

# APROXIMACIONES A LA MODELIZACIÓN Y LA PREDICCIÓN DE ECOSISTEMAS MARINOS

(Approaches to modelling and prediction of marine ecosystems)

Francesc Peters



Oscar Guadayol, Cèlia Marrasé, Estela Romero

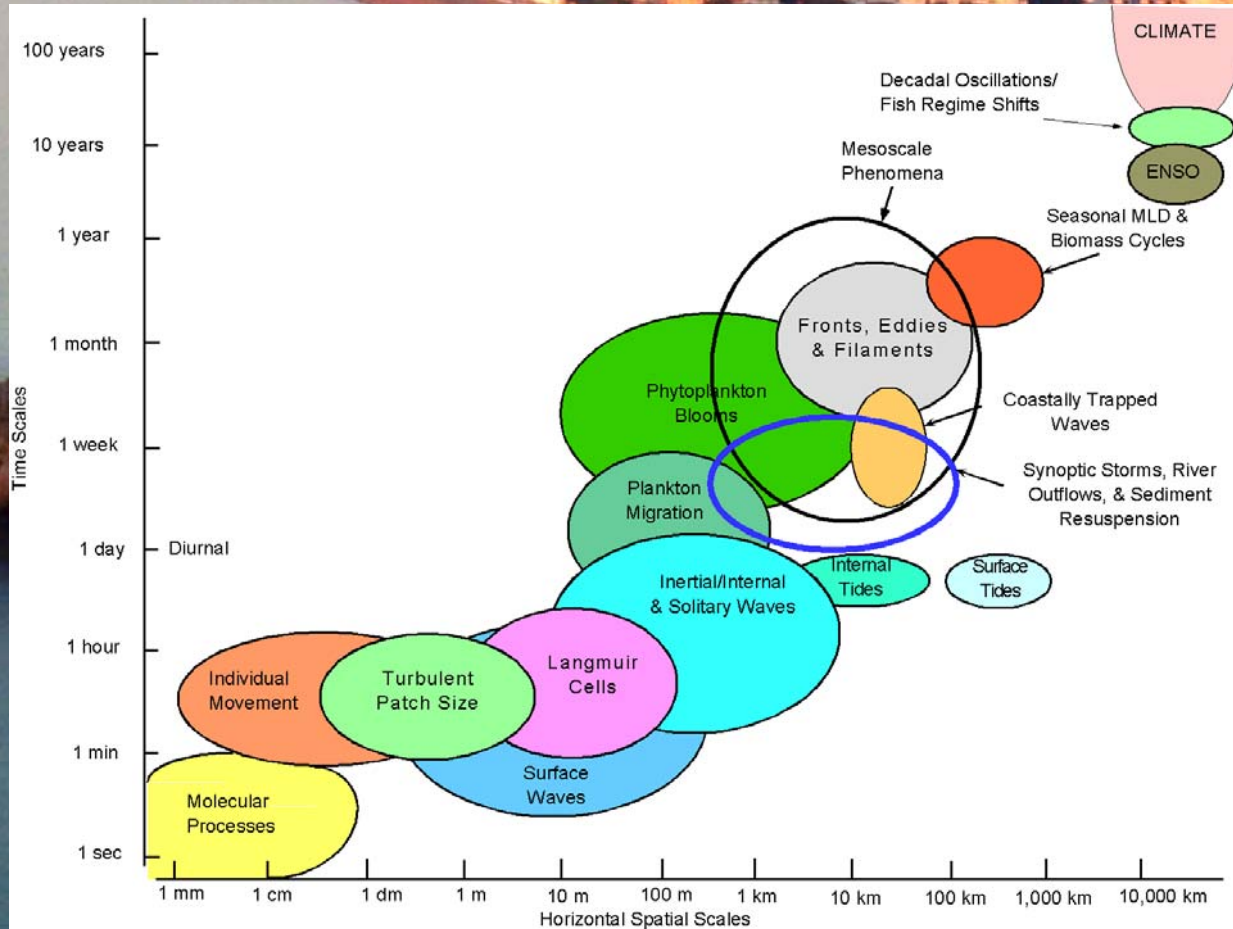
# Why do we need oceanic ecosystem modelling?

- Spanish coastline: 4,964km, EU: 65,992.9km  
-> 7.5 %. (source: CIA)
- Coastal zone: Area between +/- 50m of sea level or extending landward to a distance 100km from shore. Includes coral reefs, intertidal zones, estuaries, coastal aquaculture, and seagrass communities. Roughly 68% of Spanish population living near the coast. (source: PAGE - Coastal Ecosystems, 2001)
- Economic importance (coastal tourism alone accounts for 8.5% of GIP). (source: Duarte et al. 2006. Las Ciencias y Tecnologías Marinas en España.)

