

PYROPLANKTON – Living Planet Fellowship – J.Llort

Impacts of pyrogenic aerosols on phytoplankton ecosystems

Scientific goal

Evaluate the influence of wildfires aerosols on marine primary production and carbon export

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Internal collaborators: R. Bernardello, P. Ortega, M. Gonçalves, E. Bergas-Massó, C.Pérez Garcia-Pando, S.Basart

External collaborators: C. Santin (IMIB-CSIC, Spain), C.Guieu, M.Bressac, F.Gazeau (LOV-SU, CNRS, France)

Funding: ESA Living Planet Fellowship (70%), BSC (30%)

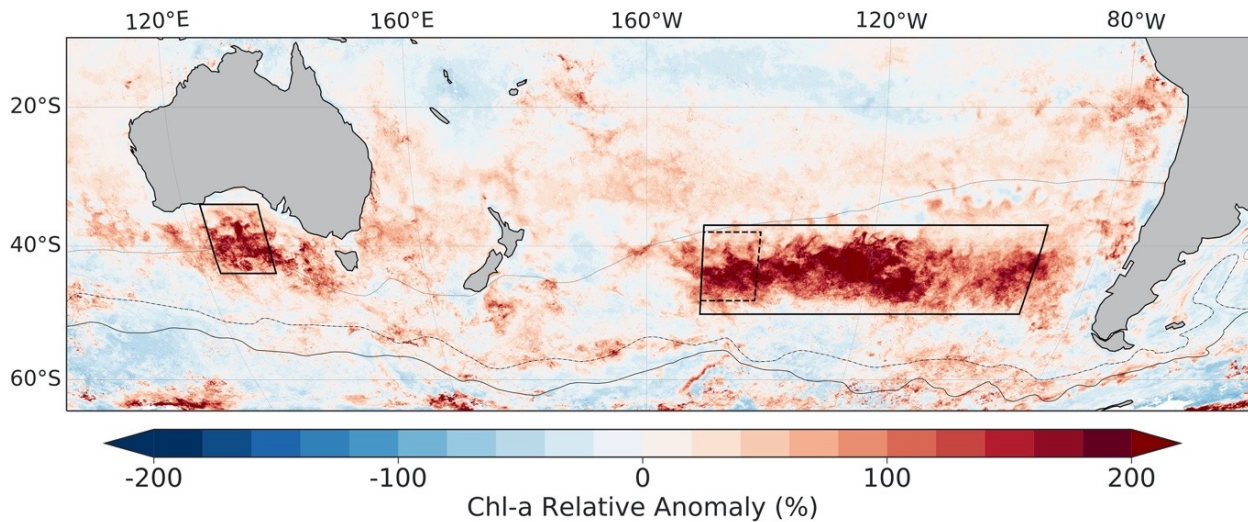
Budget: EUR ~120,000

Started: October 2021

Duration: 24 months

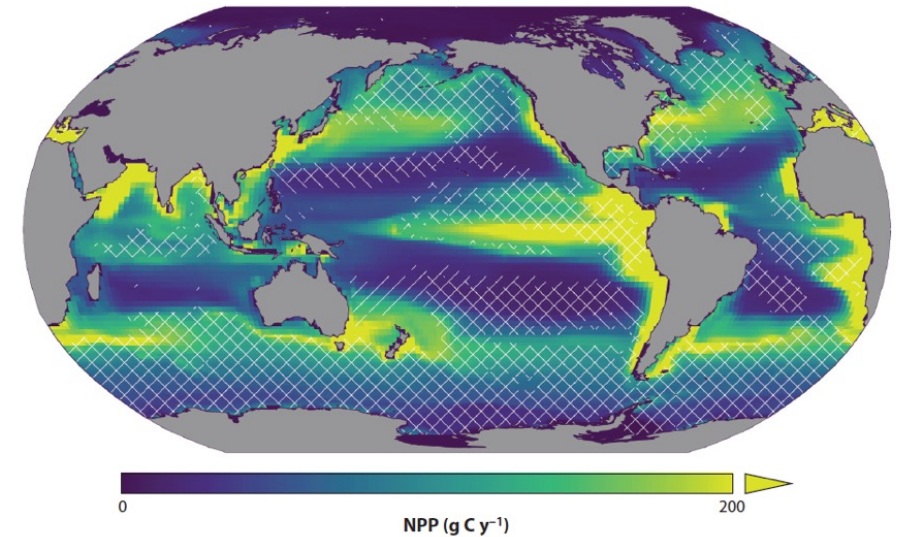
Motivation

Marine net primary production (NPP) is nutrient-limited in large areas of the open ocean. Far from continents, nutrients supplied by aerosols are essential for NPP. Modelling efforts and recent observations suggest that **burning biomass aerosols (BBa) are a key to explaining ocean fertilisation** by aerosols due to their high content of soluble Fe.



