

Final Workshop

Instituto Superior Técnico, Lisboa, Portugal

1st June
2023

Chlorophyll-a along the Portuguese Coast

Pedro Nunes
Instituto Português do Mar e da Atmosfera

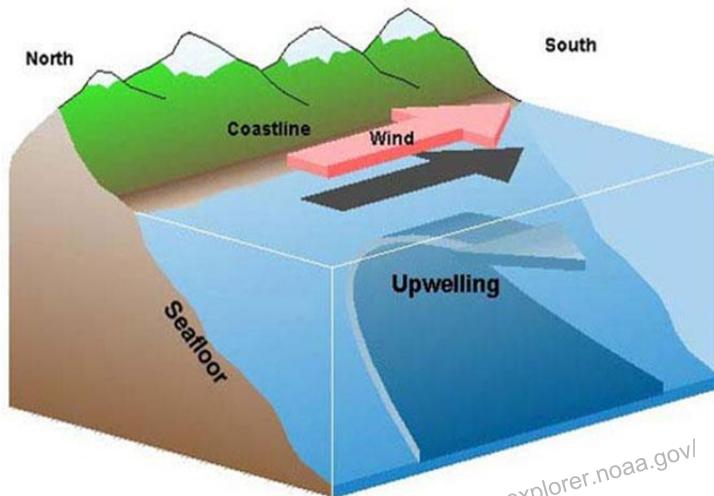
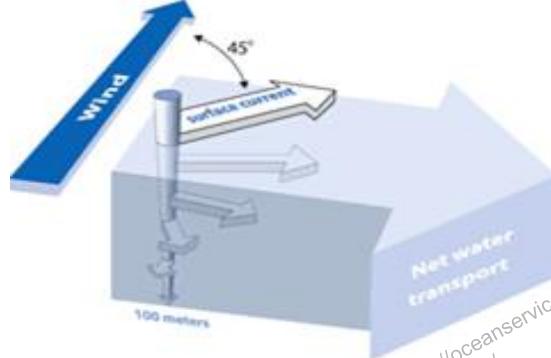
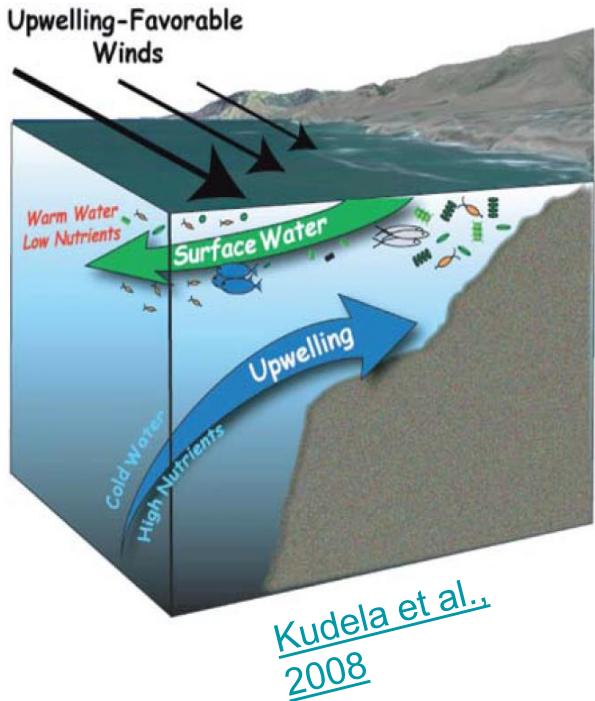


This project has received funding from the European Union's Interreg Atlantic Area programme under the grant EAPA_165/2016

