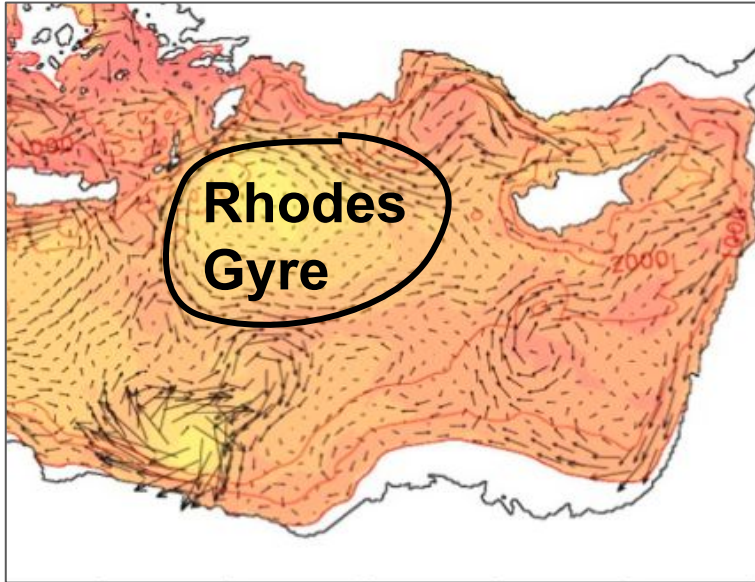


Dynamic and budget of dissolved oxygen in the Levantine basin using a hydrodynamic - biogeochemical coupled model

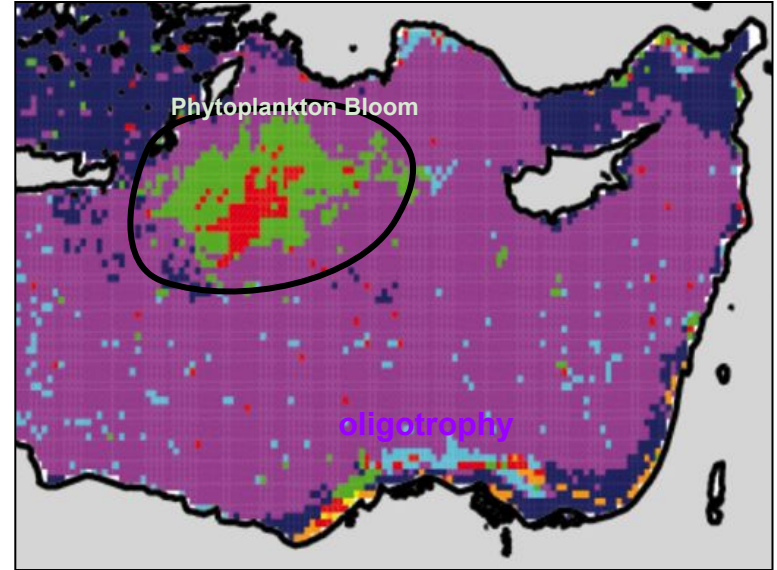
EGU 2022 - OS2.4

Joelle Habib, Caroline Ulses, Claude Estournel , Patrick Marsaleix, Laurent Coppola, Milad Fakhri



Estournel et al. (2021)

Circulation characteristics and salinity (background) in the Levantine basin



Mayot et al. (2016)

The chlorophyll bioregions in the Levantine basin

Scientific objective

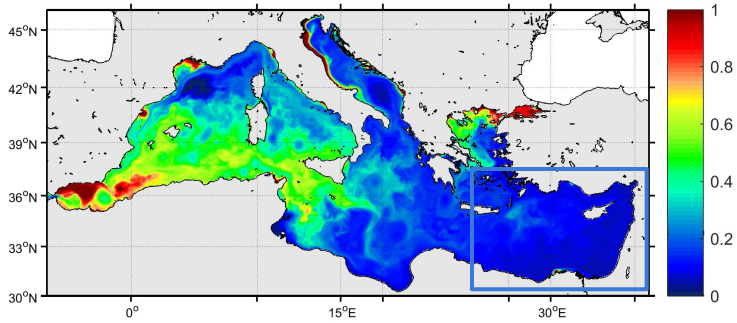


Assess the **seasonal** and the **interannual variability** of the **dissolved oxygen**



