Growth performance of larval Anchoveta *Engraulis ringens* in a natural plankton community: first insights from a mesocosm study off Peru on the effect of different light regimes and upwelling intensities

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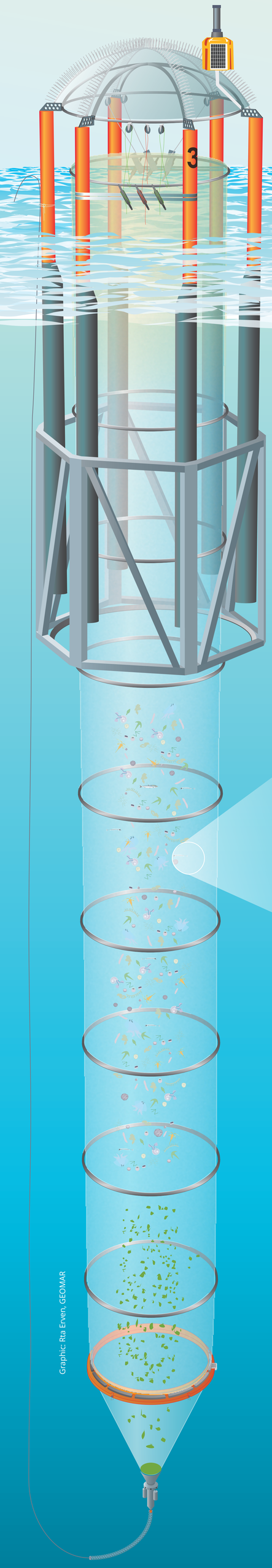


Background

In the Humboldt Upwelling System (HUS), the upwelling of nutrient-rich water, boosts a short, efficient food chain, leading to the world´s most productive fishery. The functional relationship between biological productivity and environmental conditions is not yet properly established.

Research focus

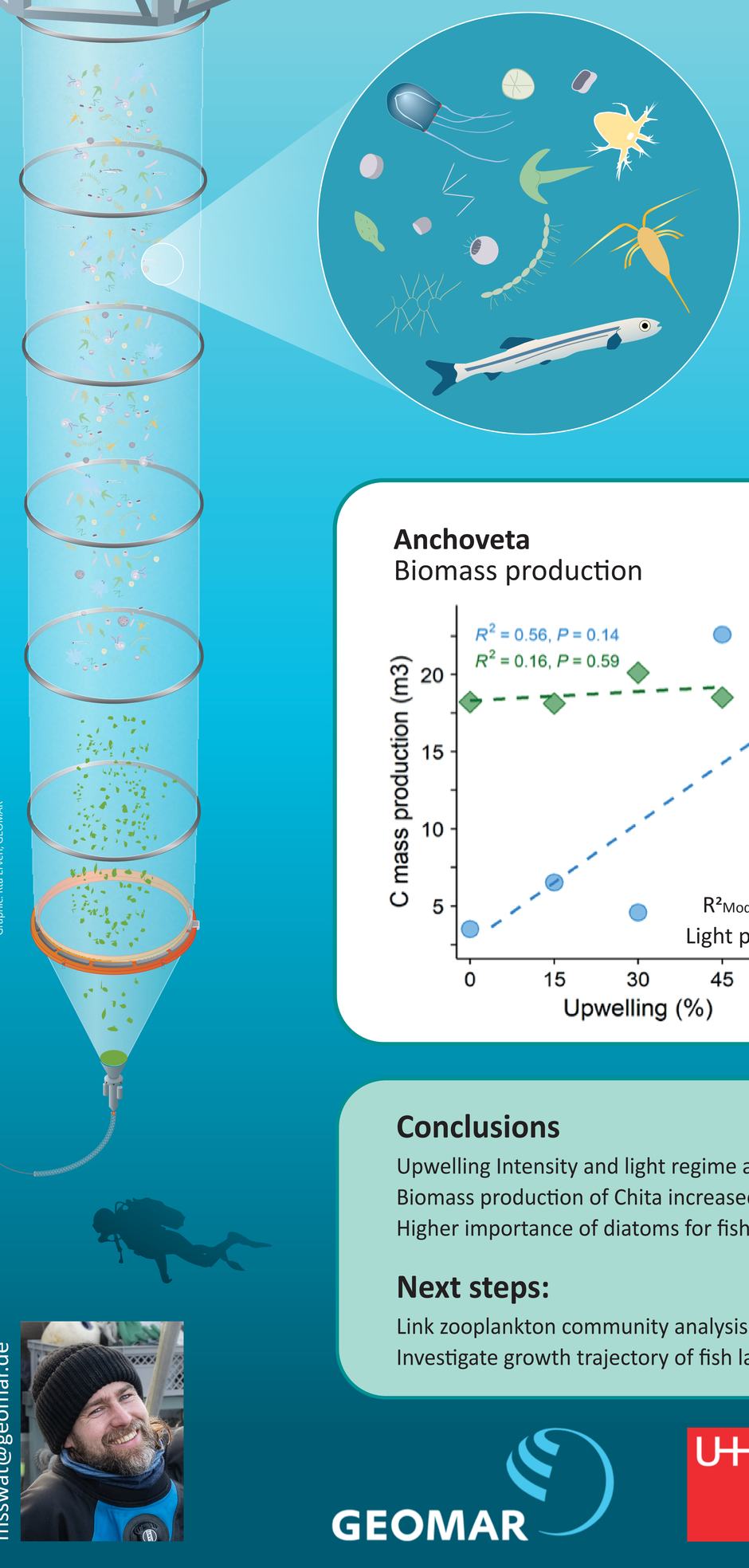
Trophic productivity and effeciency of the plankton community including fish larvae under different upwelling intensities and light regimes.