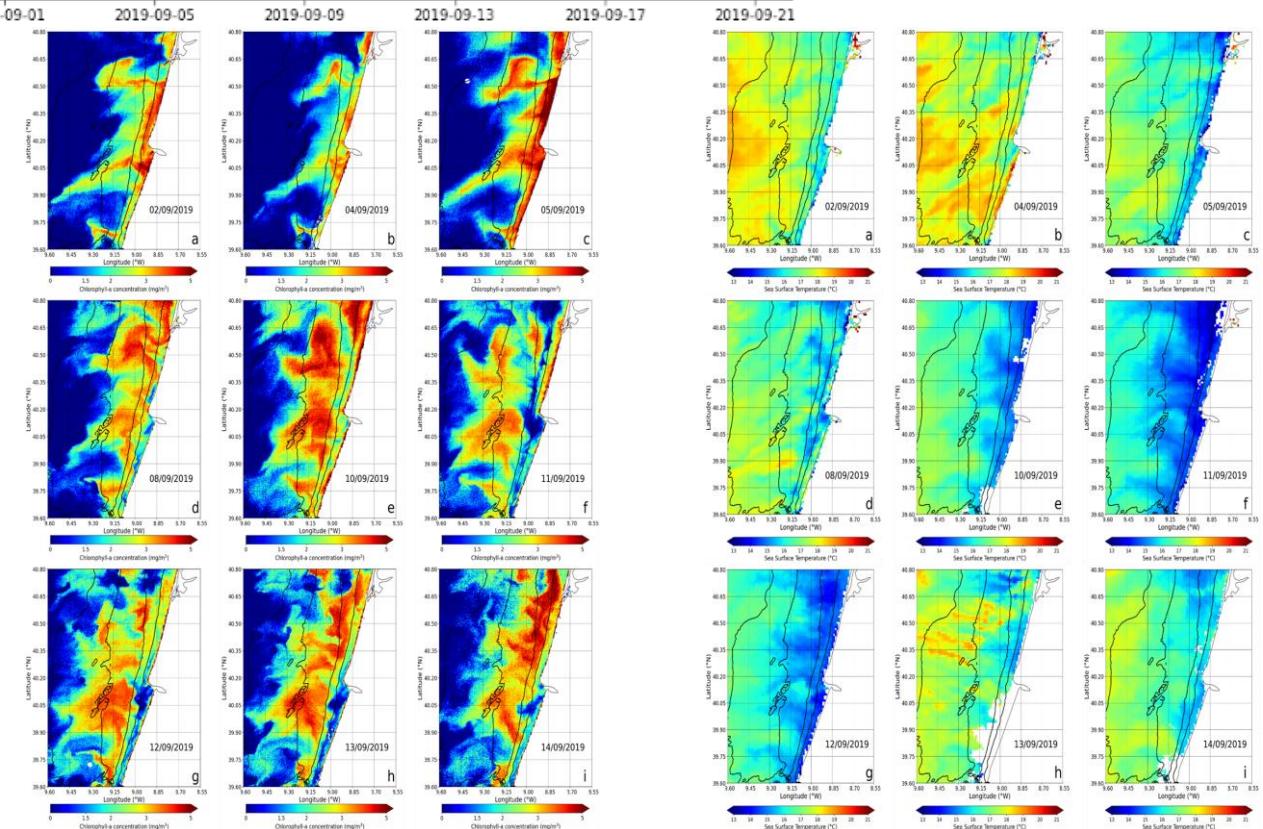
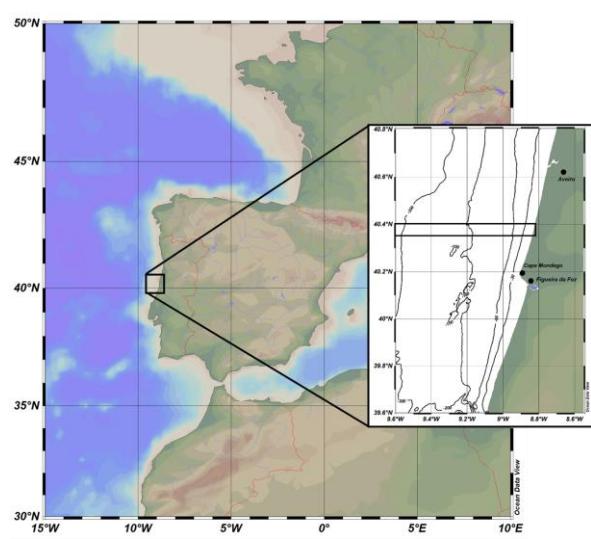
- Coastal Upwelling

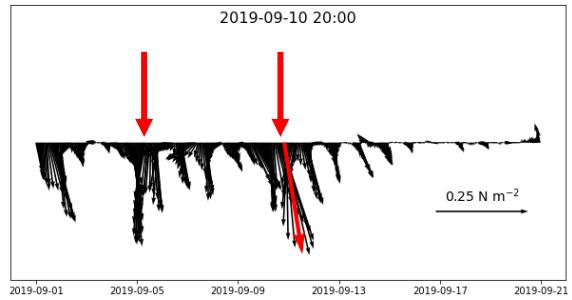
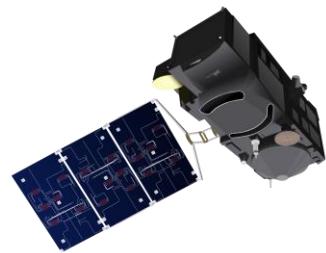


Ekman (1874 – 1954)



