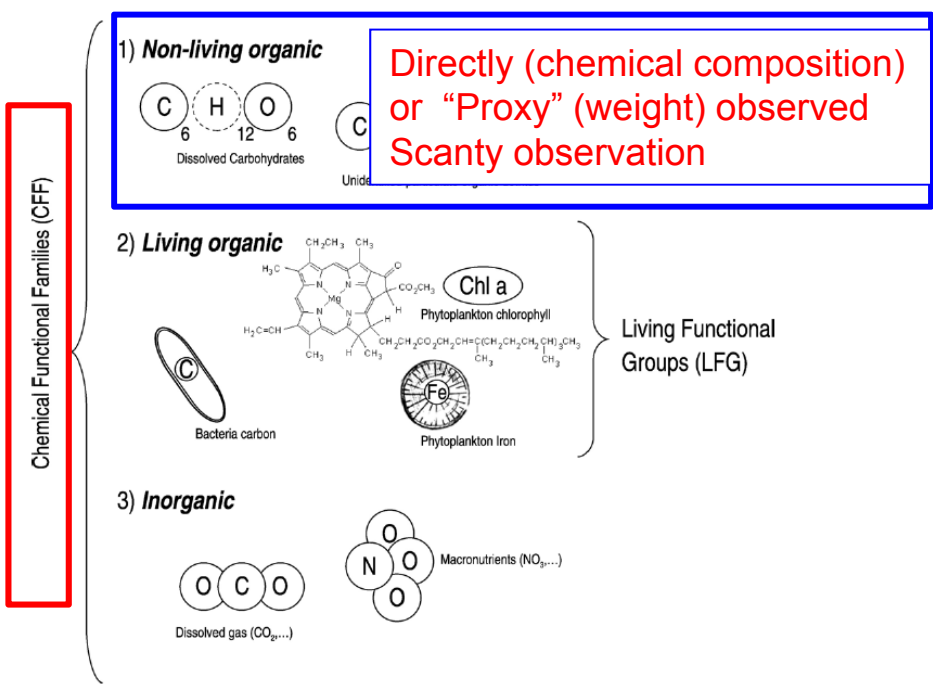
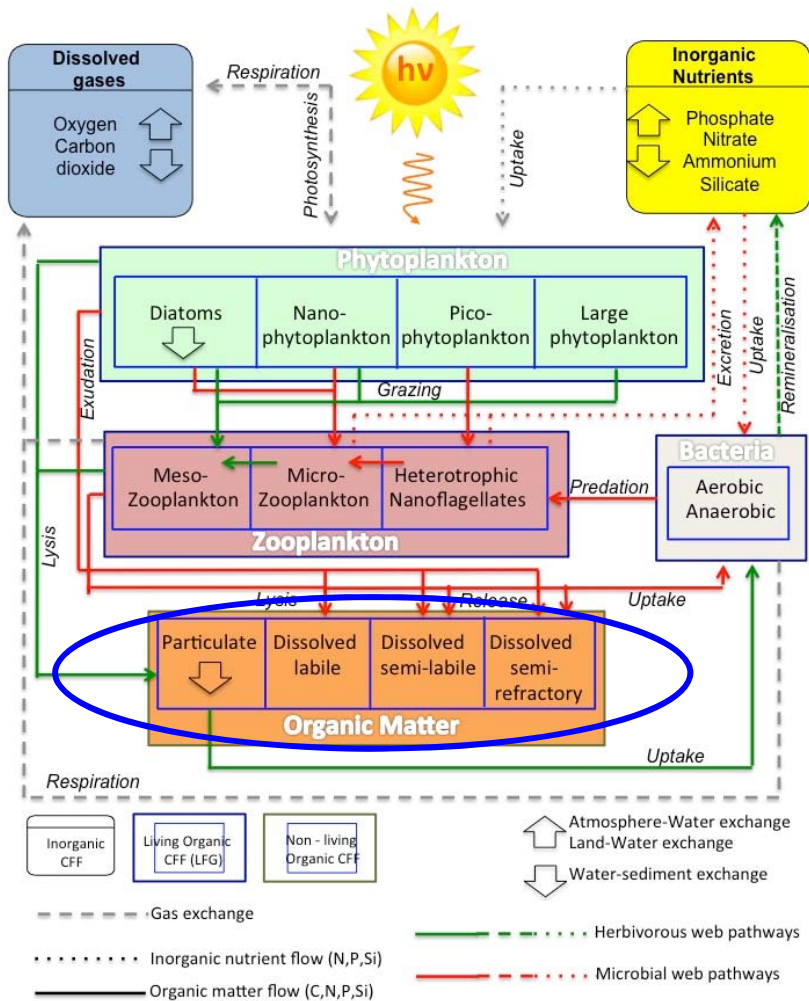


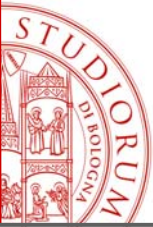
What are we talking about: LTL models



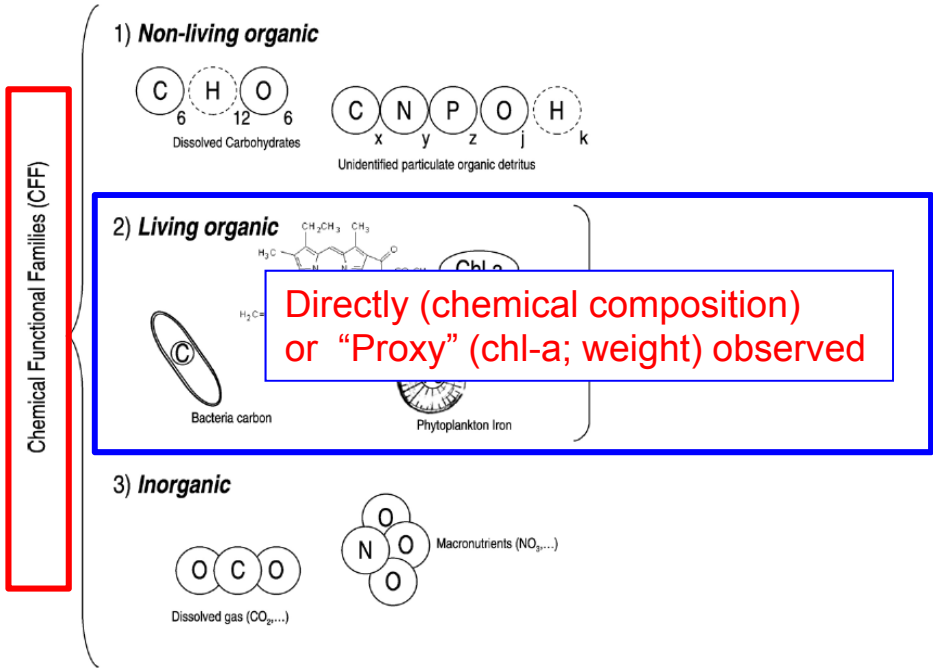
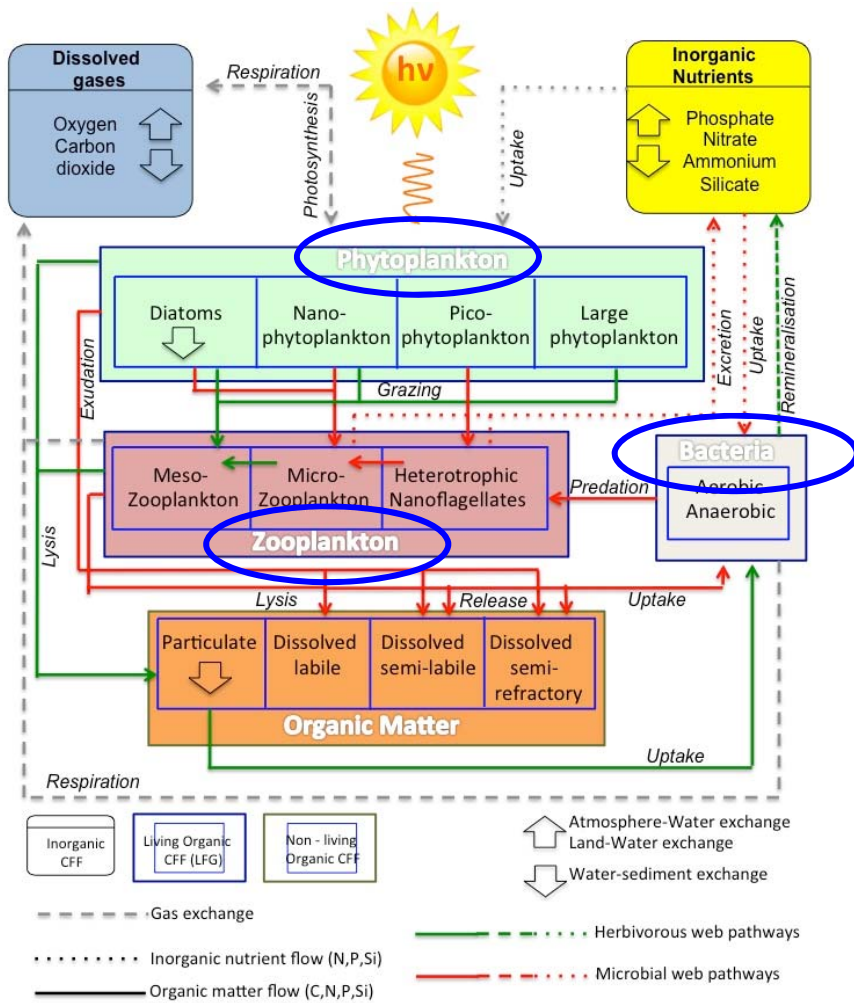