Estimate a **seasonal** and annual **budget** of dissolved oxygen

IMPLEMENTATION OF A COUPLED 3D HYDRODYNAMIC - BIOGEOCHEMICAL MODEL

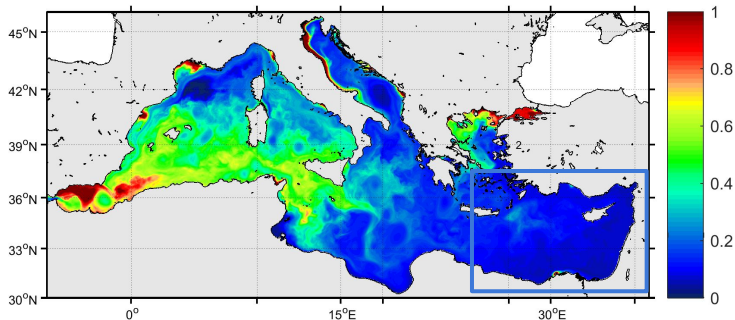


Hydrodynamic model SYMPHONIE
(Marsaleix et al., 2008; Estournel et al., 2021)

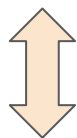


Biogeochemical model ECO3M-S
(Ulses et al., 2021)

IMPLEMENTATION OF A COUPLED 3D HYDRODYNAMIC - BIOGEOCHEMICAL MODEL



Hydrodynamic model SYMPHONIE
(Marsaleix et al., 2008; Estournel et al., 2021)



Biogeochemical model ECO3M-S
(Ulses et al., 2021)

$$\Delta O_2 \text{ inventory} = \text{Air-sea flux} + \text{BGC flux} + \text{Physical flux}$$

$$\text{Air-Sea flux} = K_w (O_{2,\text{sat}} - O_{2,\text{sea}})$$

K_w : Wanninkhof and McGillis (1999)

$O_{2,\text{sat}}$: Garcia and Gordon (1992)

$$\text{BGC flux} = \text{Gross primary production} - \text{Respiration} - 2 \times \text{Nitrification}$$

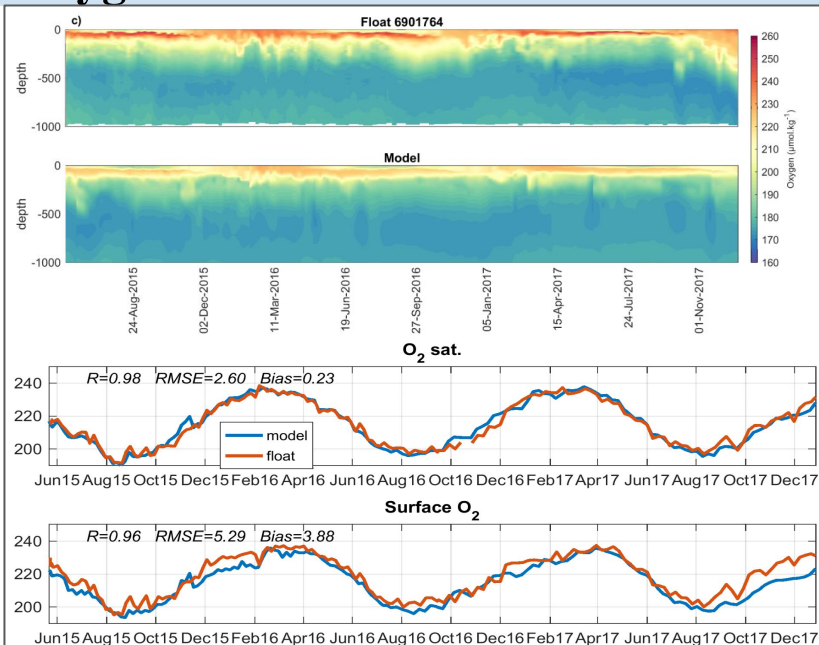
$$\text{Physical flux} = \text{Lateral flux} + \text{Vertical flux}$$