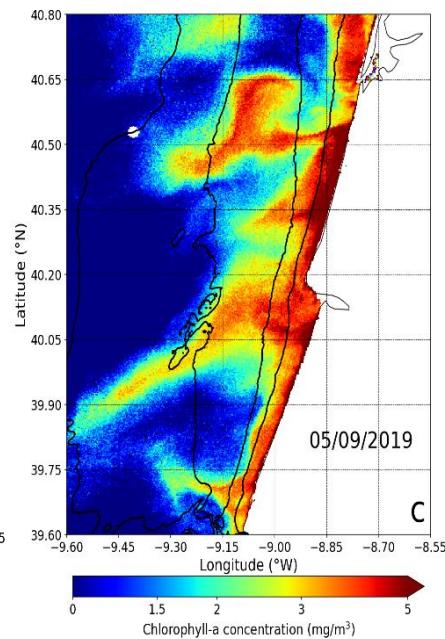
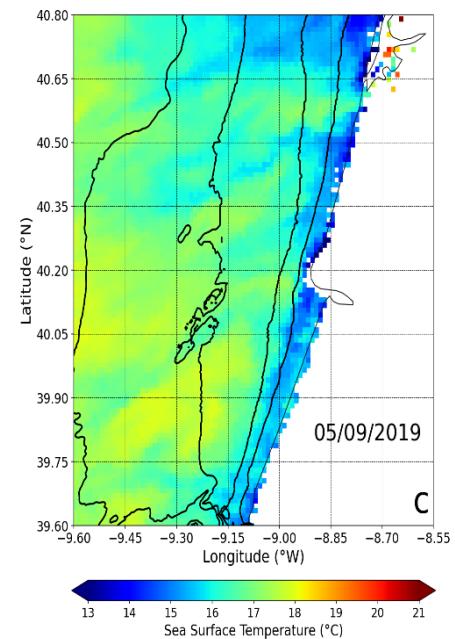
- Chl-a and SST Patterns



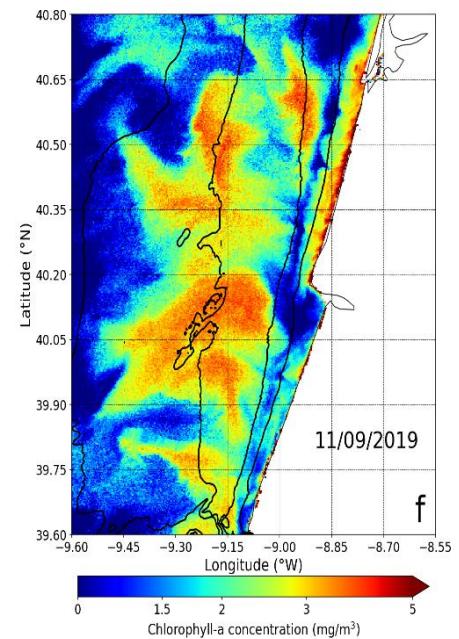
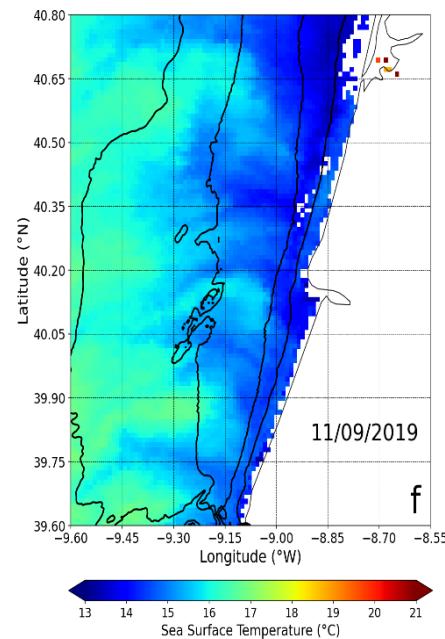