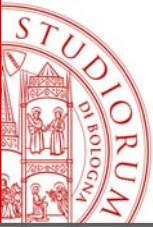
What are we talking about: LTL models



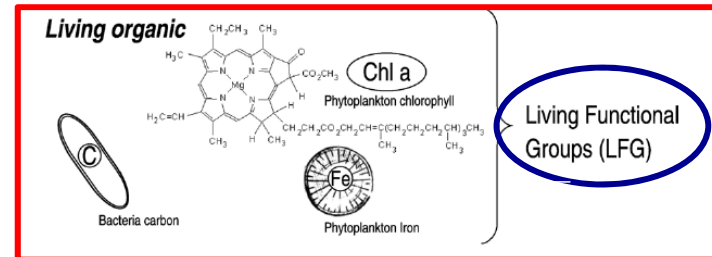
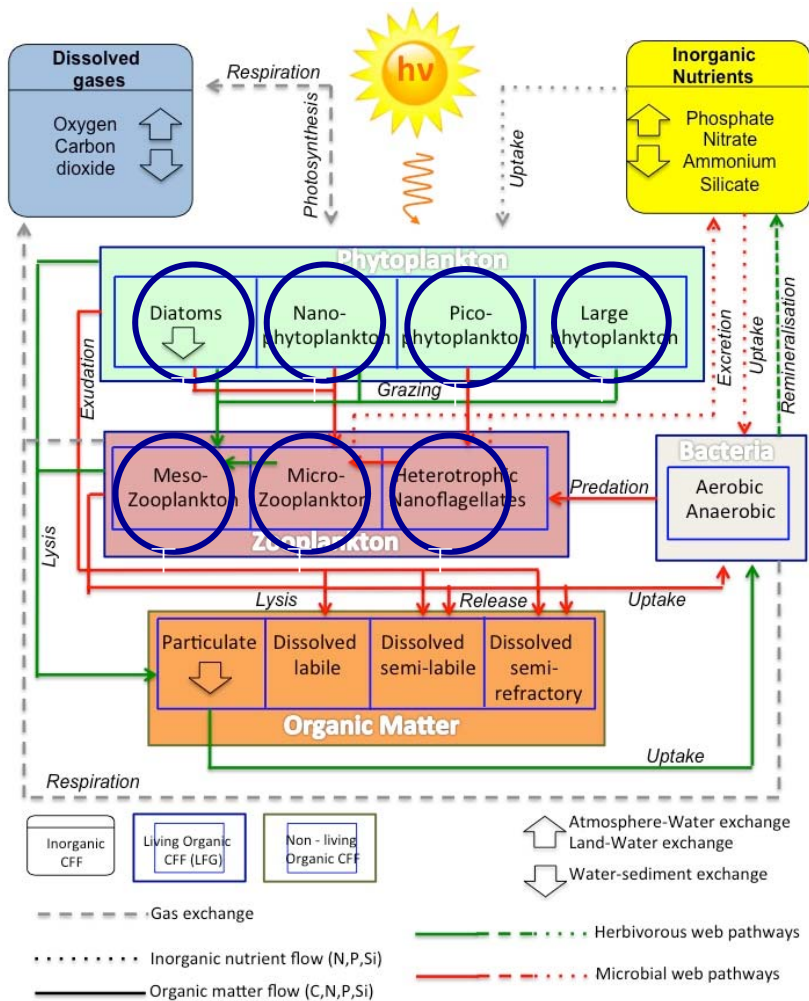


What are we talking about: LTL models



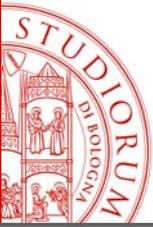


What are we talking about: LTL models

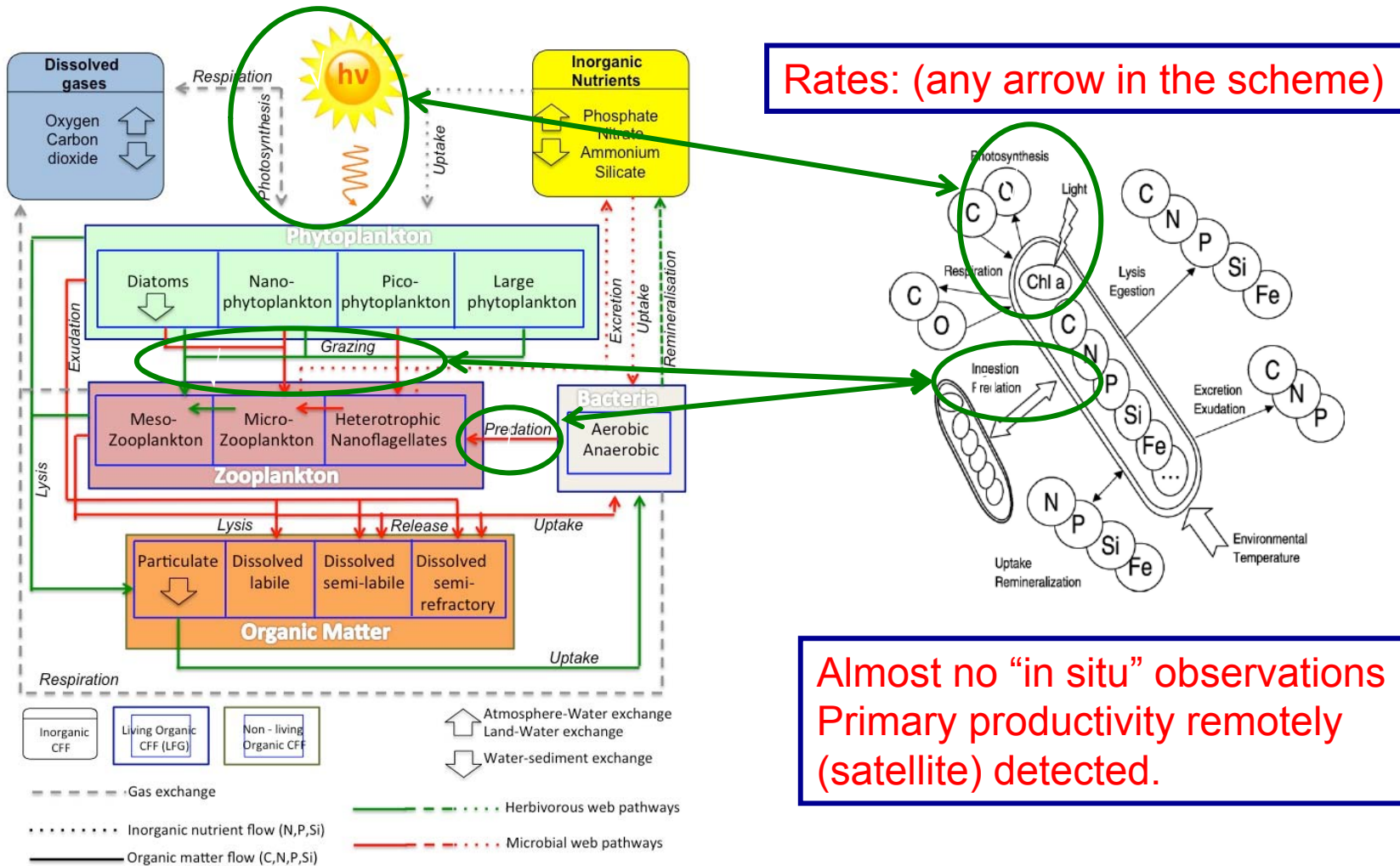


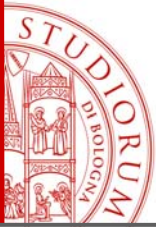
“Intra” Functional groups resolution
 Almost no observations “in situ”
 Promising progresses from remote
 Observations (for primary producers)