deduced

EVALUATION OF THE BIOGEOCHEMICAL MODEL



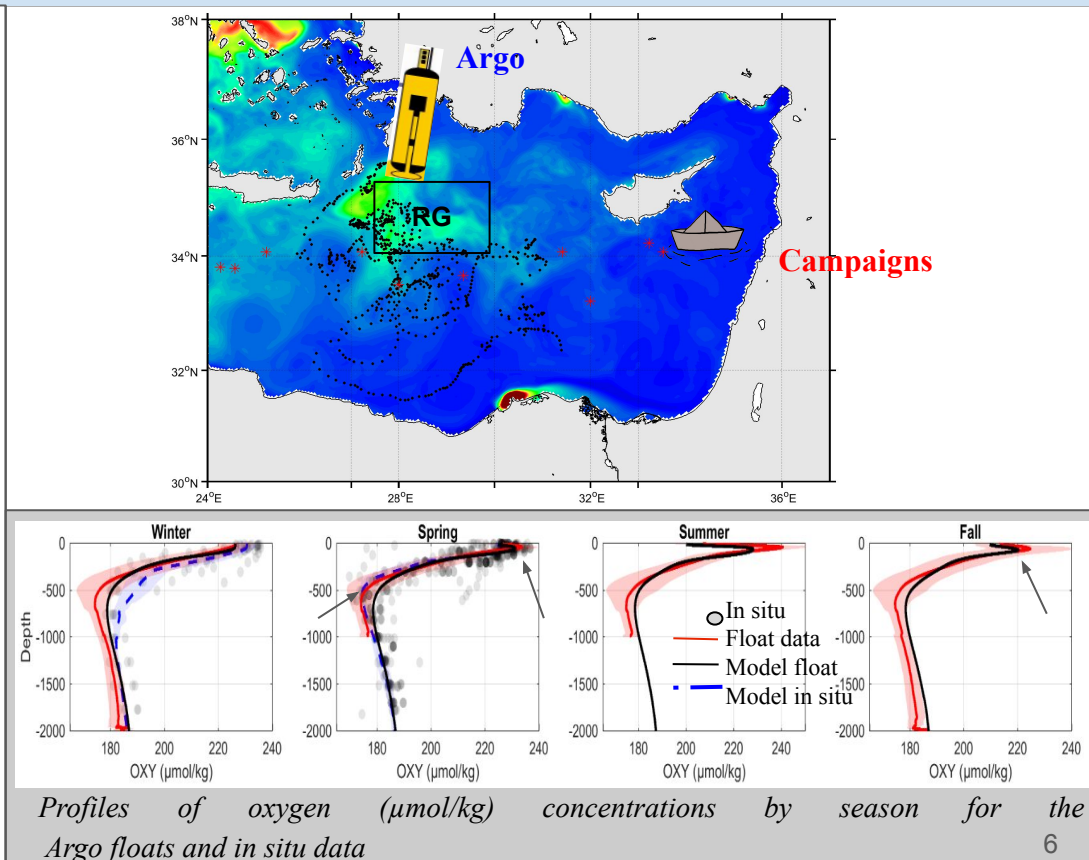
Oxygen validation



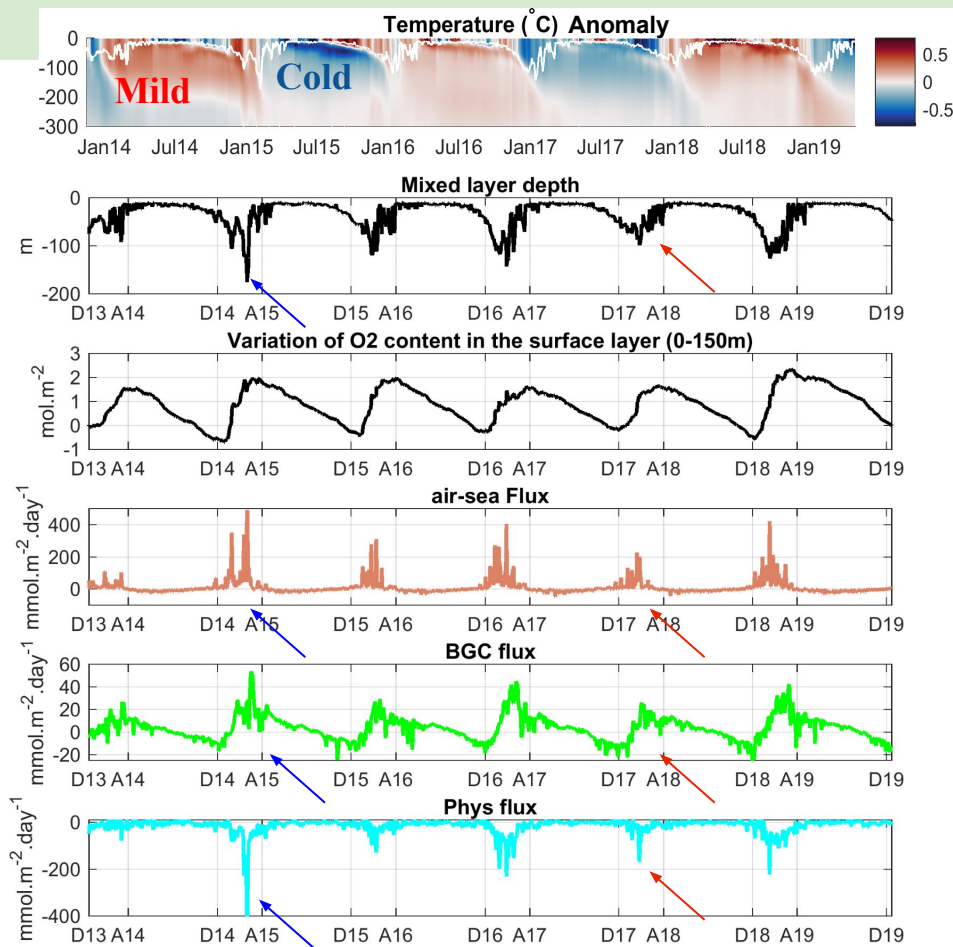
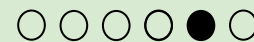
Temporal and spatial evolution of the