Sentinel 3
• OLCI
• SLSTR

5SEP

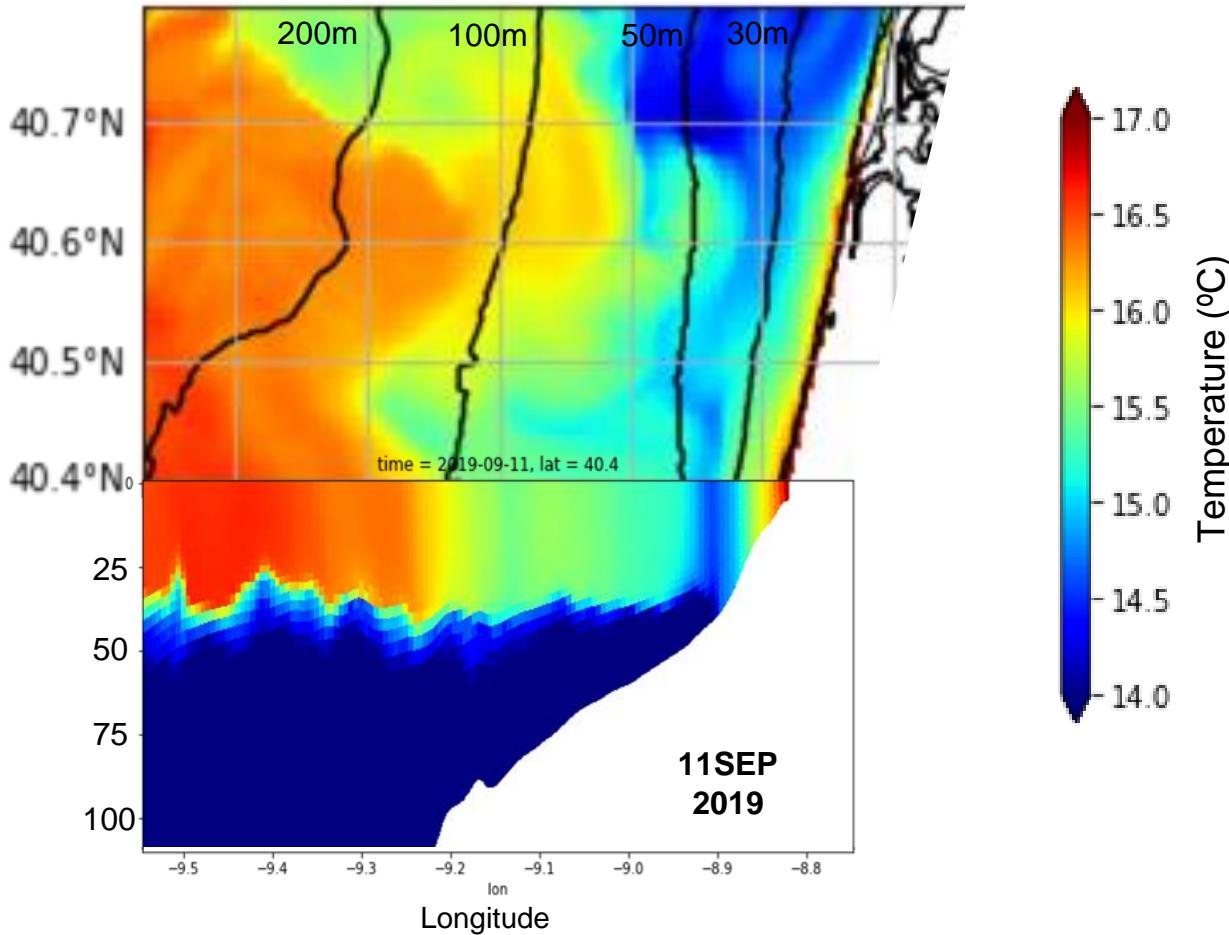
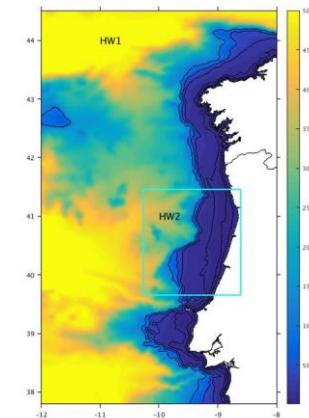