Experimental design

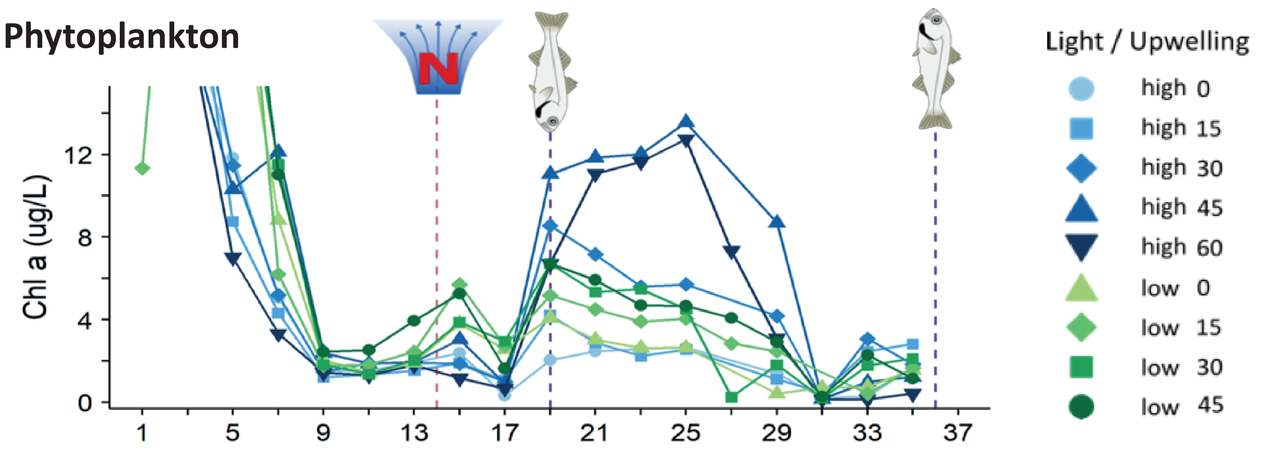
- Mesocosm study for 36 days in Mar / Apr 2020, North off Isla San Lorenzo, Callao, Peru
- In total, 9 mesocosms, each enclosing ~30 m³ of seawater including natural plankton community < 3mm
- Upwelling simulated by replacing mesocosm water with natural deep-water according to treatment on day 14
- Treatments: 5 mesocosms at high light with 0% – 60% upwelling & 4 mesocosms at low light with 0% – 45% upwelling