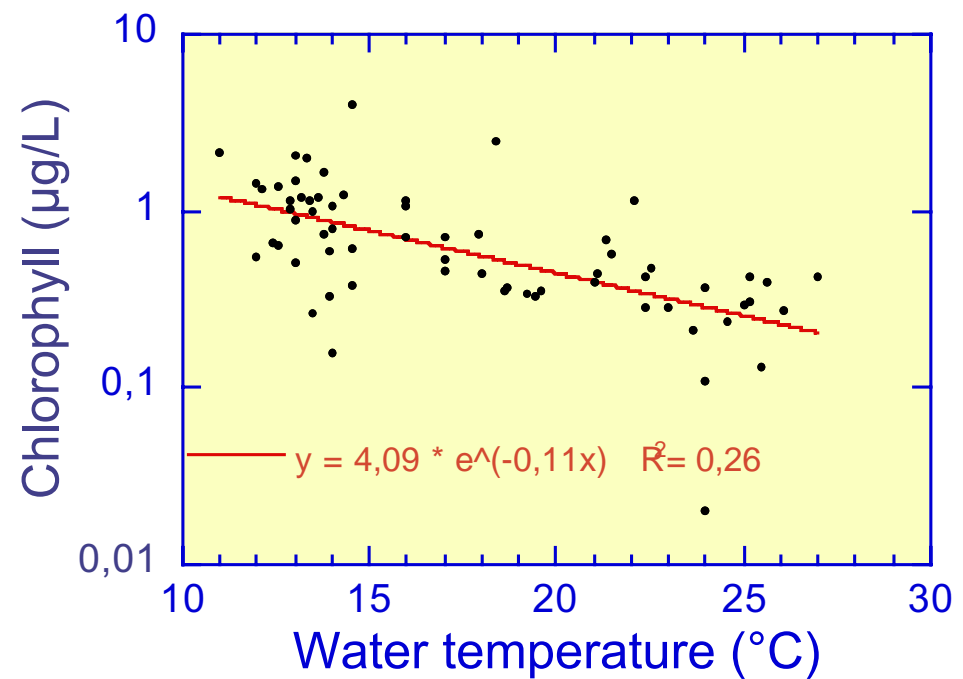
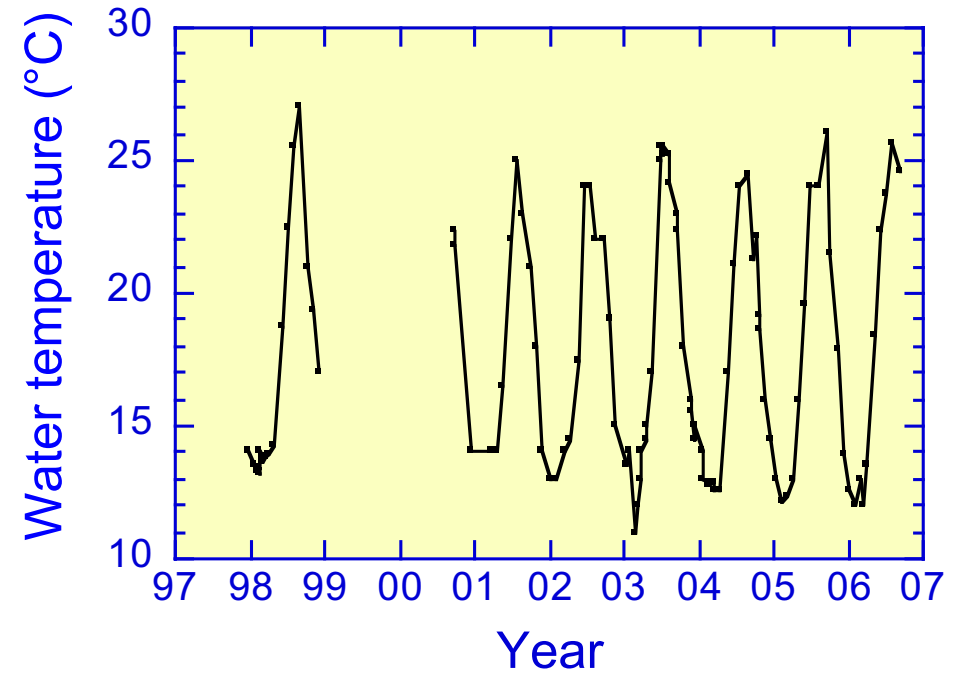
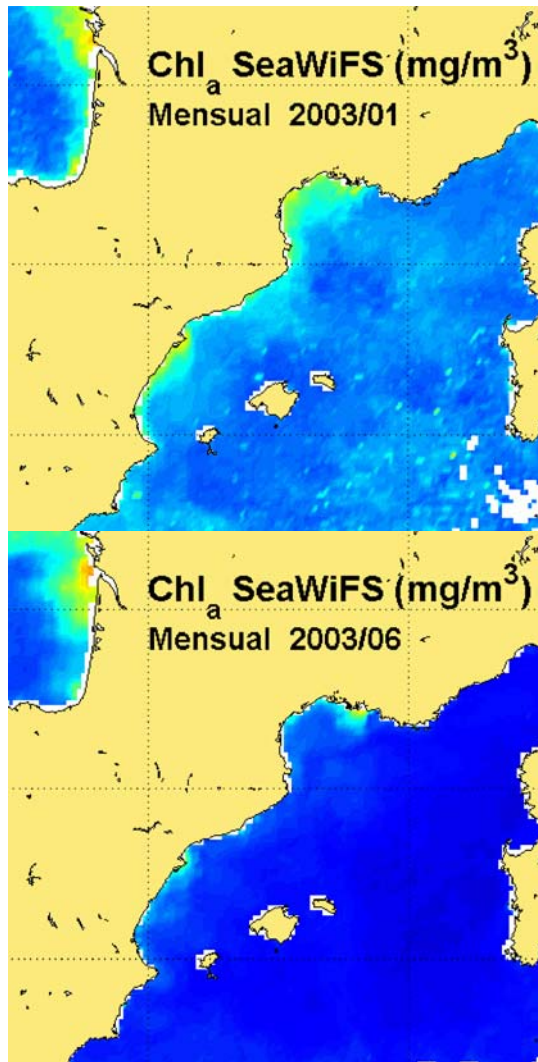
# OK! but, Why do we need oceanic ecosystem modelling?

- Harmful algal blooms
- Water quality, O<sub>2</sub> depletion
- Fisheries sustainability
- Aquaculture impact
- Jellyfish warning
- Ecosystem integrity
- Coastal development advice
- ...