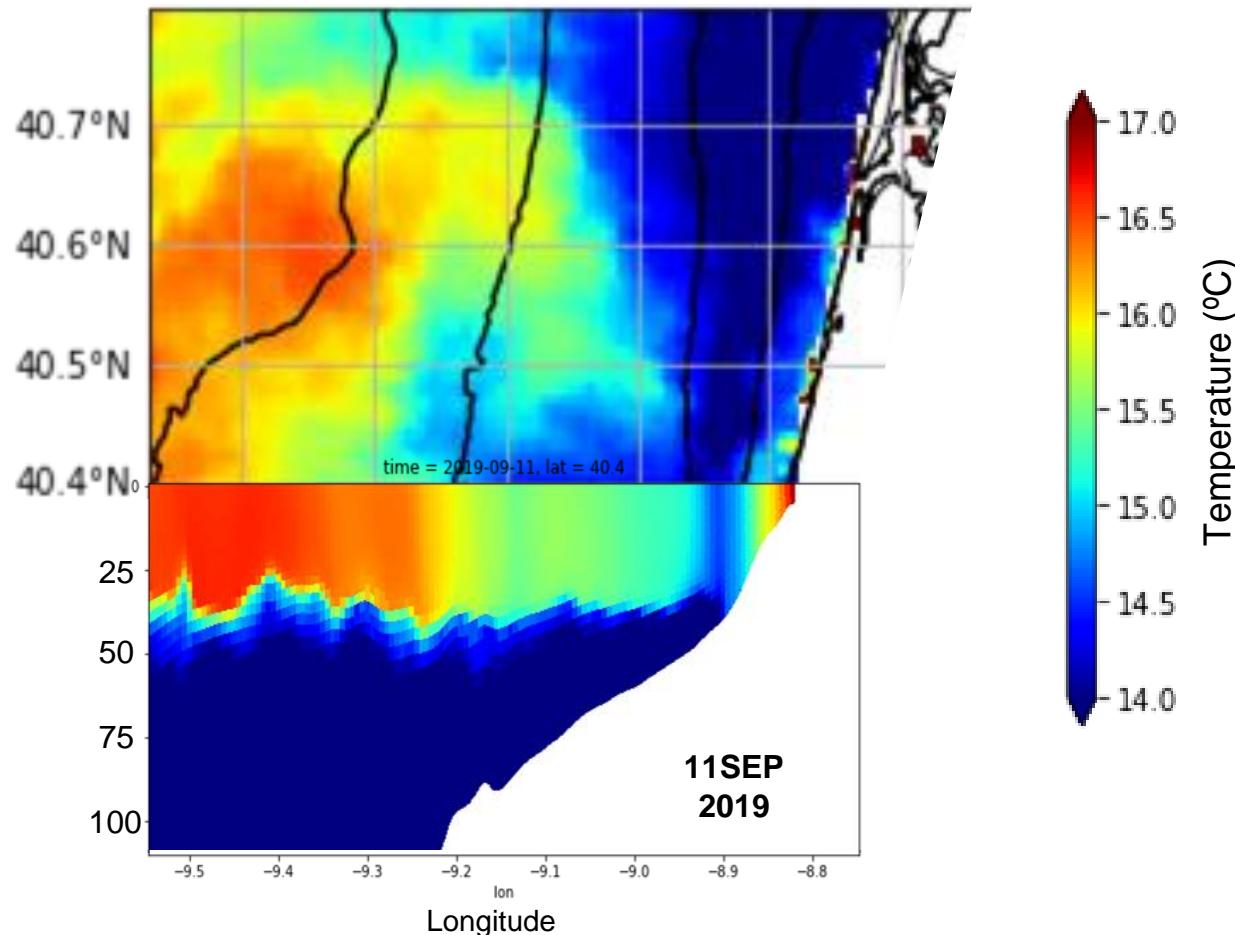
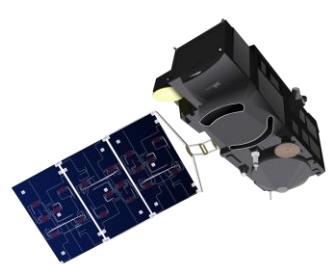
11SEP