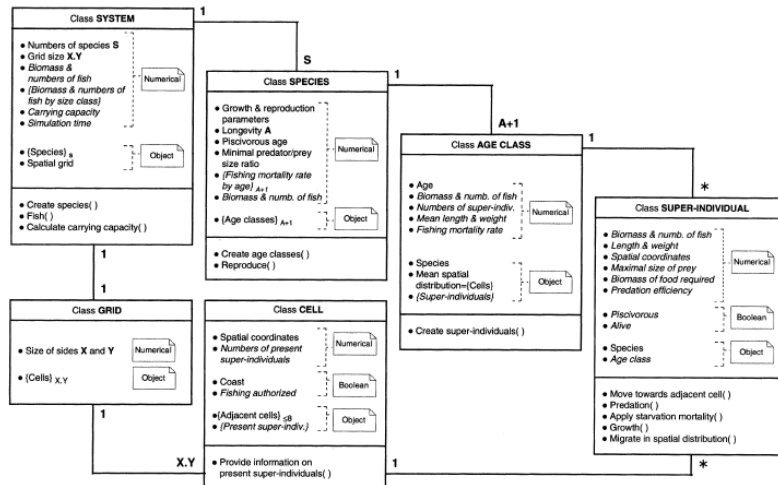


What are we talking about: LTL models

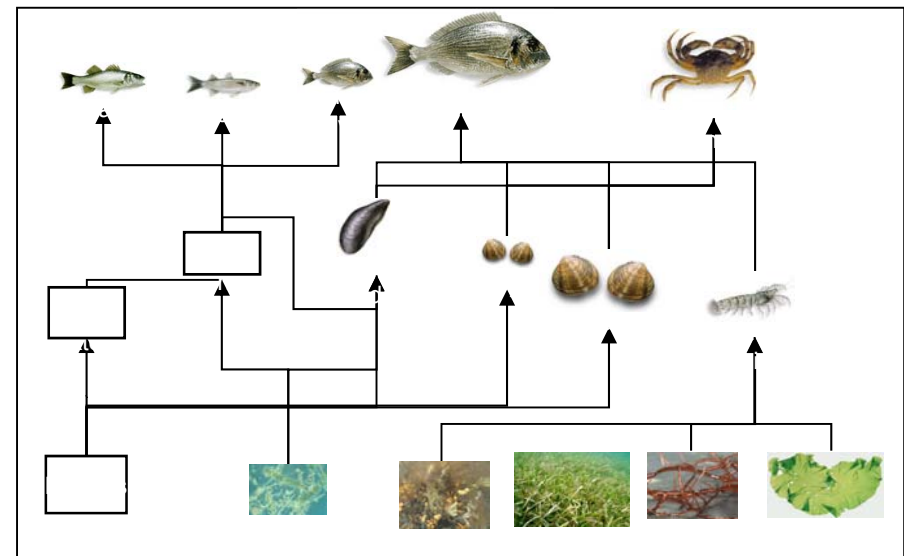




What are we talking about: HTL models



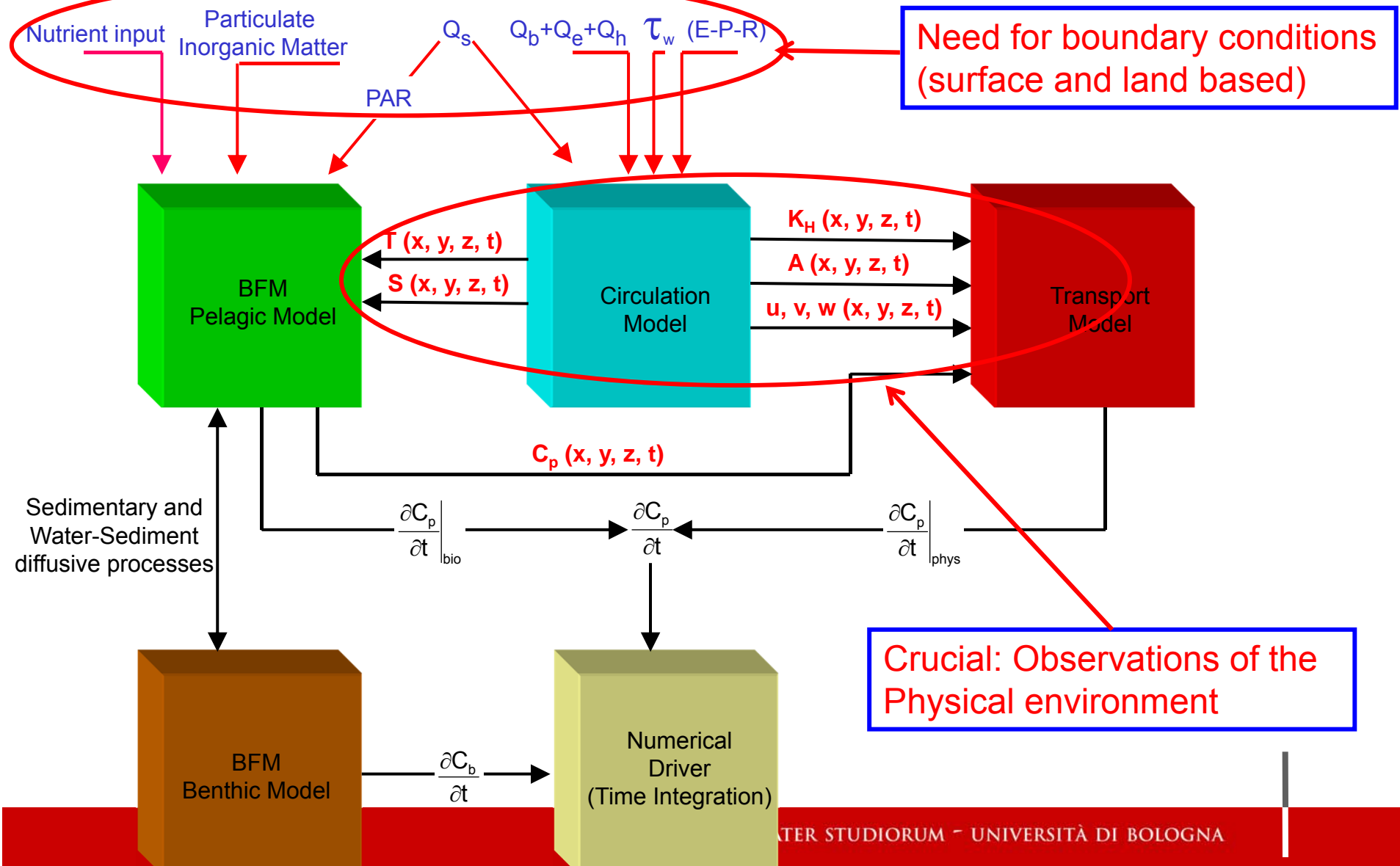
Biomass or individual models
Strongly data driven