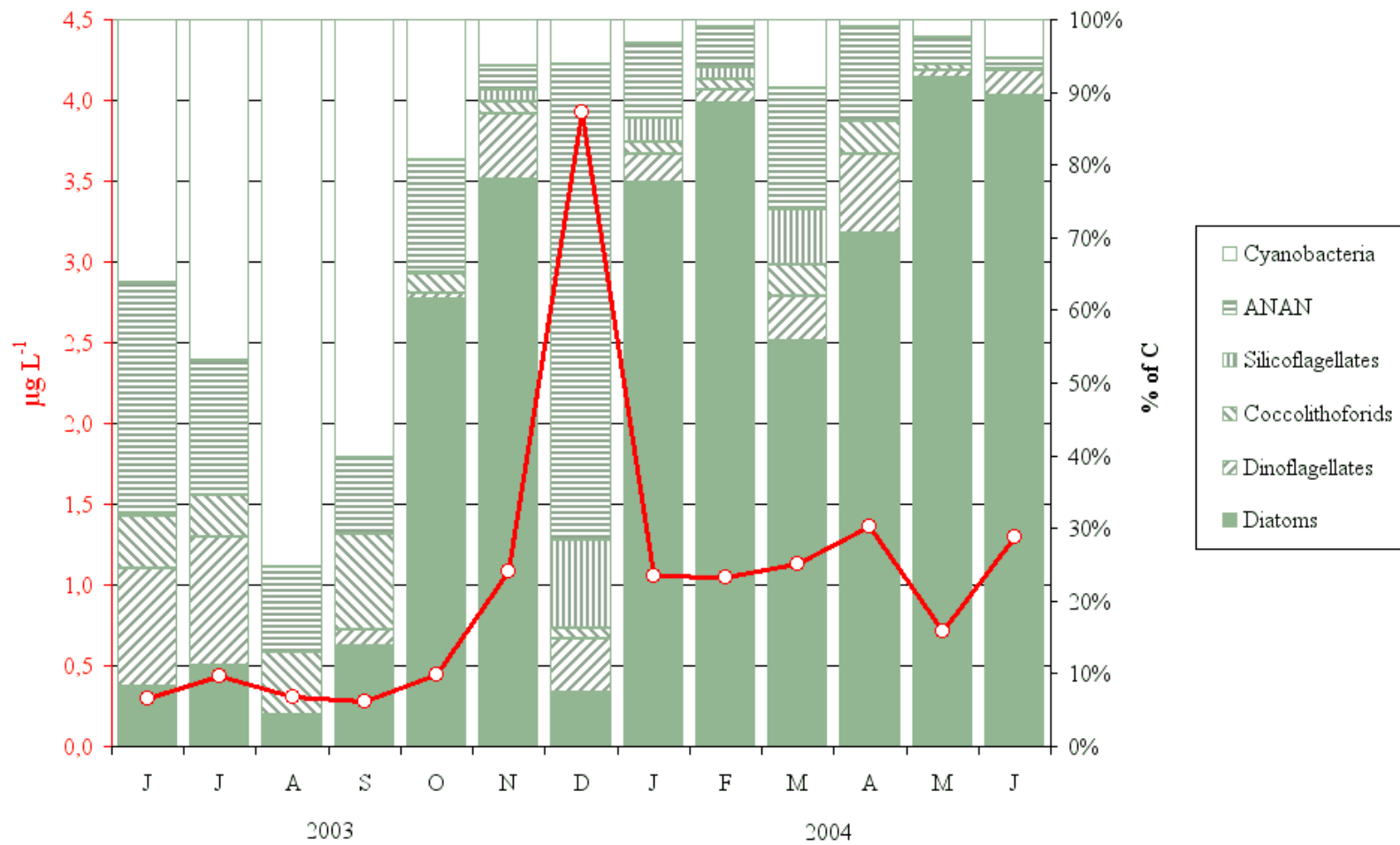
# The challenges, still there...