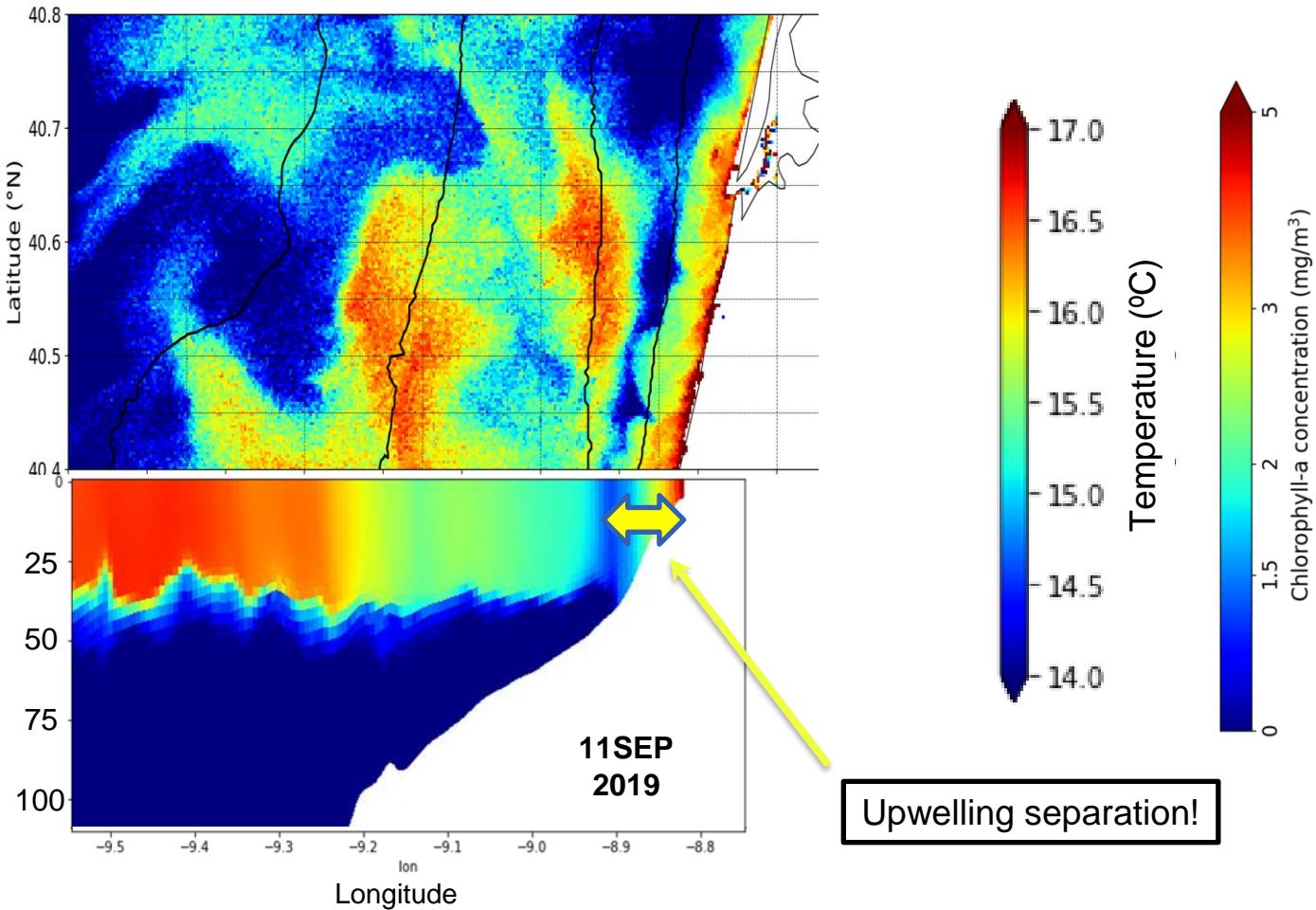


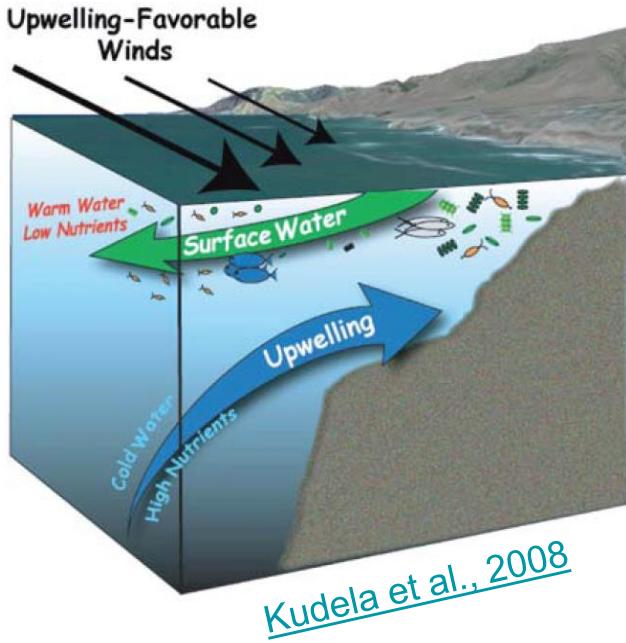
Domain HW1 ~ 1.3 a 1.5Km

Domain HW2 ~ 460 a 475 m

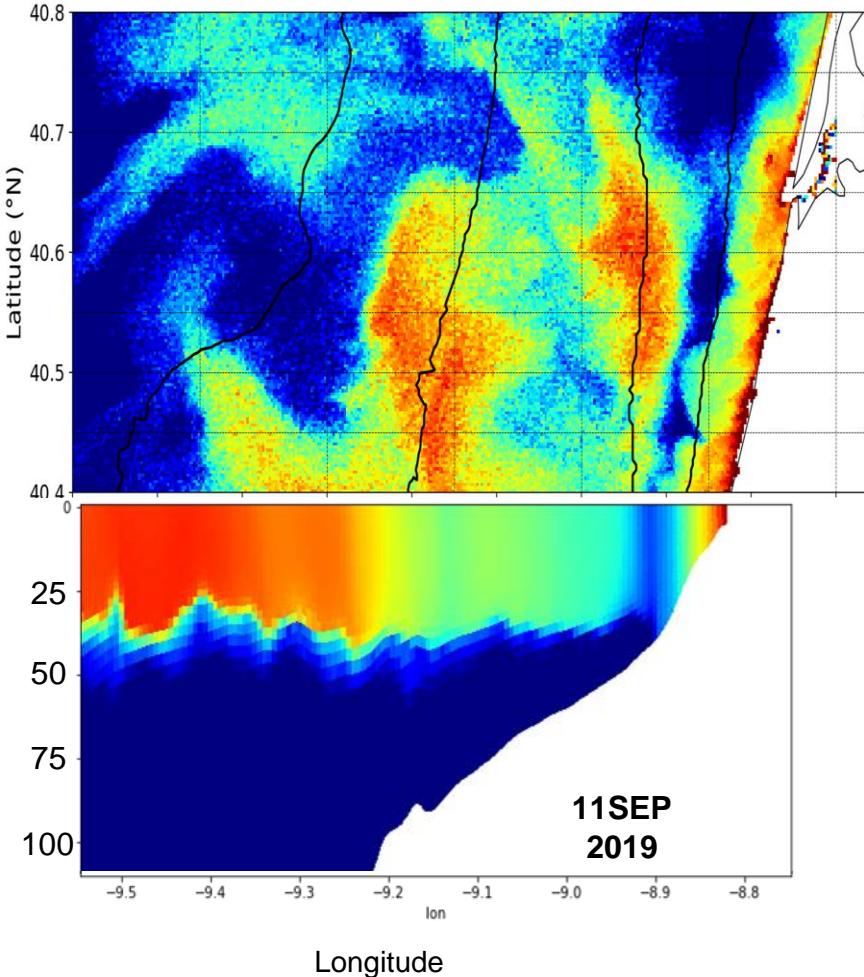








- The key to optimal phytoplankton growth is a series of upwelling-relaxation cycles;
- The size of the bloom is more or less proportional to the intensity of upwelling and the length of the relaxation phase.