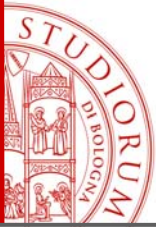


No (sustained) "in situ" observations

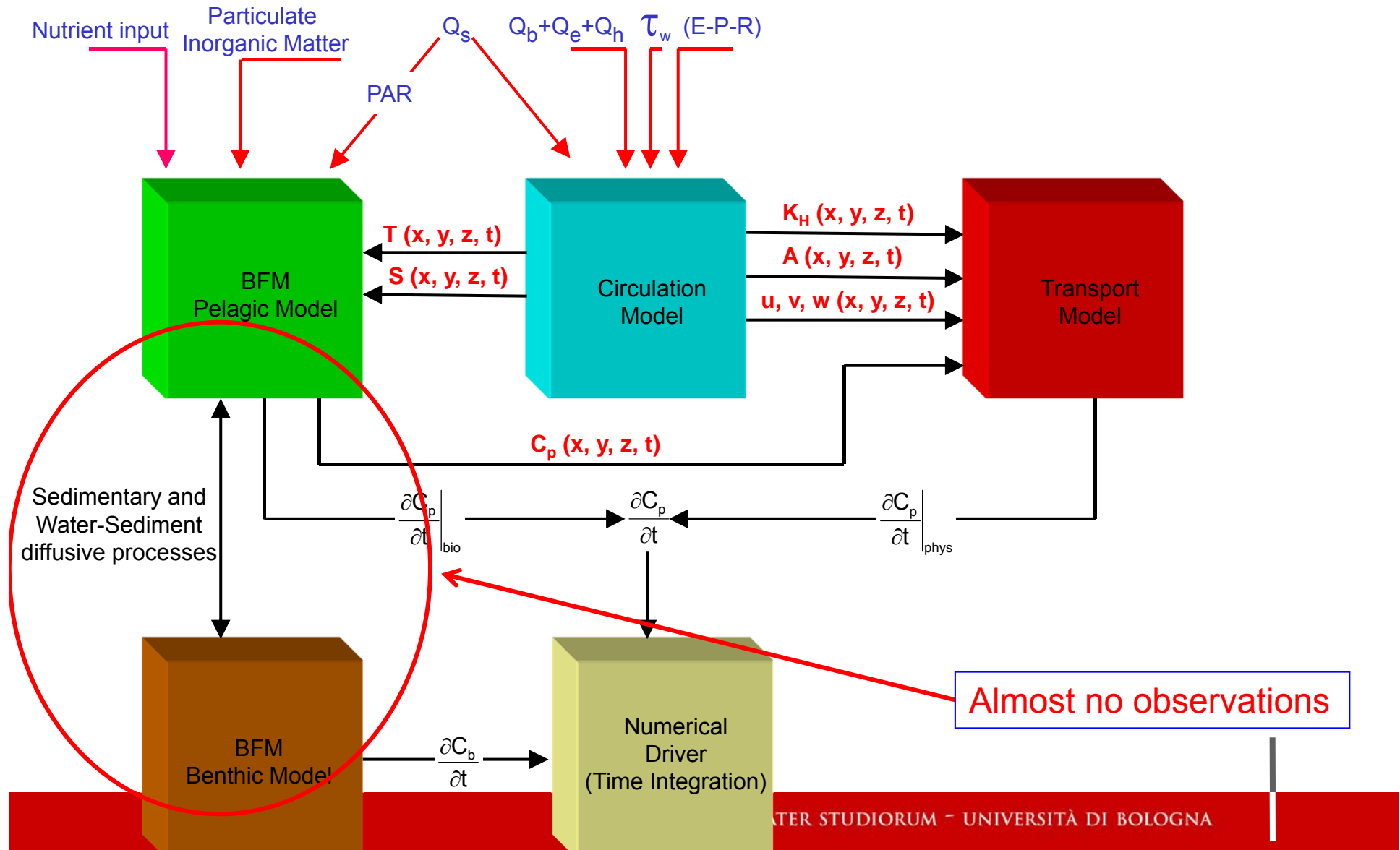


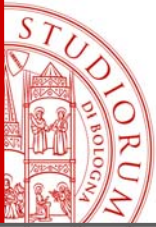
The LTL physical-biogeochemical coupling



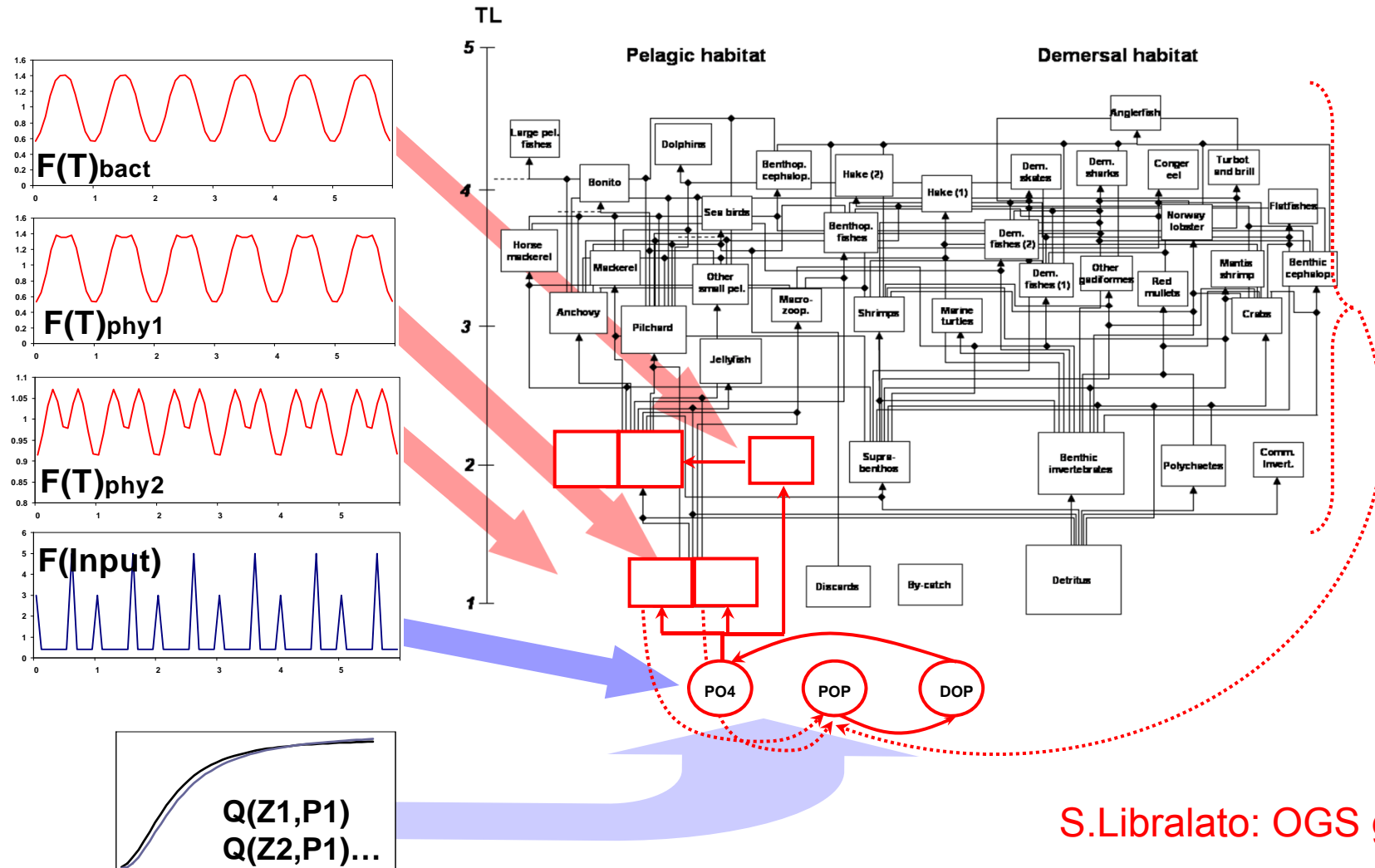


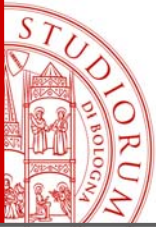
The LTL physical-biogeochemical coupling





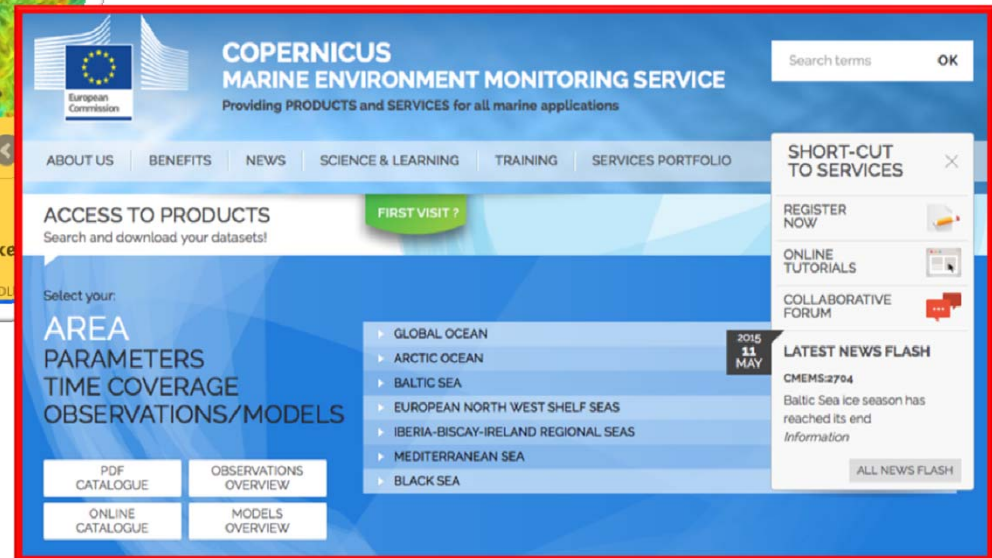
Connecting with HTL models





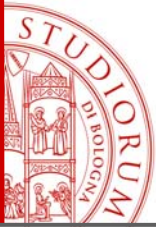
State of the art in the SES: Operational

Ecosystem based modelling in the Mediterranean Sea within COPERNICUS system.