Large scale phytoplankton blooms induced by deposition of BBa in the Pacific Southern Ocean

Tang and Lloret et al, 2021



Modelled impact of BBa on marine NPP.
White lines indicate increase

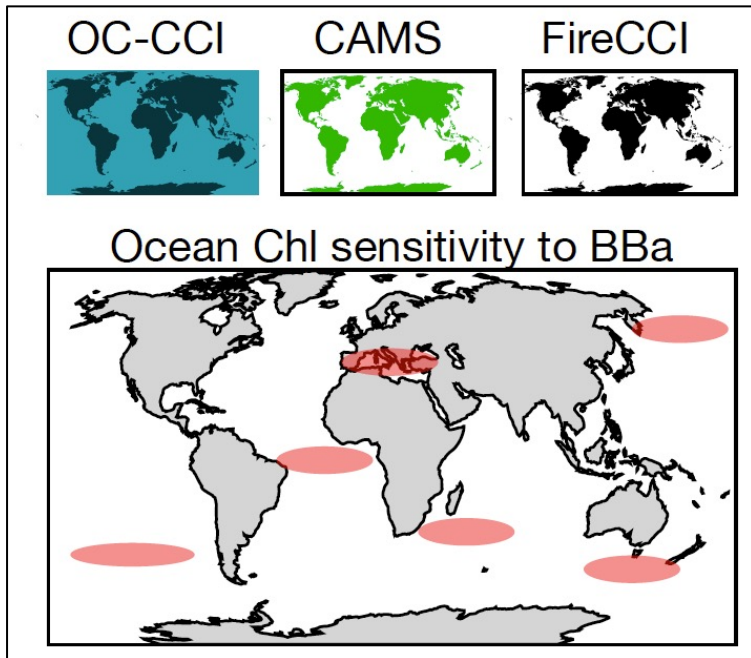
Hamilton et al, 2022

Can we observe and characterise these impacts?

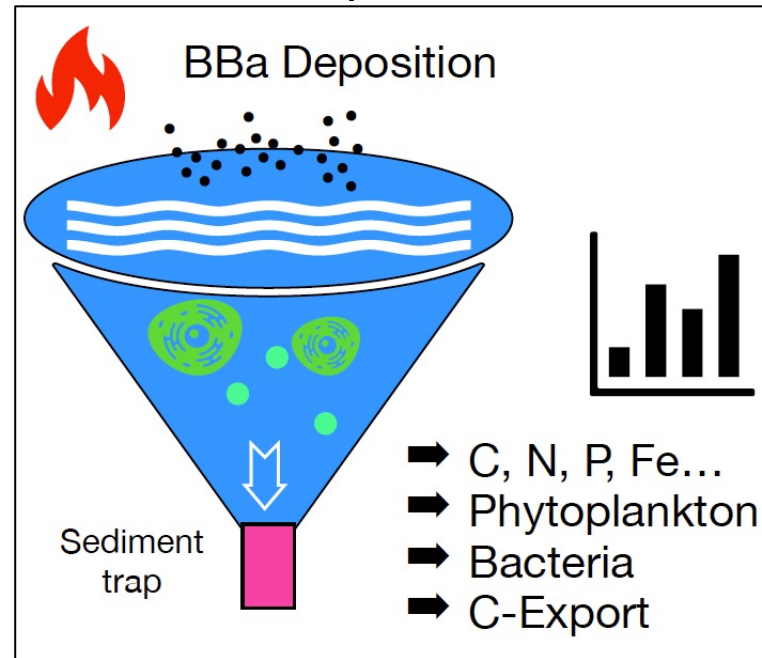
PYROPLANKTON strategy

In PYROPLANKTON will build mechanistical understanding of the BBa impact on marine primary production by means of satellite and groundbreaking mesocosm experiments.