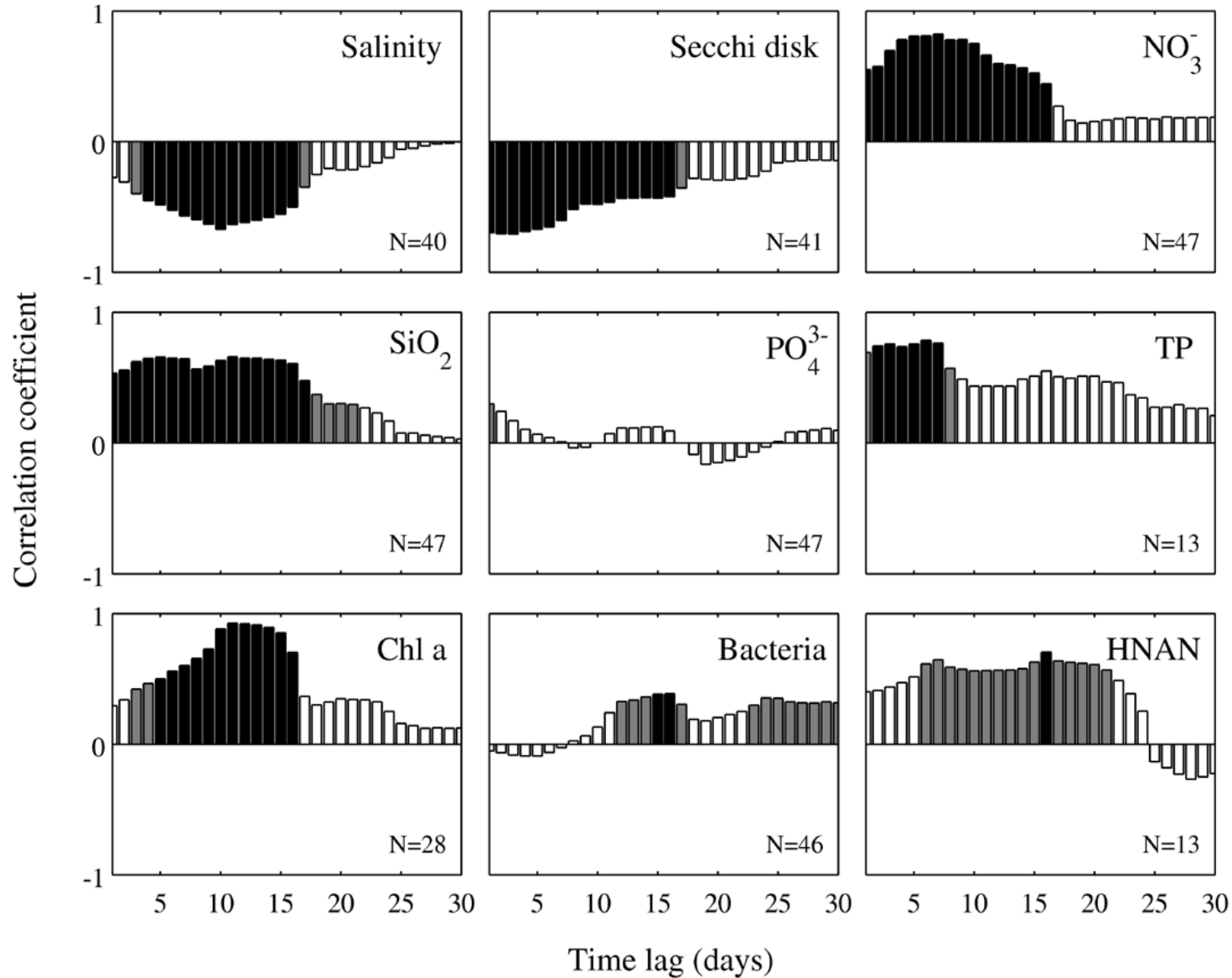
Dickey 1991, 2002

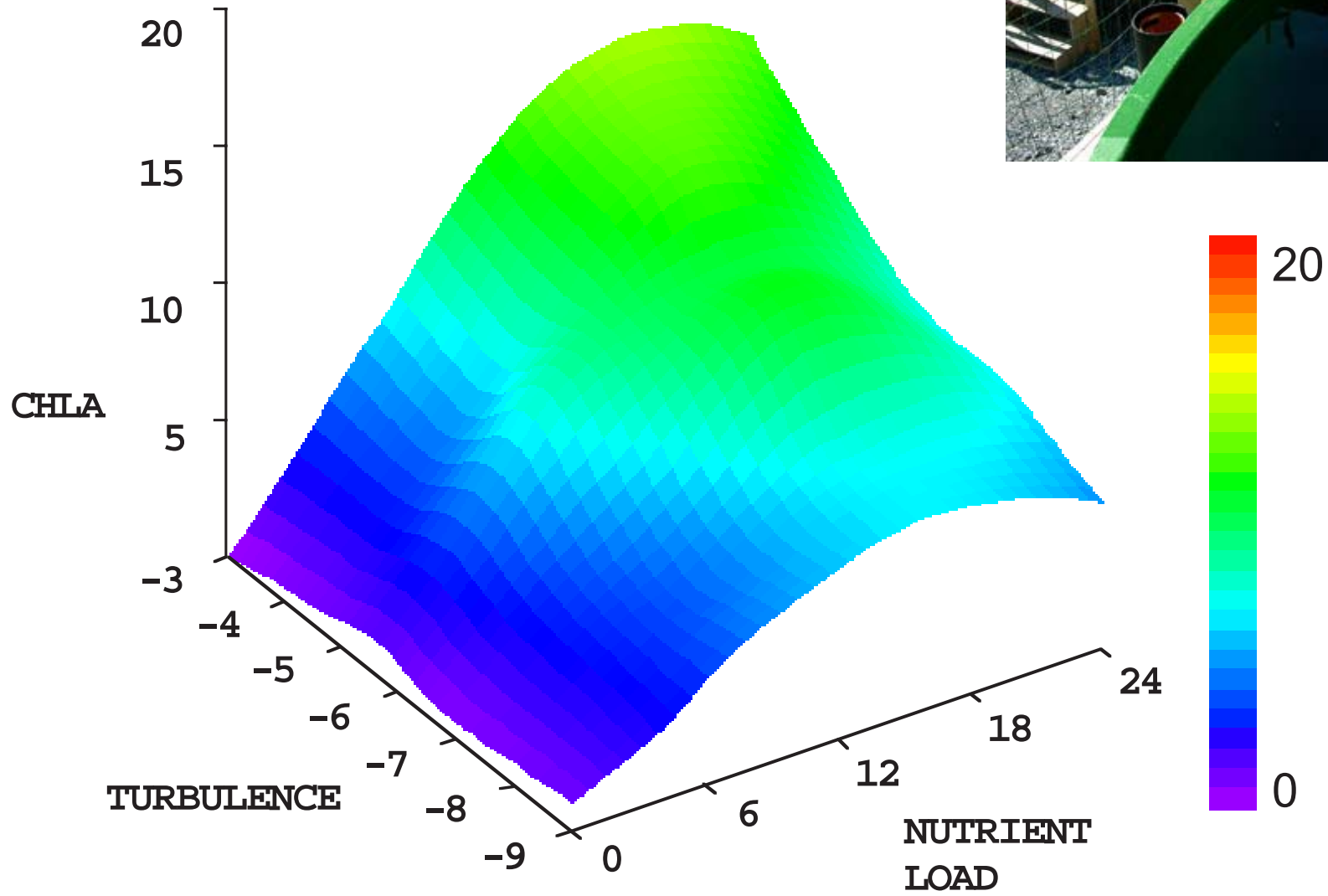


Son relativamente buenos!!