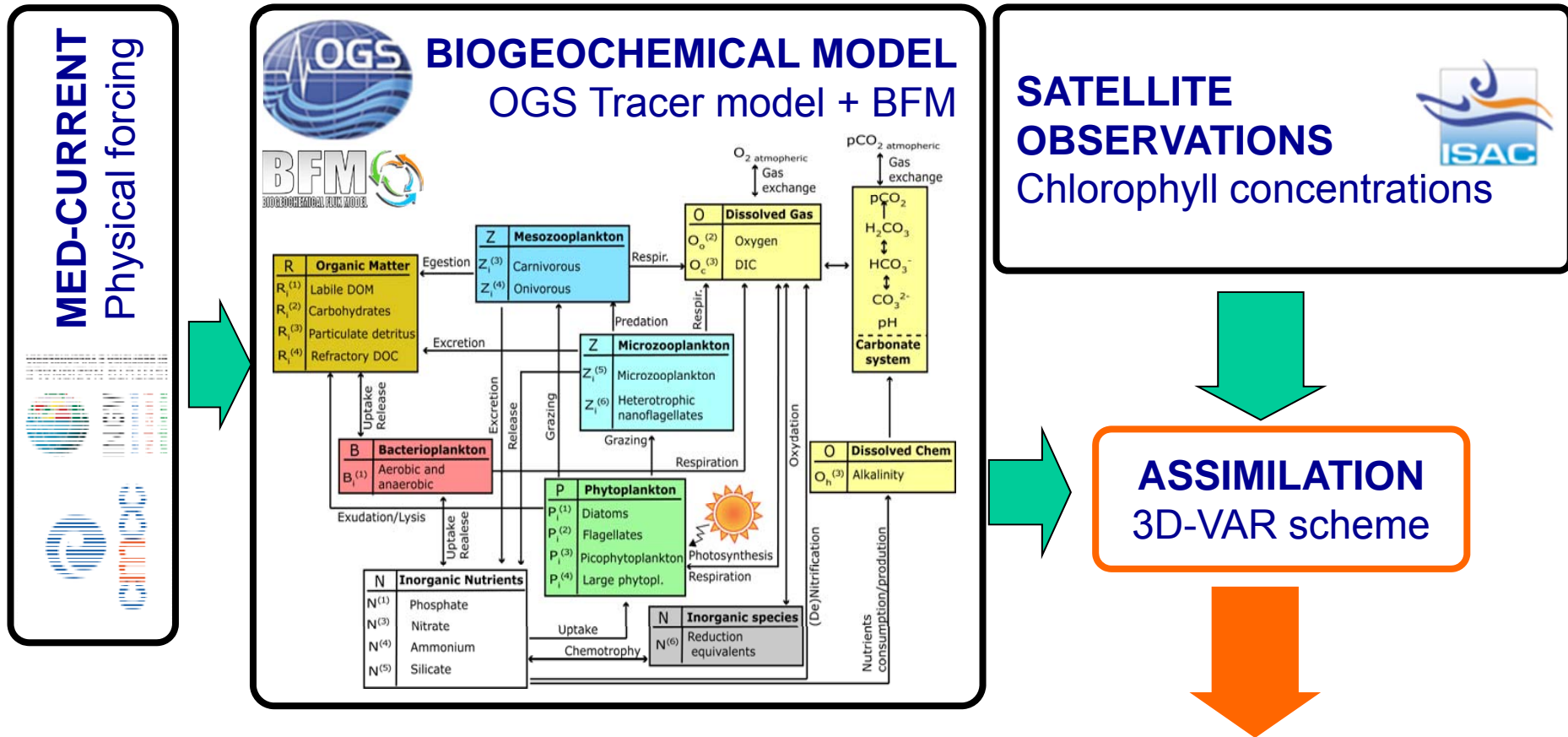


OGS biogeochemical model system (OGSTM-BFM model) is part of the Mediterranean Copernicus Marine Service





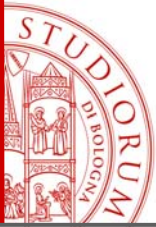
State of the art in the SES: Operational



Mediterranean biogeochemical simulations

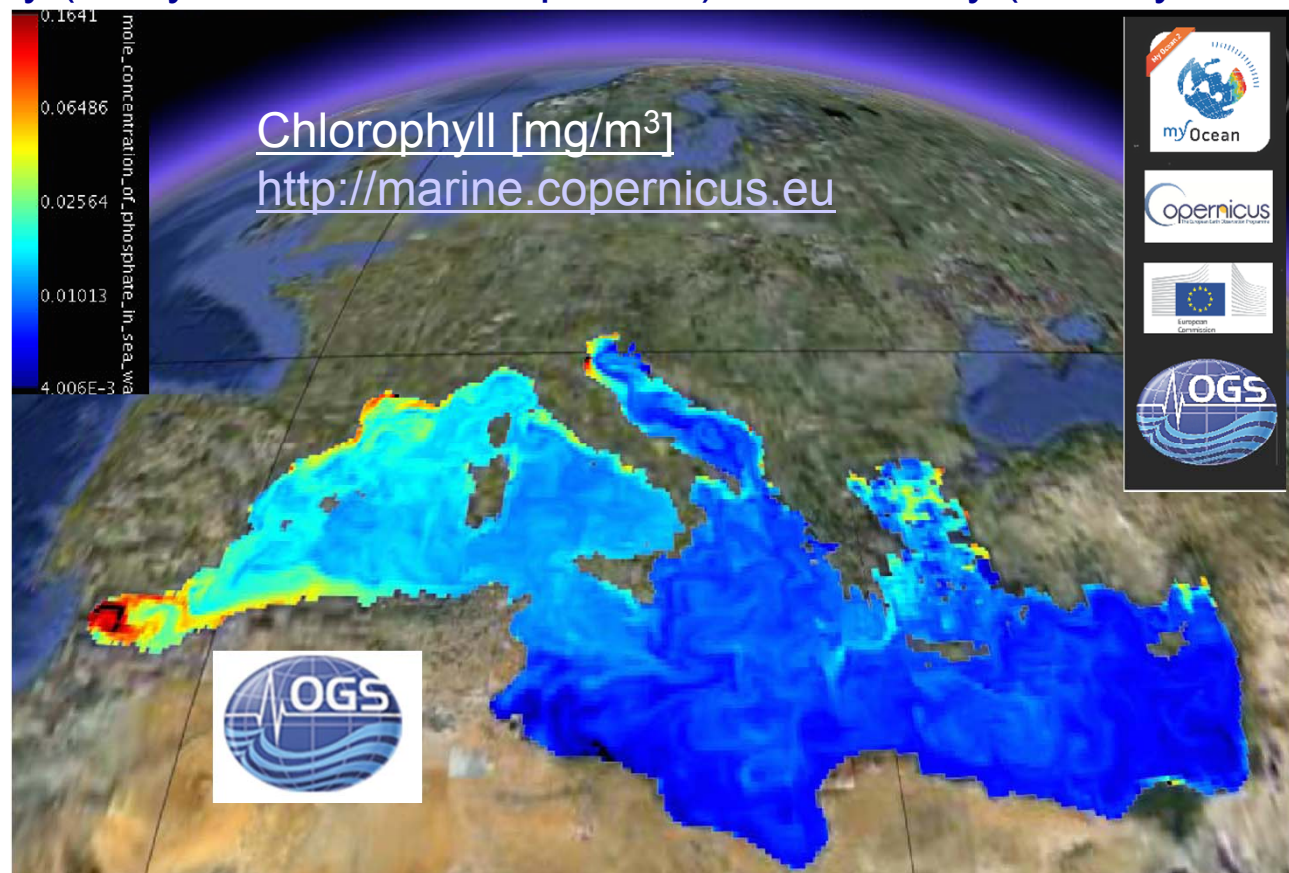
2 type of products:- every week, 7 days analysis + 10 days forecast
- 1999-2013 reanalysis run