Cross-shelf structure of coastal upwelling: A two-dimensional extension of Ekman's theory and a mechanism for inner shelf upwelling shut down

by Philippe Estrade¹, Patrick Marchesiello², Alain Colin De Verdier³,
and Claude Roy⁴

2008]

Estrade et al.: *Cross-shelf structure of coastal upwelling*

601

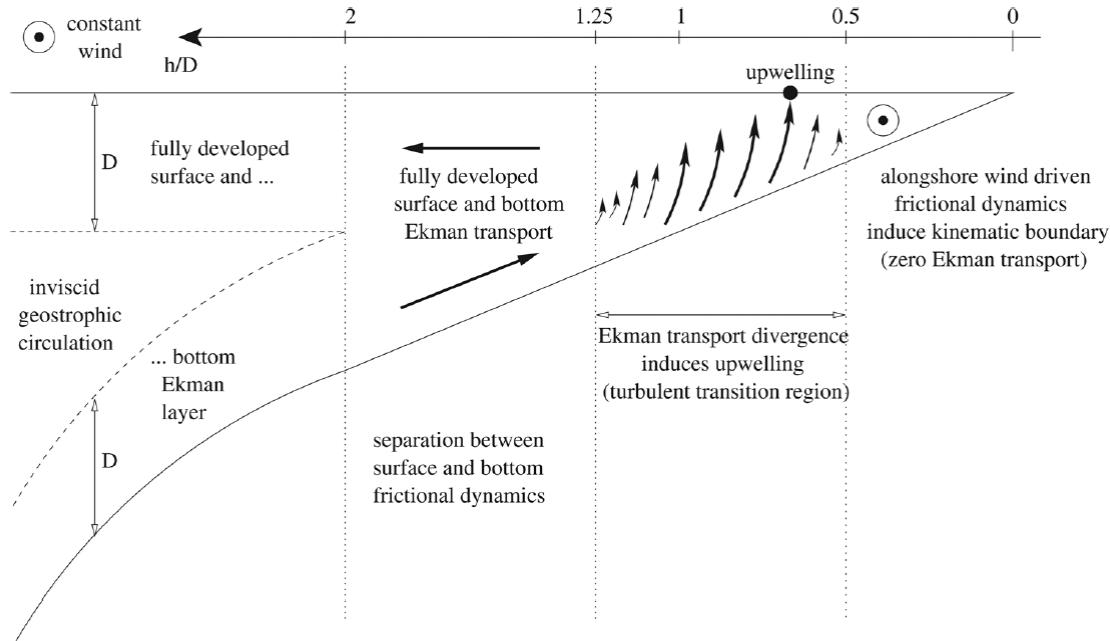
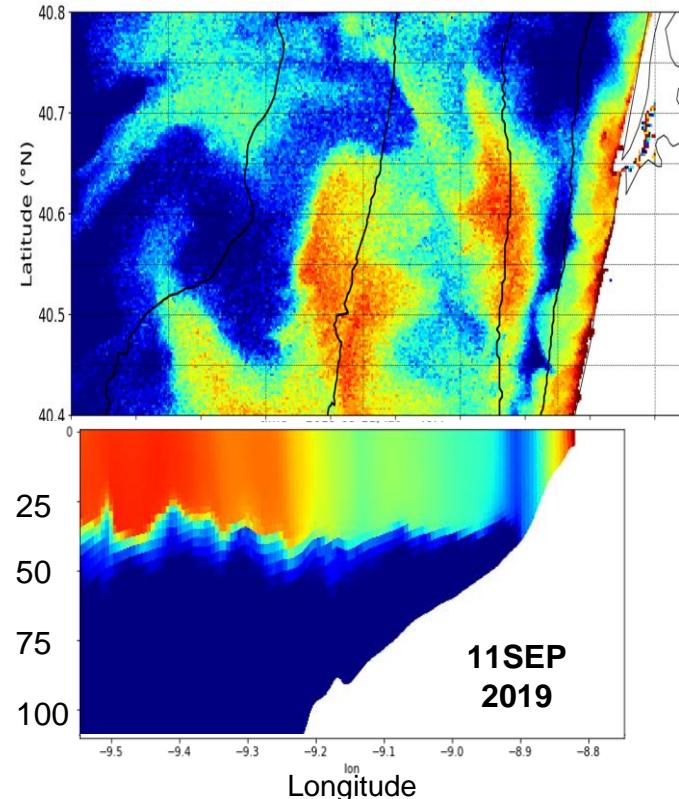


Figure 5. Conceptual scheme of the mechanism of upwelling separation from the coast.



- Interaction between the Ekman layers at shallow depths;
- The upwelling cell is found in a transition zone between two regimes.