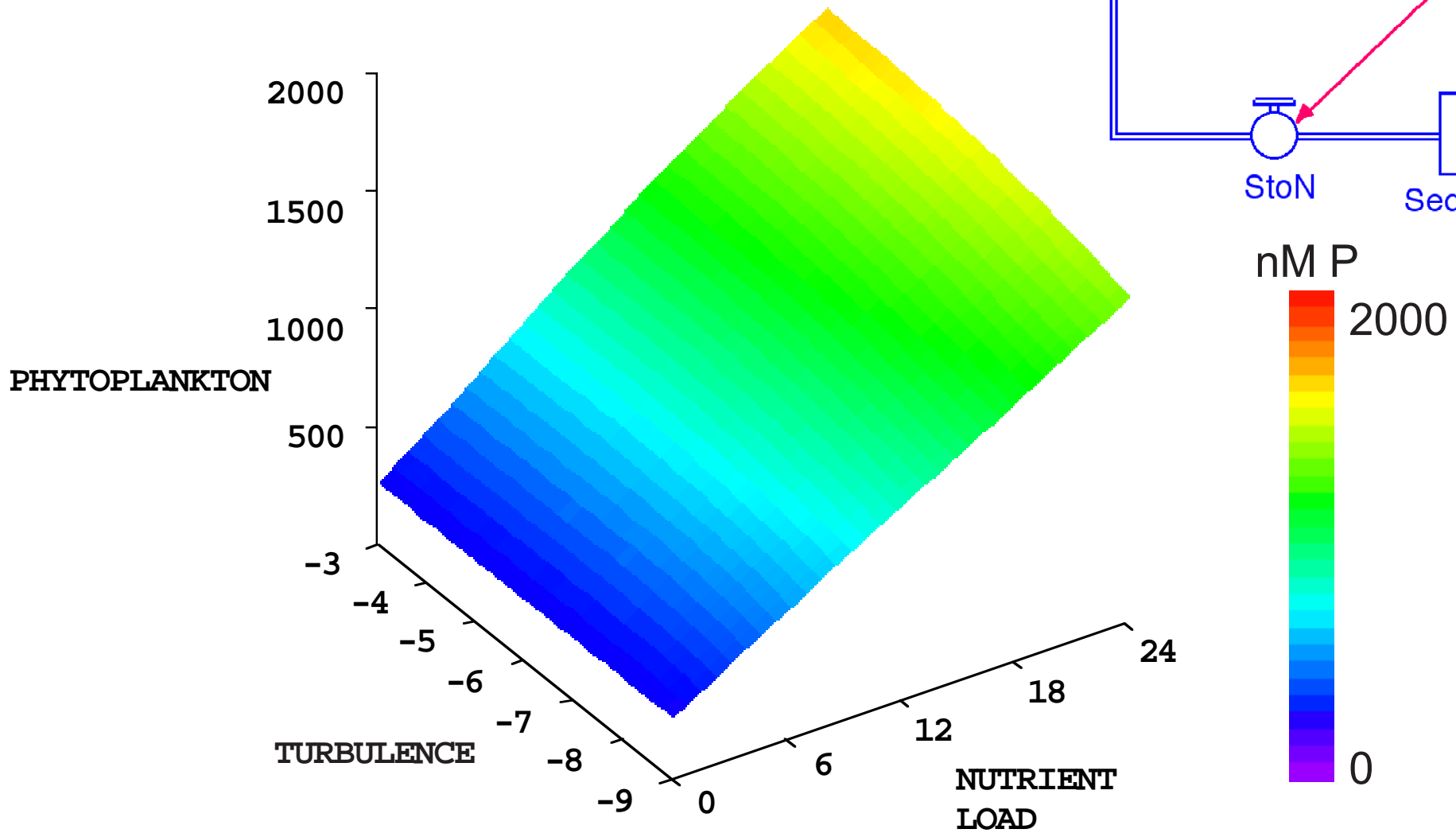
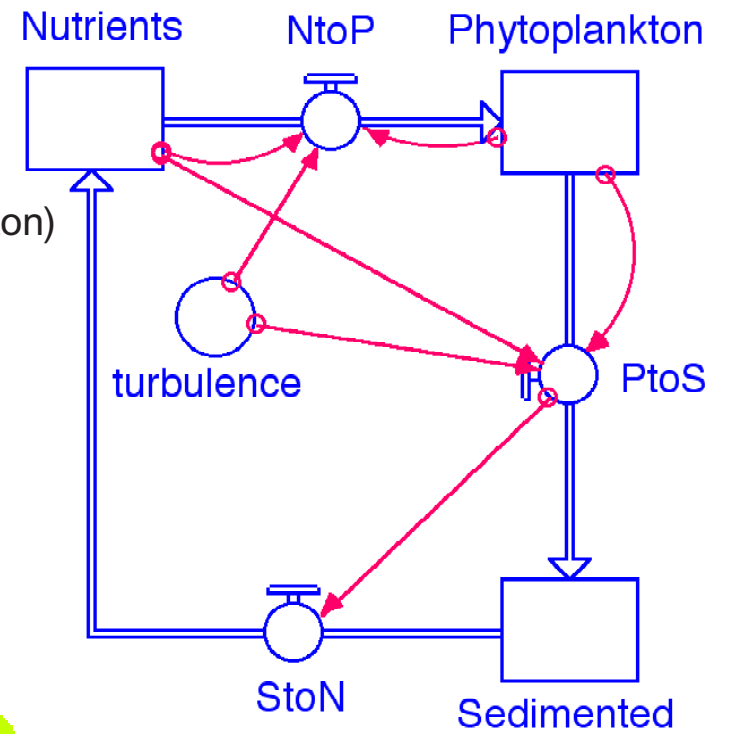
# Blanes, relación respecto a descarga del río Tordera