Fish larvae introduction and sampling

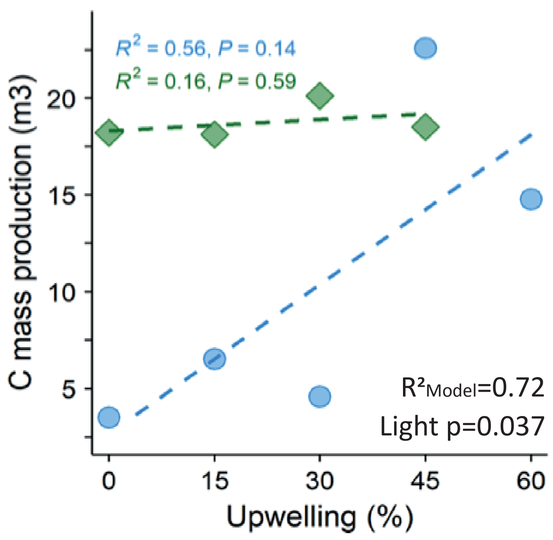
- Peruvian Anchoveta Engraulis ringens & Chita Anisotremus scapularis
- Fish larvae reared in lab until introduction on day 19 of experiment: per mesocosm 120 Anchoveta (24 days old) & 70 Chita (44 days old)
- Dead fish continiously collected from the sediment trap & final sampling of survivors after fish lived for 17 days in mesocosms.
- Survivors analysed for carbon biomass production and dietary importance of diatom



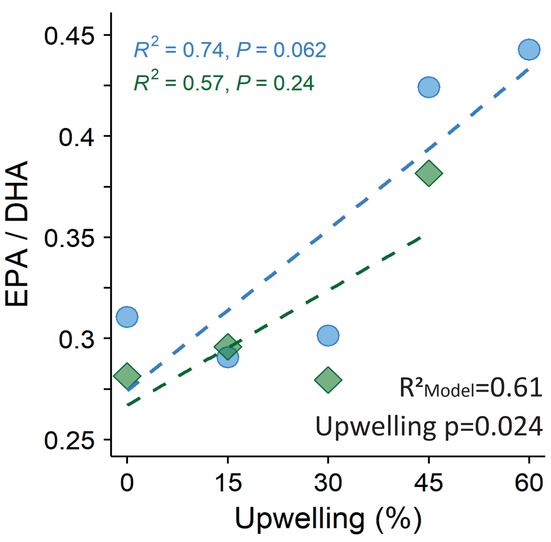
Phytoplankton



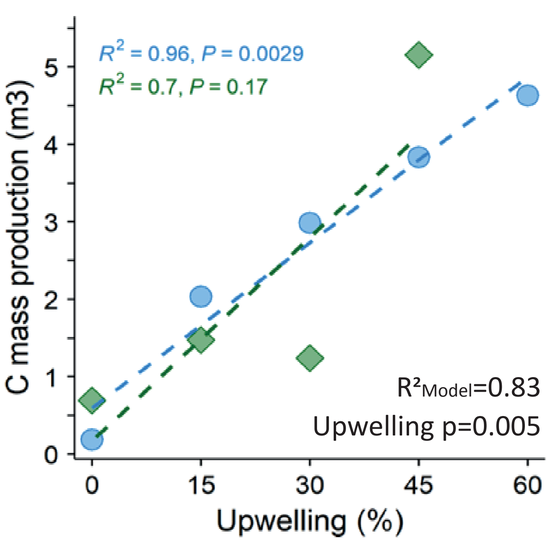
Anchoveta
Biomass production



Anchoveta
Importance of diatoms



Chita
Biomass production



Conclusions

Upwelling Intensity and light regime are strong drivers of fish performance and thus food web productivity towards fisheries.
Biomass production of Chita increased with upwelling, under both light regimes, but Anchoveta biomass was significantly influenced by the light regime.
Higher importance of diatoms for fish production with increasing upwelling intensities under both light regimes.

Next steps:

Link zooplankton community analysis to fish performance to validate trophic levels and interaction between fish larvae and their prey.
Investigate growth trajectory of fish larvae via otolith increment width analysis.

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