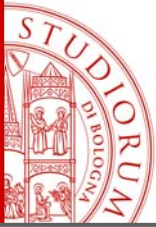
Available through <http://marine.copernicus.eu> webportal



State of the art in the SES: Operational

- Spatial resolution: $1/16^\circ$ (~7 km)
- 72 vertical levels: 1.5 m at surface
- Temporal resolution: daily (analysis and forecast product) and monthly (reanalysis product)
- 6 variables:
chlorophyll,
phytoplankton biomass,
phosphate,
nitrate,
primary production,
oxygen
- Validation of each product-variable against available data





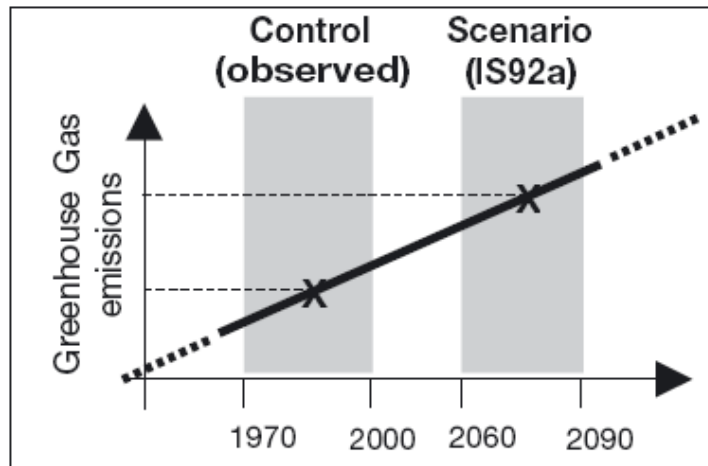
State of the art in the SES: Hindcast & Scenarios



and the



contribution



Hindcast and scenario
 “time slices” simulations
 Emphasis on climate variability

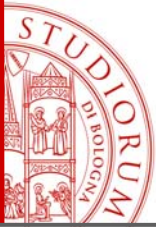
COMMISSION DECISION
 of 1 September 2010
 on criteria and methodological standards on good environmental status of marine waters
 (notified under document C(2010) 5956)
 (Text with EEA relevance)
 (2010/477/EU)

Aquatic Ecology 33: 105–115, 1999.
 © 1999 Elsevier Academic Publishers. Printed in the Netherlands. 105

What is a healthy ecosystem?
 Robert Costanza and Michael Mageau
 University of Maryland Institute for Ecological Economics, Center for Environmental Science and College of Life Sciences, Box 38, Solomons, MD 20688, USA



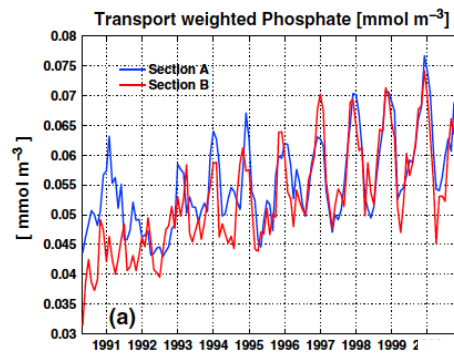
“Good Environmental Status”
 assessment
 “Emphasis on support to policy”



State of the art in the SES: Hindcast & Scenarios



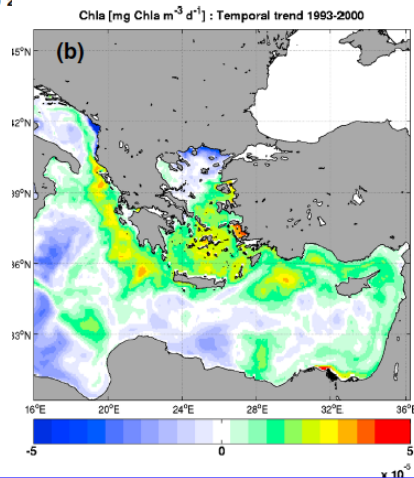
Southern European Seas: Assessing and Modelling Ecosystem changes



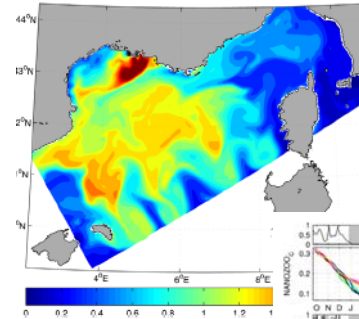
PO₄ transport
Levantine → Ionian

Chl-a trend
1993 2000

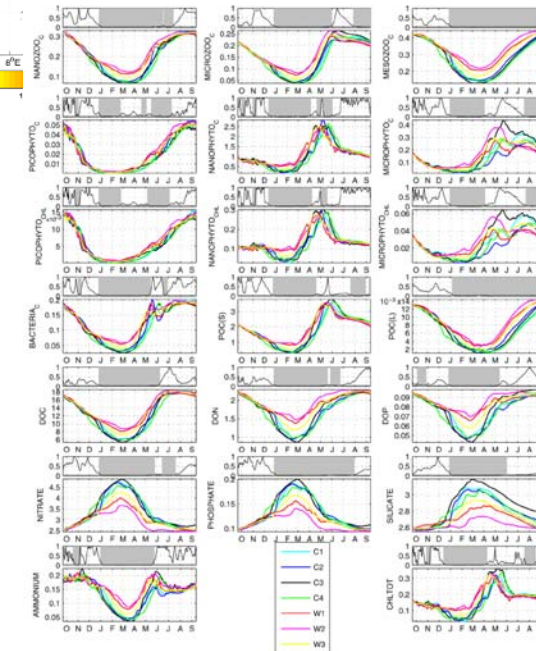
Mattia et.al 2013



Chlorophyll (mgChl.m⁻³), 05/17



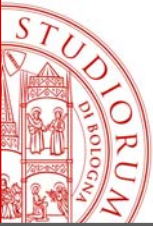
Southern European Seas: Assessing and Modelling Ecosystem changes



Hermann et.al 2013

Interannual variability assessment

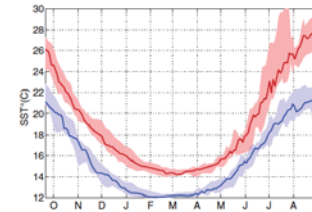
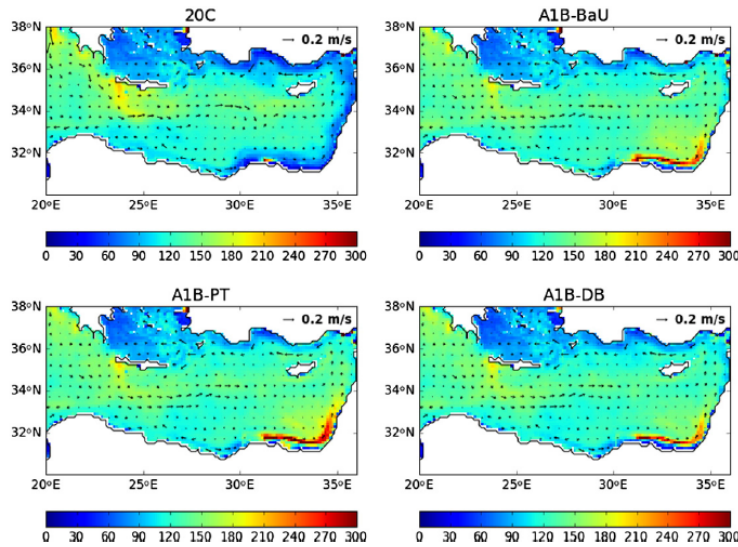
Biogeochemical response to the EMT