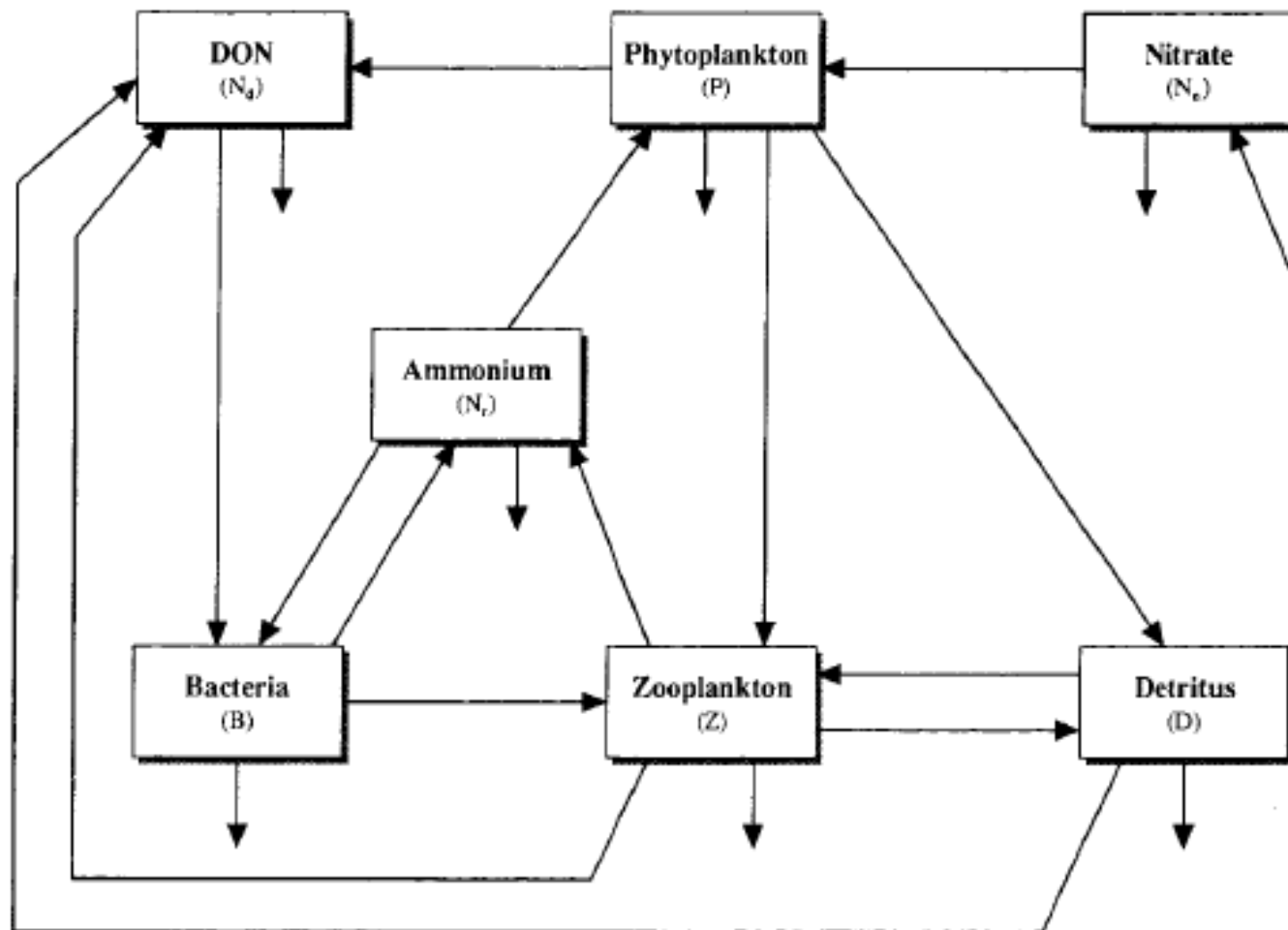




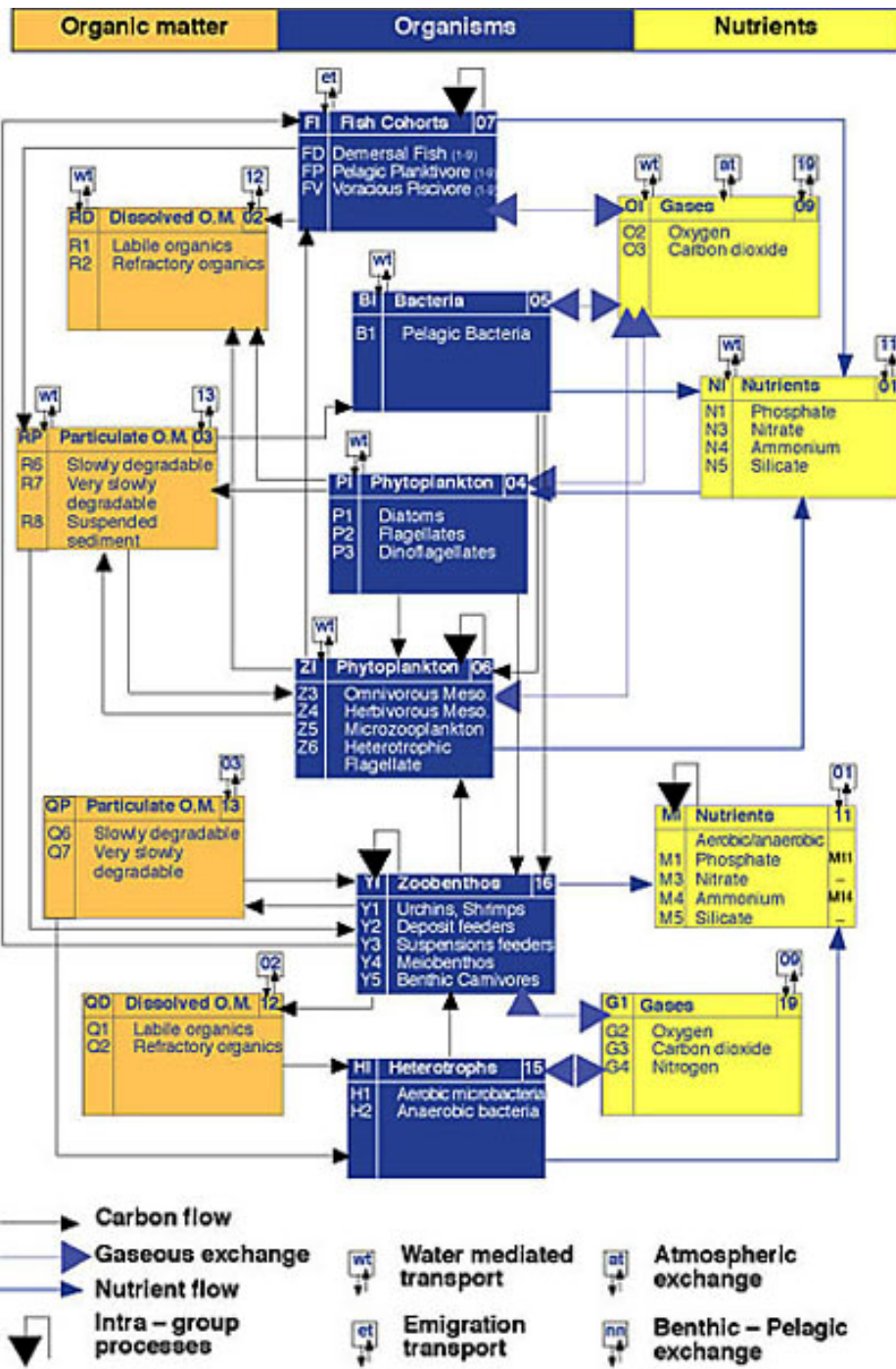


$$PtoS = C_0 - C_1 \cdot \text{turbulence} + C_2 \cdot \text{Phytoplankton} - C_3 \cdot (\text{Nutrients}/\text{Phytoplankton})$$