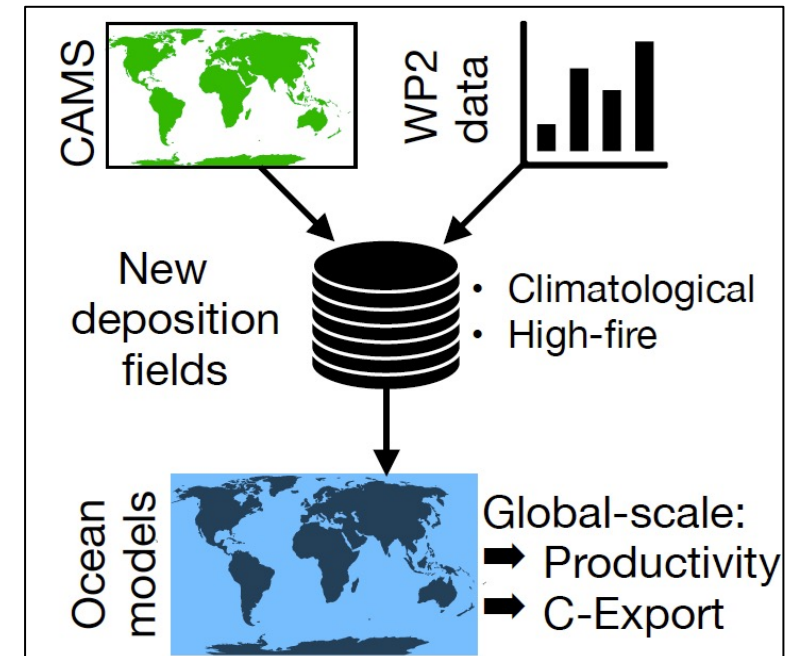
Remote observations



Lab experiments

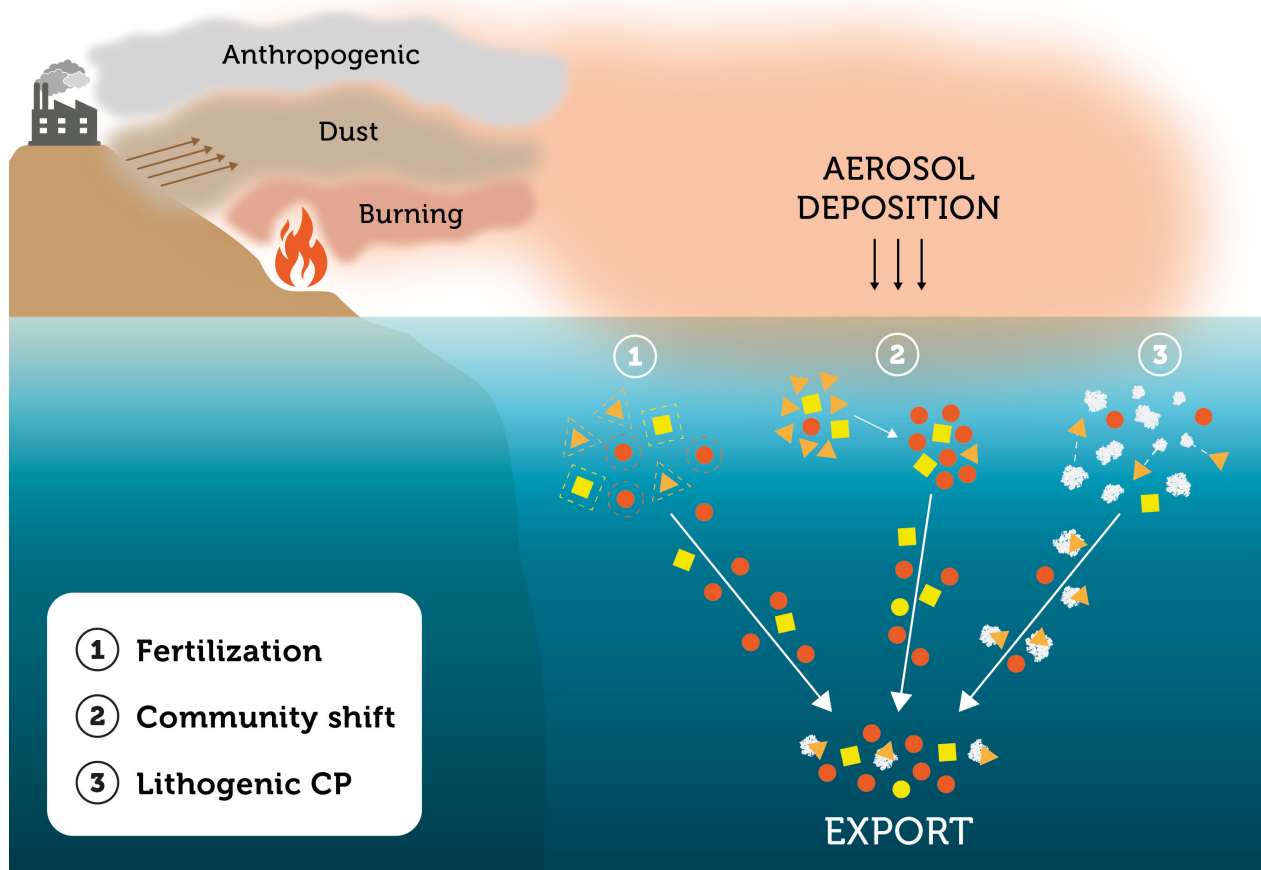


Improved ocean BGC models



Click on the infographics to know more about each task

Knowledge gaps and future efforts



The large-scale impact of aerosols on marine carbon export is still unknown. Strong observational efforts are needed to quantify all the mechanisms involved.

Priorities for satellite-based research (1-5ys)

- Remote estimate of the Biological Carbon Pump
- Remote estimates of phytoplankton community composition, DOC, DIC and PIC