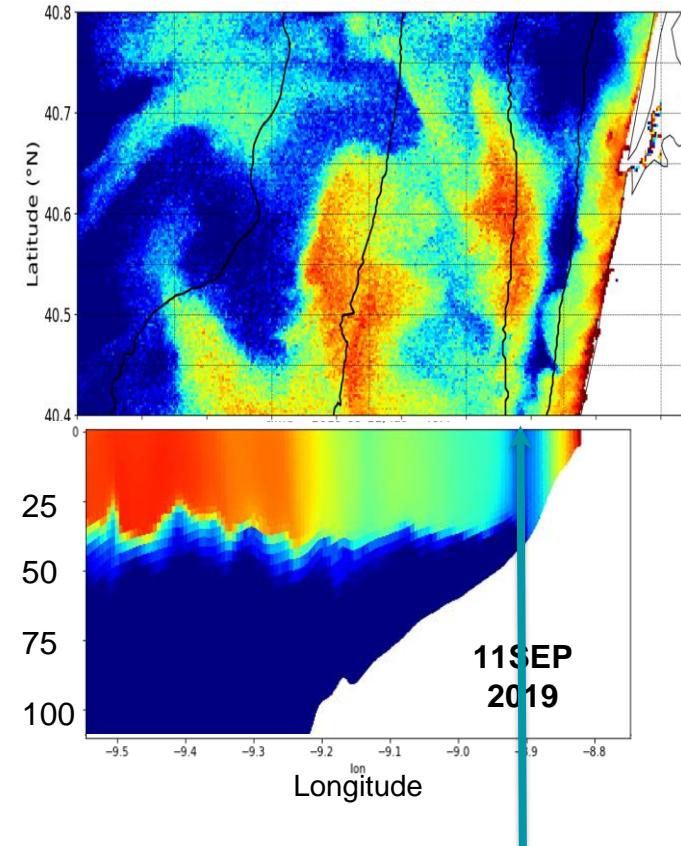
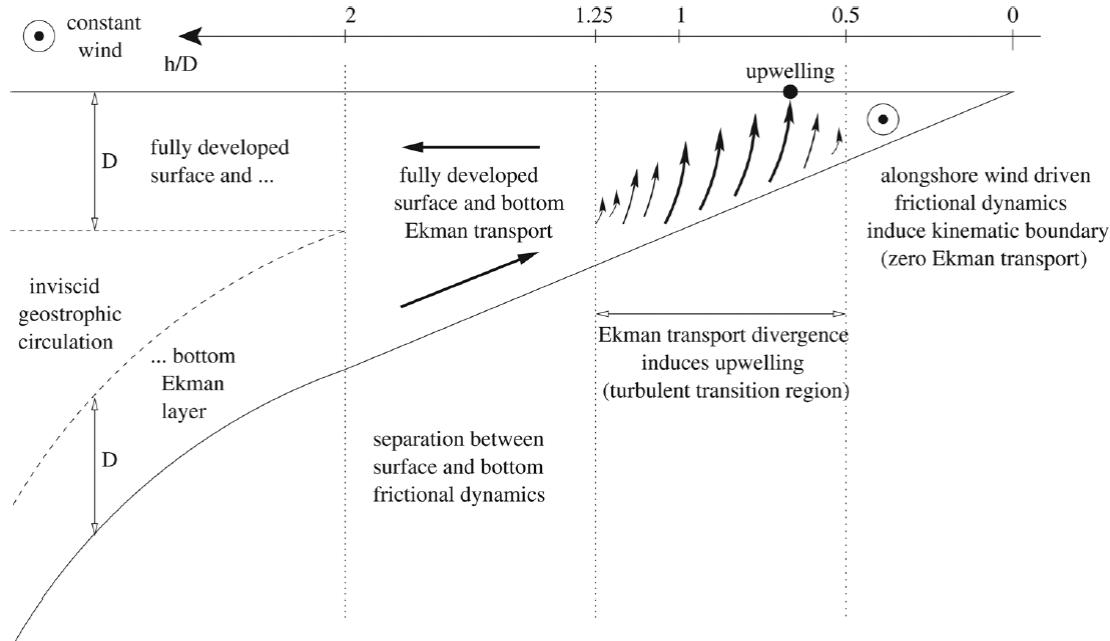
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601



$$h/D = 0.6, h = 40 \dots D \sim 67\text{m}$$

Figure 5. Conceptual scheme of the mechanism of upwelling separation from the coast.

OK, UPWELLING...

... but watch out for the “Depth of wind current” (Ekman depth)
and friction

OK, Enhanced productivity...

... but watch out for the vertical mixing
and coastal (innershelf) dynamics

Agradecimentos

- co-financiamento EU, Programas ERDF - Lisbon Regional Operational Program (PORLisboa) e Portugal 2020 - FCT/MCT - Projeto HabWAVE - LISBOA-01-0145-FEDER-031265
- Projecto iFADO - EAPA/165_2016, European Union Atlantic Area Interreg Programme
- Projecto Portugal Twinning for Innovation and Excellence in Marine Science and Earth Observation – PORTWIMS.



Fundação
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e a Tecnologia