oxygen concentration for float 64

- ⇒ The model reproduces correctly the oxygen cycle
- ⇒ High correlation between the model and the data

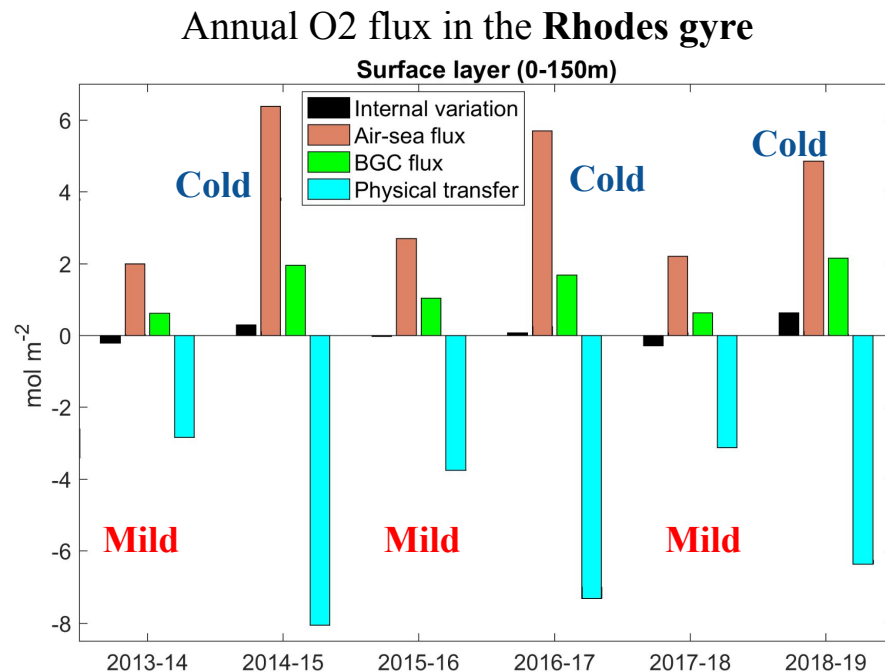
Modeled surface chlorophyll for february 2013