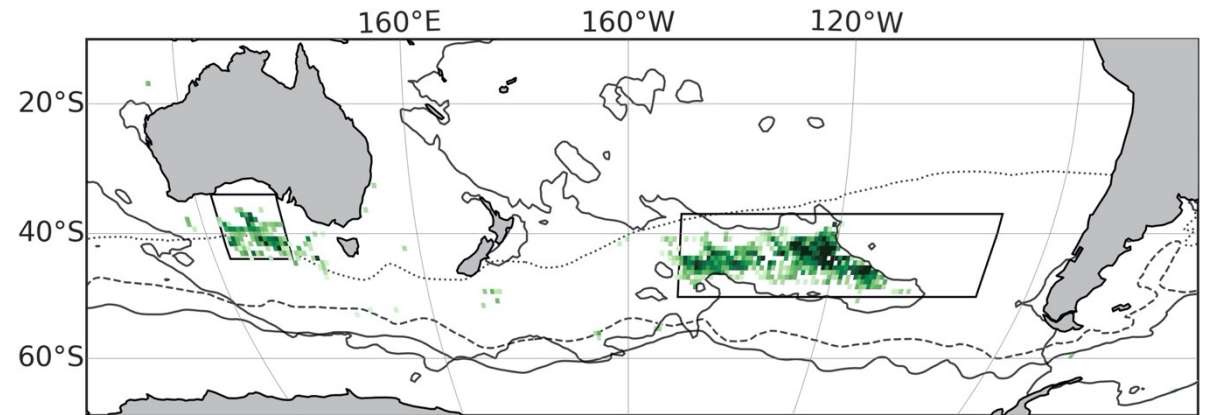
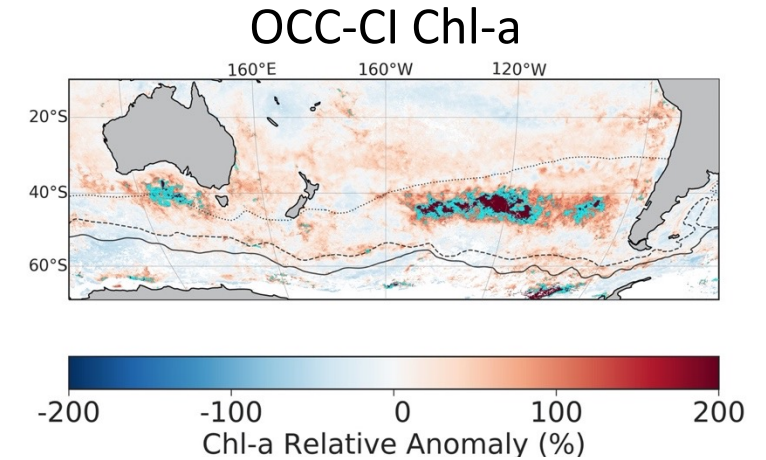
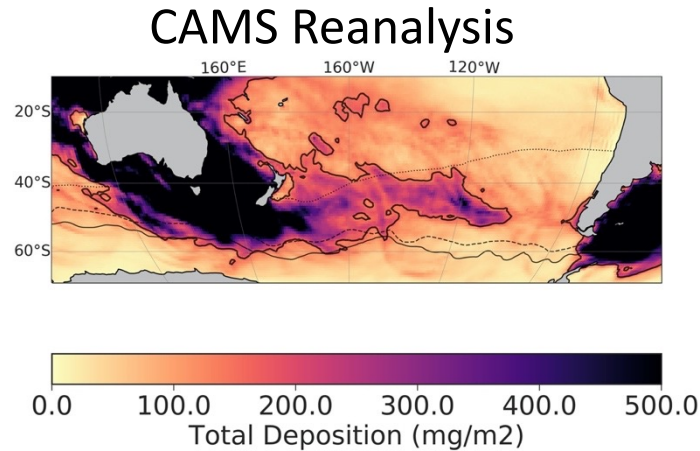
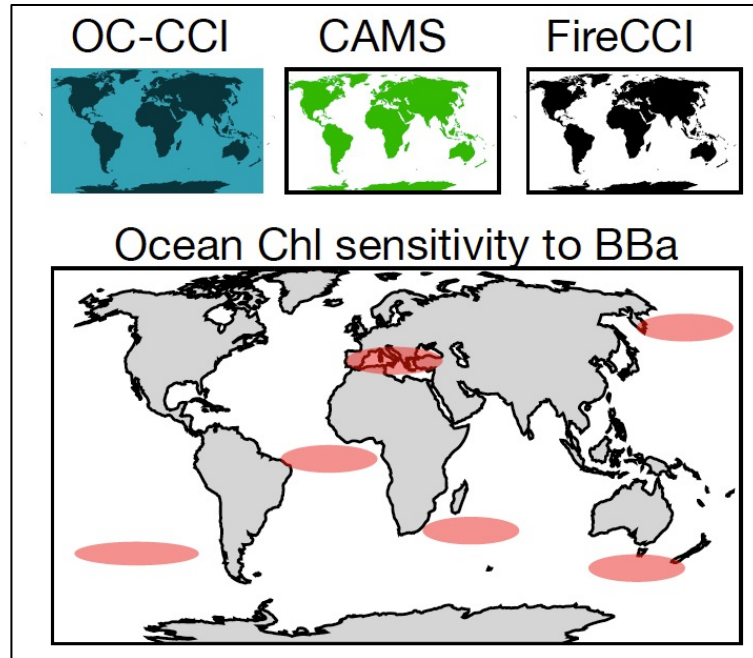
5-10 years

- Measuring aerosol deposition over the oceans
- Observations of aerosols chemical composition and transformation in the atmosphere

Additional slides

PYROPLANKTON workpackages

Remote observations



Attribution of Chl anomalies to aerosol deposition

Collaborators:

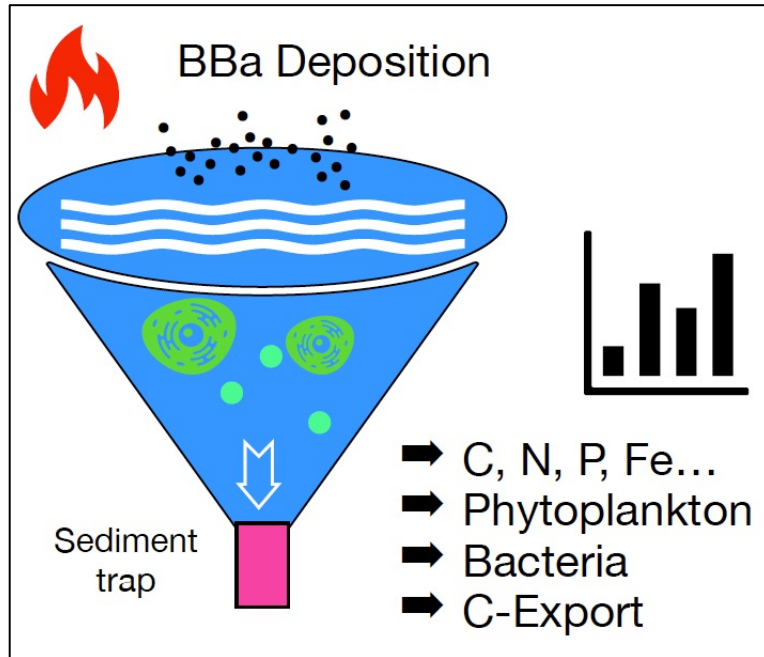
R. Bernardello, P. Ortega, S. Basart, C. Garcia Perez-Pando (BSC)

W. Tang (Princeton), M. Ardyna (CNRS)

D. Hamilton (Cornell Univ)

PYROPLANKTON workpackages

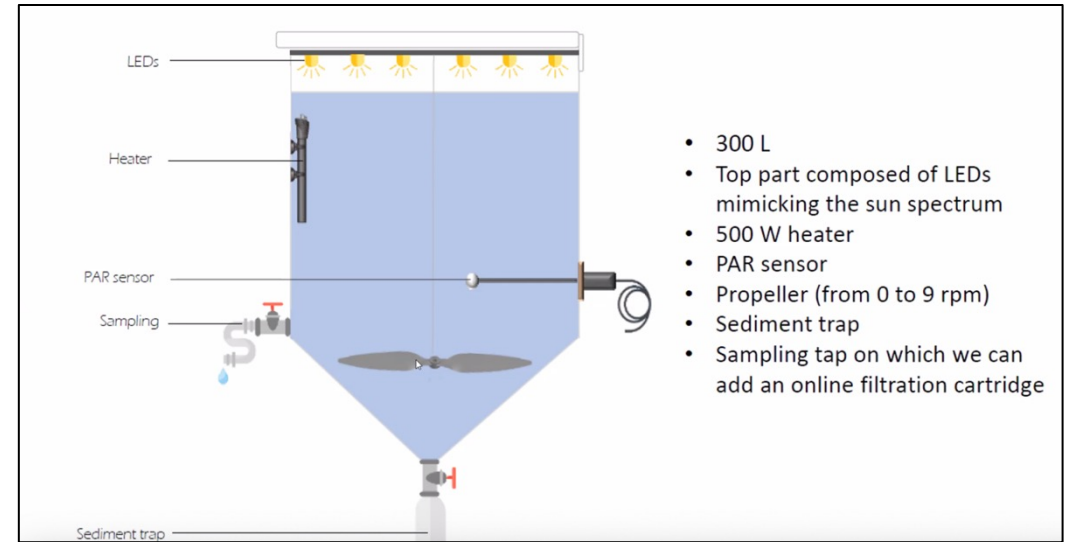
Lab experiments



Collaborators:

C. Guieu, M. Bressac, F. Gazeau (LOV-SU, IMEV)

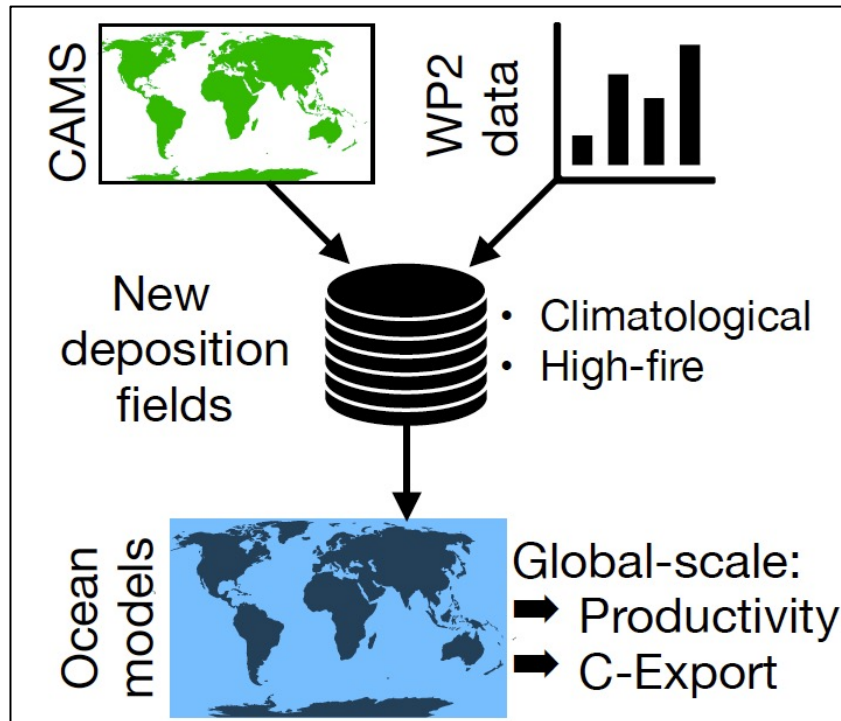
C. Santin (IMIB-CSIC, Swansea Univ)



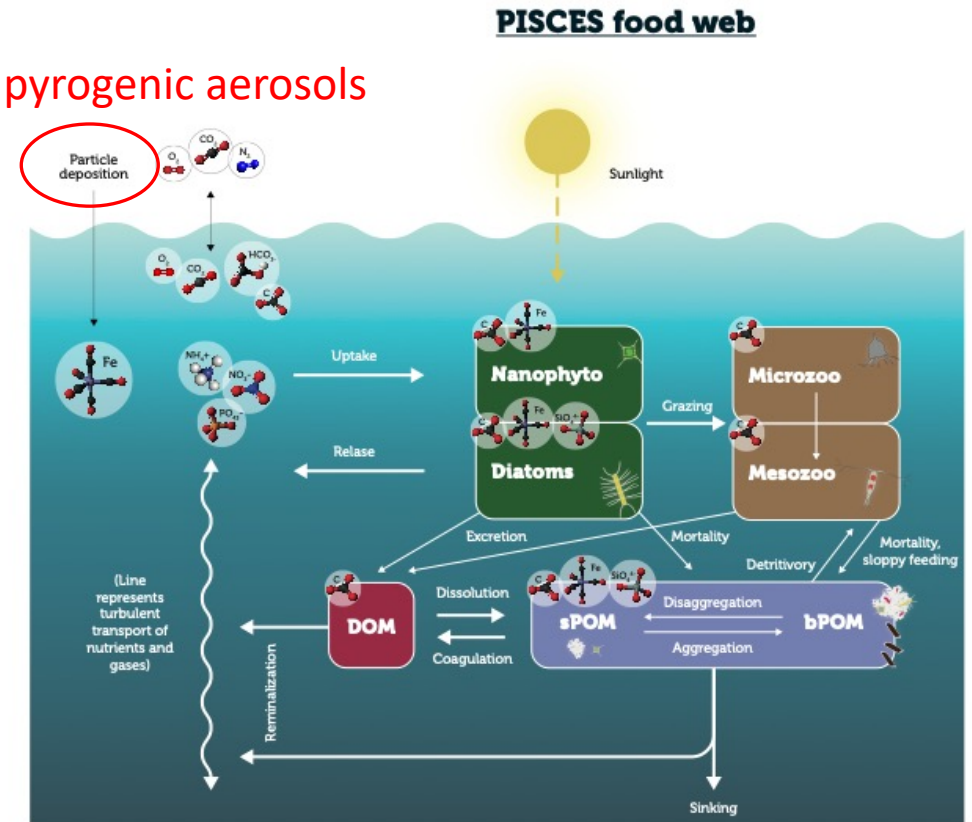
Courtesy of C.Guieu and F.Gazeau

PYROPLANKTON workpackages

Improved ocean BGC models



Nuts from pyrogenic aerosols



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Collaborators:

F. Doblas-Reyes, R. Bernardello, P. Ortega, M. Gonçalves, E. Bergas-Massó, C. Garcia Perez-Pando (BSC)
D. Hamilton (Cornell Univ)