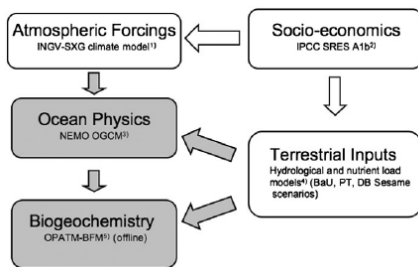
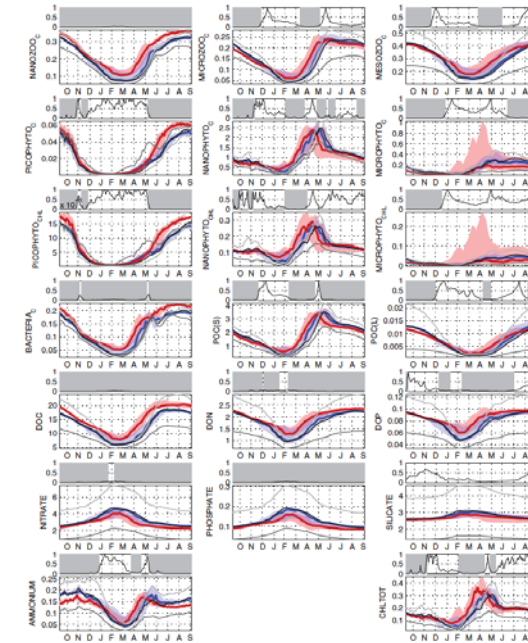
State of the art in the SES: Hindcast & Scenarios



Southern European Seas: Assessing and Modelling Ecosystem changes

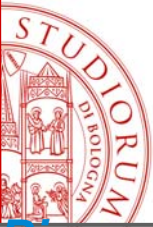


Southern European Seas: Assessing and Modelling Ecosystem changes



Scenarios for atmospheric
And land
based forcing
Lazzari et al 2014

Impact of warming trend on
Biogeochemistry
Hermann et al. 2014



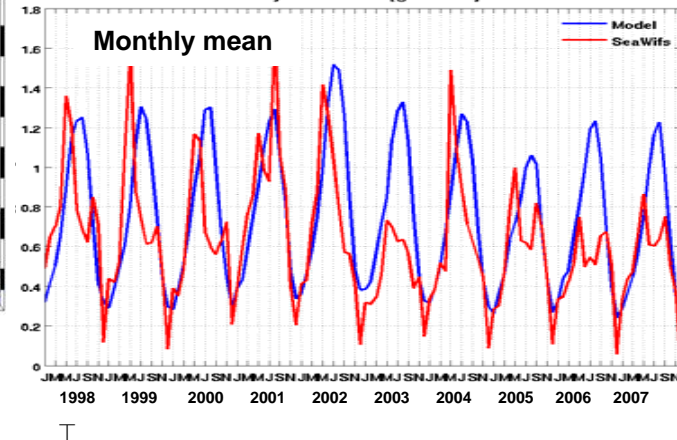
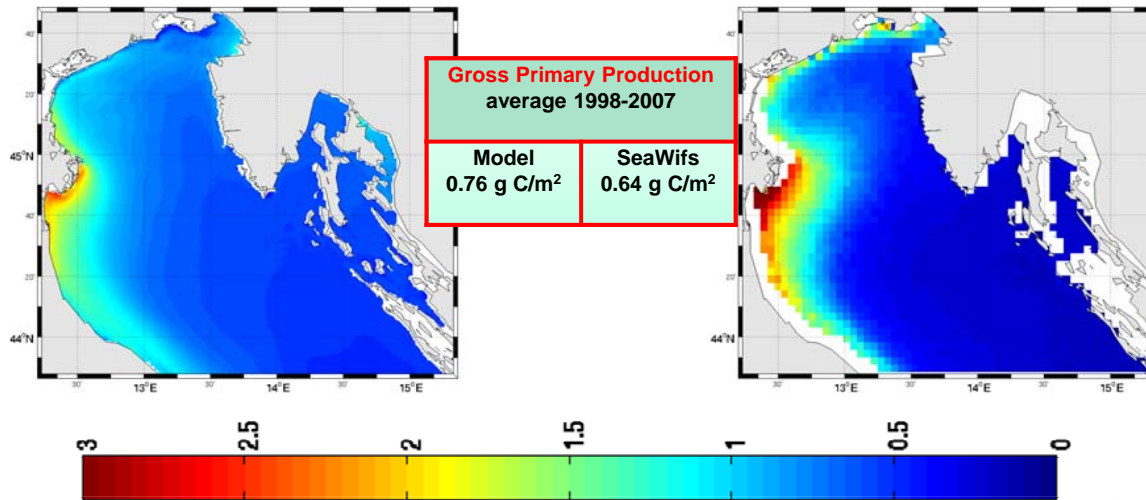
State of the art in the SES: Hindcast & Scenarios

Biogeochemistry Gross Primary Production

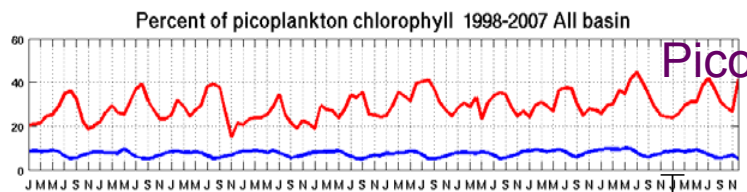
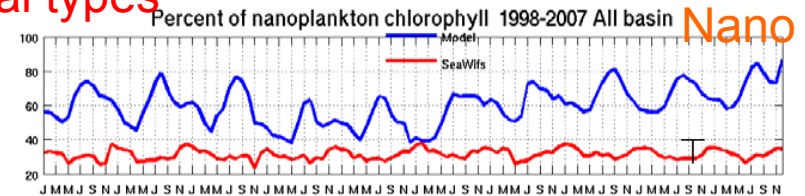
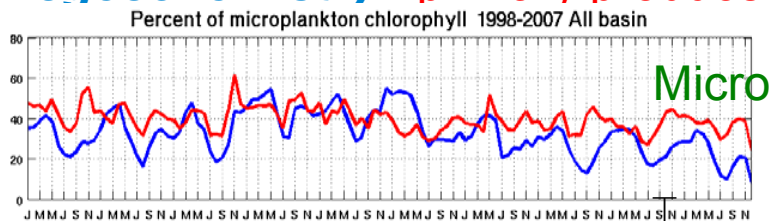
Model Average 1998-2007 **SeaWiFS**