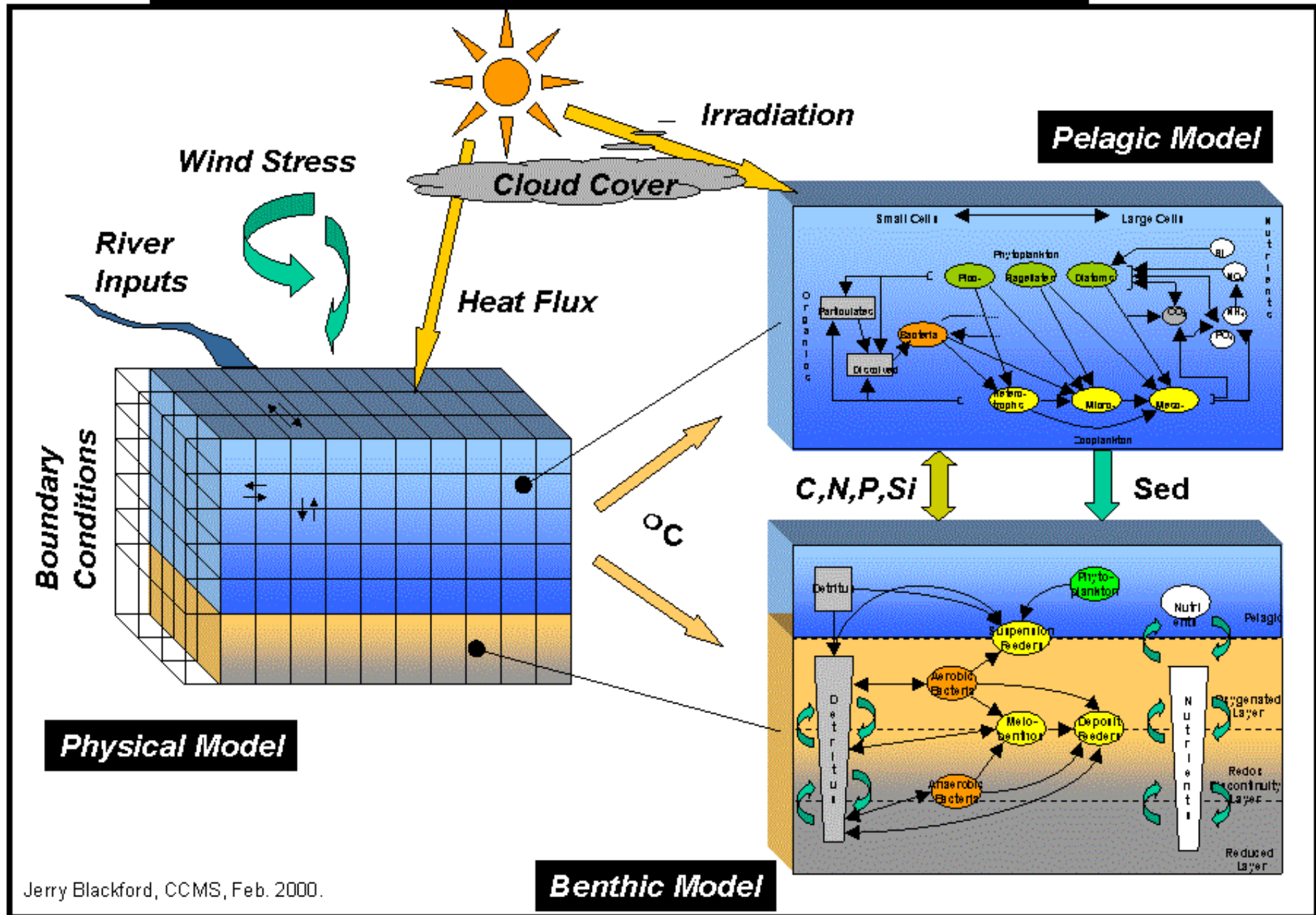




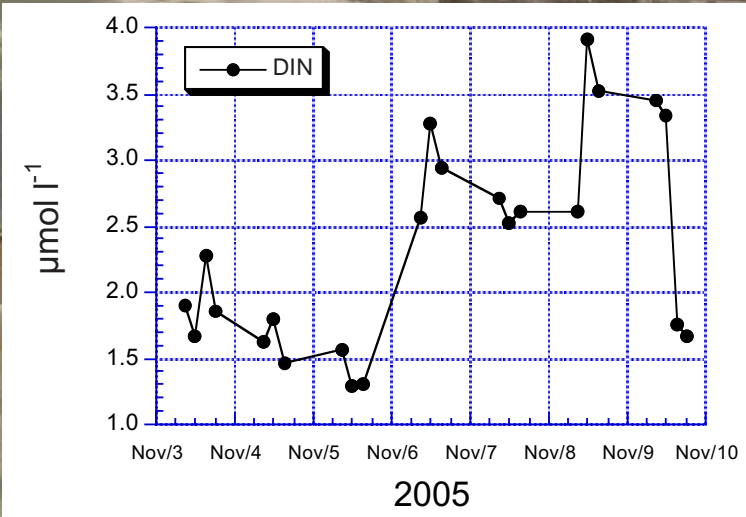
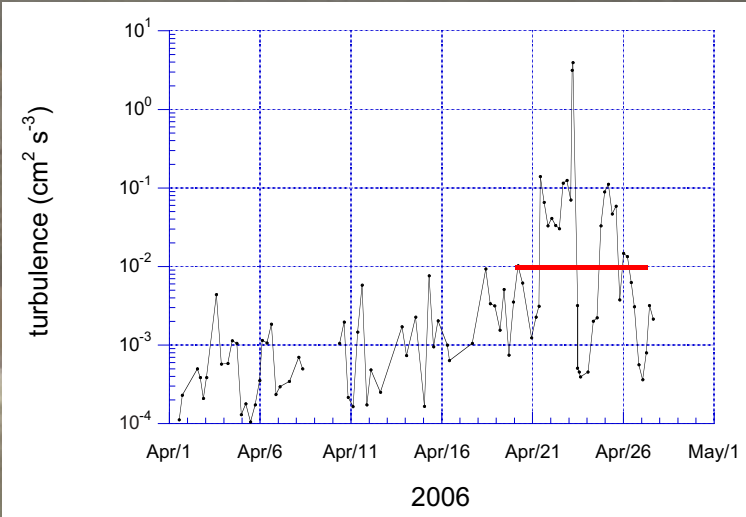
Fasham et al. 1990