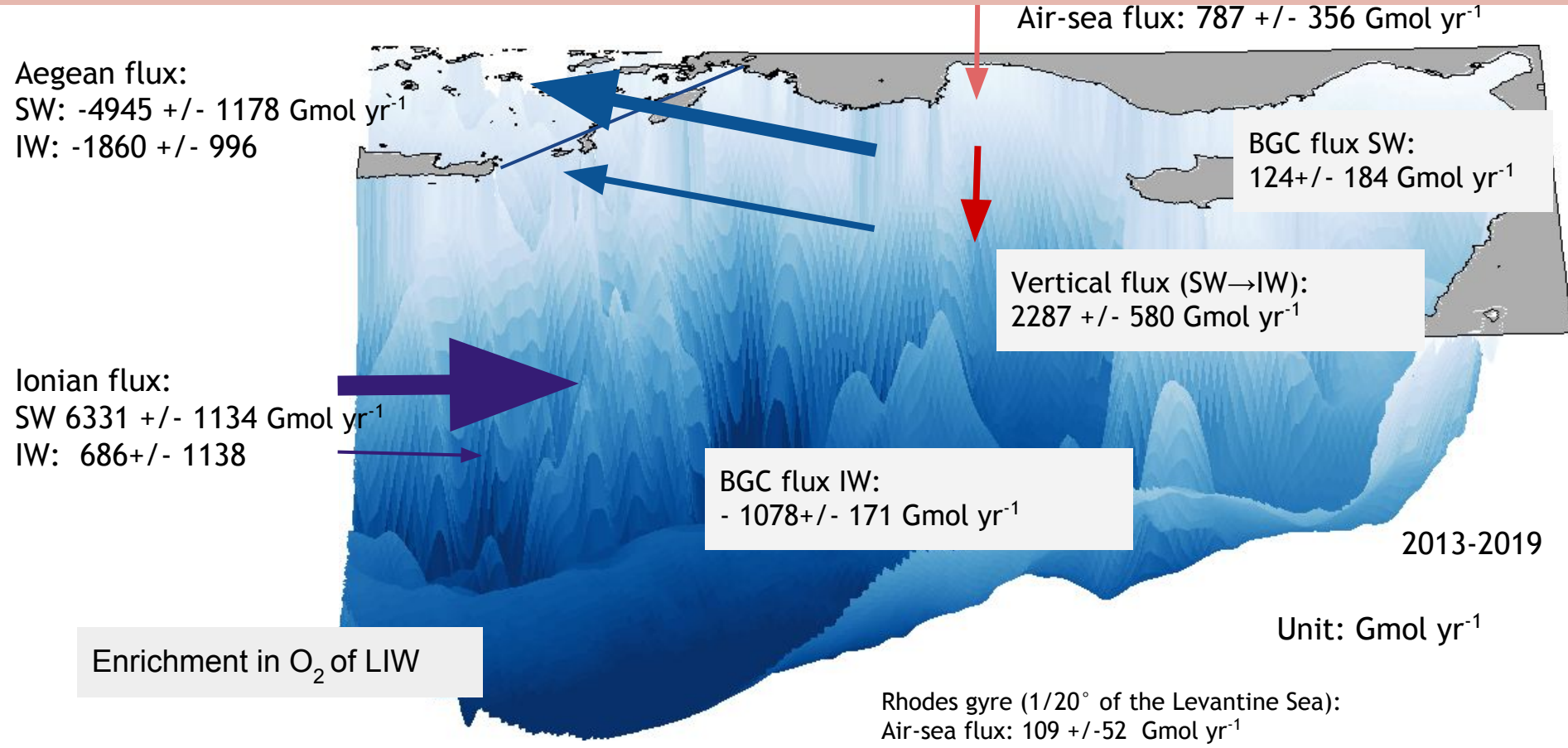
SEASONAL VARIABILITY OF OXYGEN INVENTORY AND FLUXES IN THE RHODES GYRE



$$\Delta O_2 \text{ inventory} = \text{Air-sea flux} + \text{BGC flux} + \text{Physical flux}$$



BUDGET OF OXYGEN IN THE SURFACE AND INTERMEDIATE LAYERS IN THE LEVANTINE



Thank you for your attention

Get in touch

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