Gross Primary Production [g C/m²/d] 1998-2007

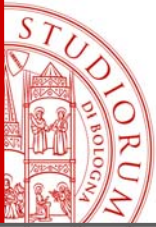


Biogeochemistry : primary producers functional types



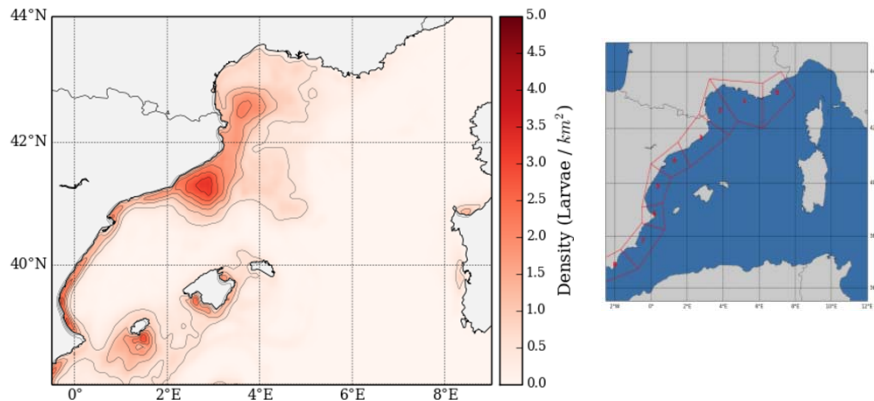
— SeaWiFS — Model



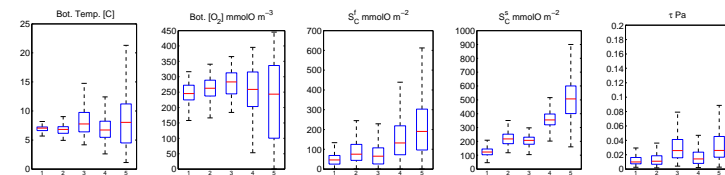


State of the art in the SES: Hindcast & Scenarios

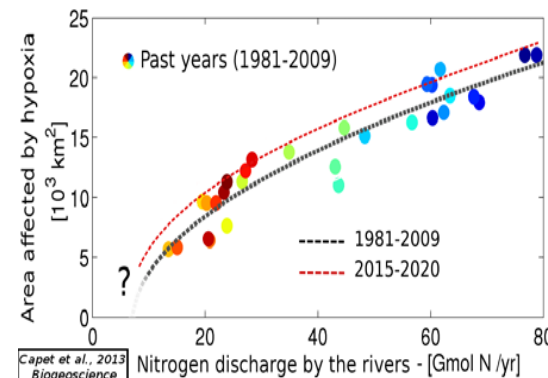
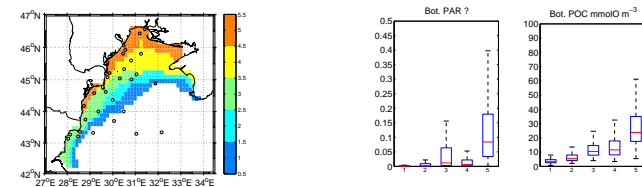
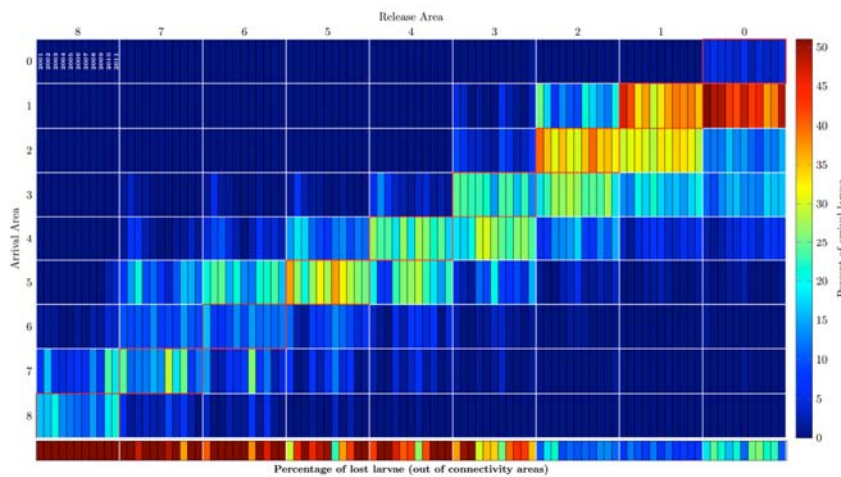
Extending to pelagic HTL and Benthic domain



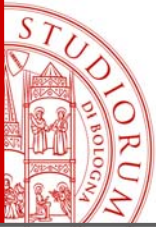
Ulg-MARE Benthic habitat characterization



UPS-LA: simulating anchovies spawning and connectivity



ULg-MARE:
Scenario
For coastal
hypoxia

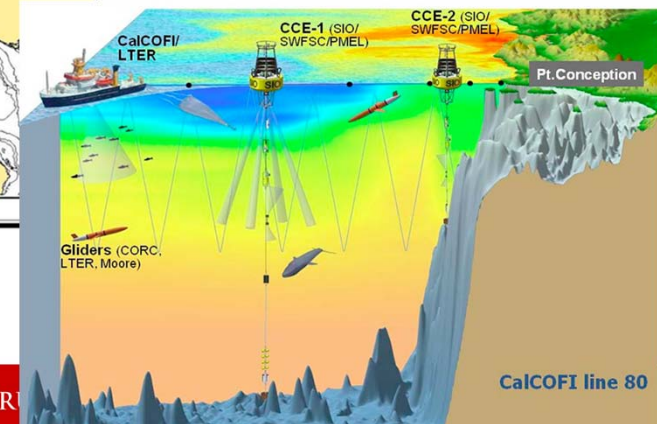
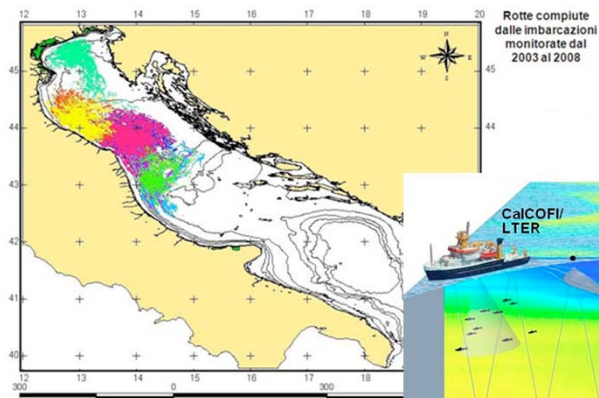


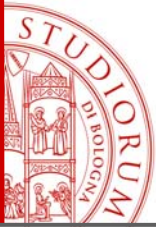
Where do we go from here?

Benefits for ecosystem modelling from physical environment sustained observations are Out of question.

Increased observational capabilities for ecosystem properties is crucial for advancement Of ecosystem models structure.

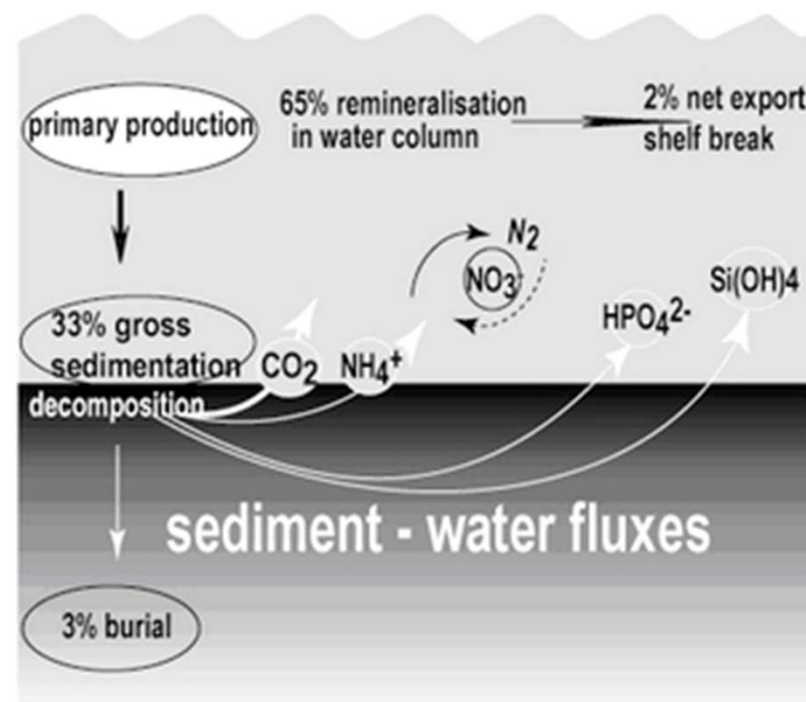
There is urgency to start observing ecosystem state variables and rates that are either Poorly/proxy observed (LTL state var's) or (almost.....) non observed.





Where do we go from here?

Strong needs for coastal observing systems encompassing benthic pelagic coupling
In order to constrain model performances.



Where do we go from here?

Extend the operational provision of remotely sensed “Proxies” for phytoplankton Biomass to Primary production and size class composition

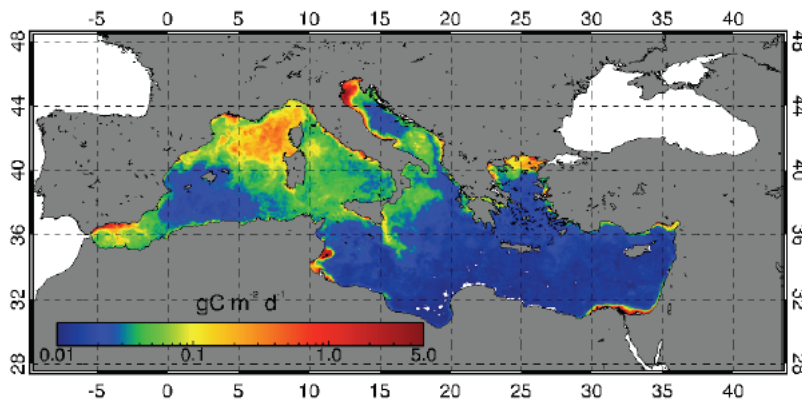


Figure 2. Monthly mean of PP of April 1999