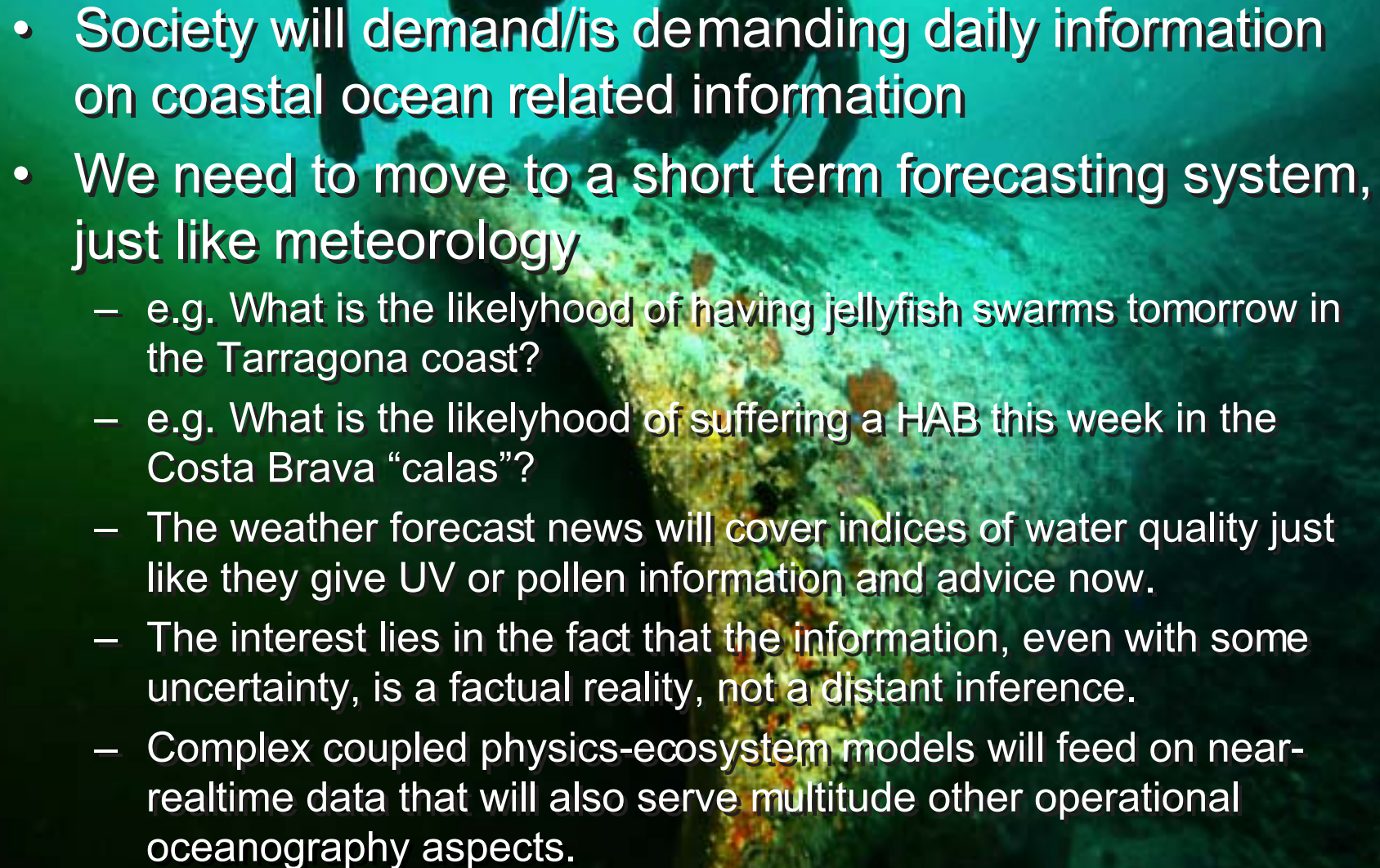


# Conceptual Coupled Physical - Ecosystem Model



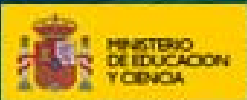
# Future? Net of remotely operated stations



- 
- An underwater photograph showing two divers exploring a coral reef. The water is clear and blue, and the reef is covered in various colorful corals and marine life. The divers are in the upper left and center of the frame, looking towards the right.
- Society will demand/is demanding daily information on coastal ocean related information
  - We need to move to a short term forecasting system, just like meteorology
    - e.g. What is the likelihood of having jellyfish swarms tomorrow in the Tarragona coast?
    - e.g. What is the likelihood of suffering a HAB this week in the Costa Brava “calas”?
    - The weather forecast news will cover indices of water quality just like they give UV or pollen information and advice now.
    - The interest lies in the fact that the information, even with some uncertainty, is a factual reality, not a distant inference.
    - Complex coupled physics-ecosystem models will feed on near-realtime data that will also serve multitude other operational oceanography aspects.

**GRÀCIES!!**

**NTAP**



**VARITEC**  **i+d**