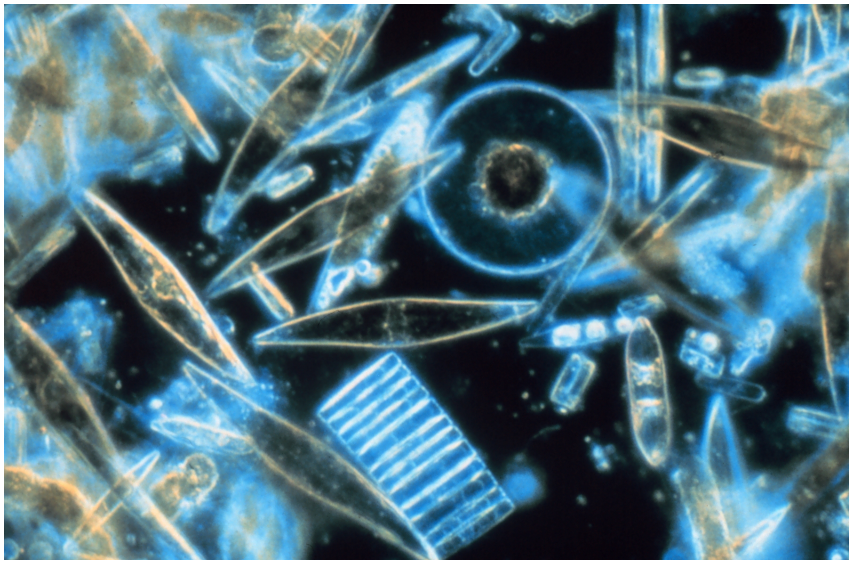
Plankton 0-dimensionale

Gabriele Labanca

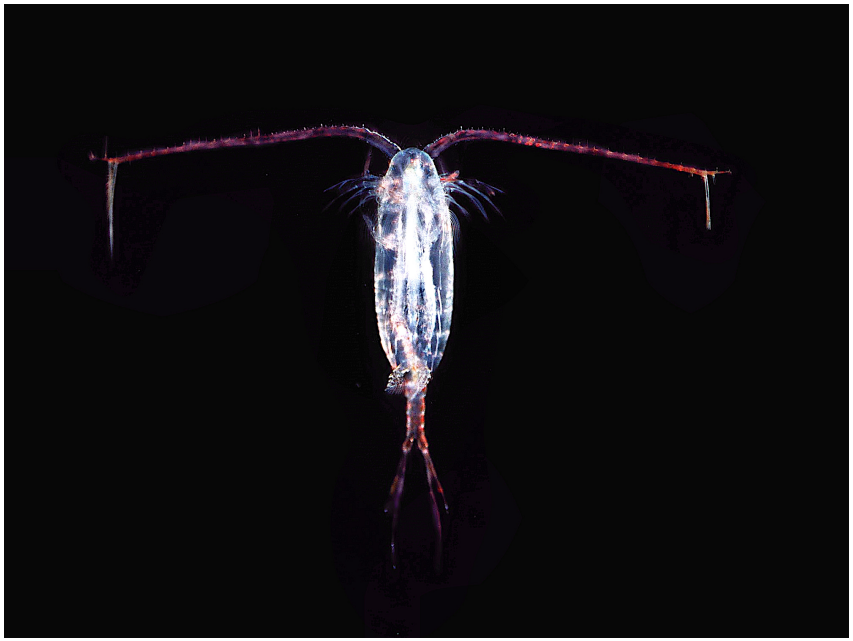
July 12, 2018

Plankton



- "living seston, adapted for a life spent wholly or partly in quasi-suspension in open water, and whose powers of motility do not exceed turbulent entrainment" [Reynolds 2006]
- $10^{-7} - 10^{-2}$m
- **paradosso del plankton**

Plankton



- "living seston, adapted for a life spent wholly or partly in quasi-suspension in open water, and whose powers of motility do not exceed turbulent entrainment" [Reynolds 2006]
- $10^{-7} - 10^{-2}$m
- **paradosso del plankton**

Plankton

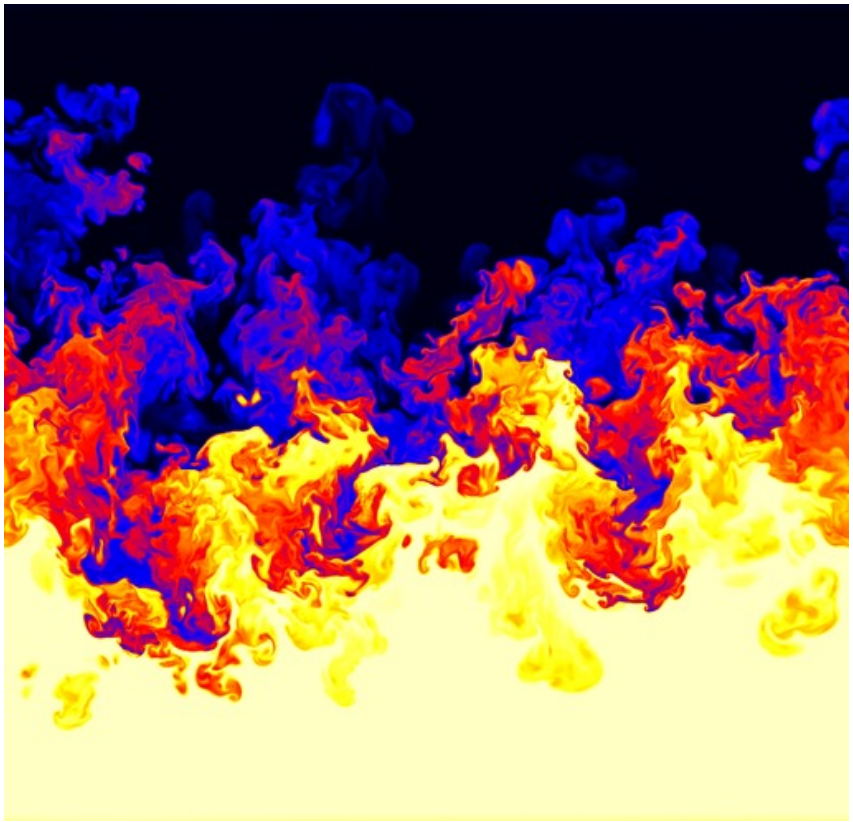
- "living seston, adapted for a life spent wholly or partly in quasi-suspension in open water, and whose powers of motility do not exceed turbulent entrainment" [Reynolds 2006]
- $10^{-7} - 10^{-2}$m
- **paradosso del plankton**

Equazioni Navier-Stokes

$$\begin{cases} \partial_t \rho + \partial_i(\rho u_i) = 0 \\ \partial_t(\rho u_j) + \partial_i(\rho u_j u_i + P_{ij}) - \rho a_i = 0 \end{cases}$$

$$\frac{\mathrm{d}u_j}{\mathrm{d}t} = -\partial_j p + \nu \Delta u_j + f_j$$

Turbolenza



(Boffetta)

- $Re = \frac{Lu}{\nu}$
- $\partial \cdot u = 0$

Modello Huisman (2002)

$$n(z,t)$$

$$\partial_t n + v\partial_z n = D\partial_z^2 n + (g(z,n) - \mu)n$$

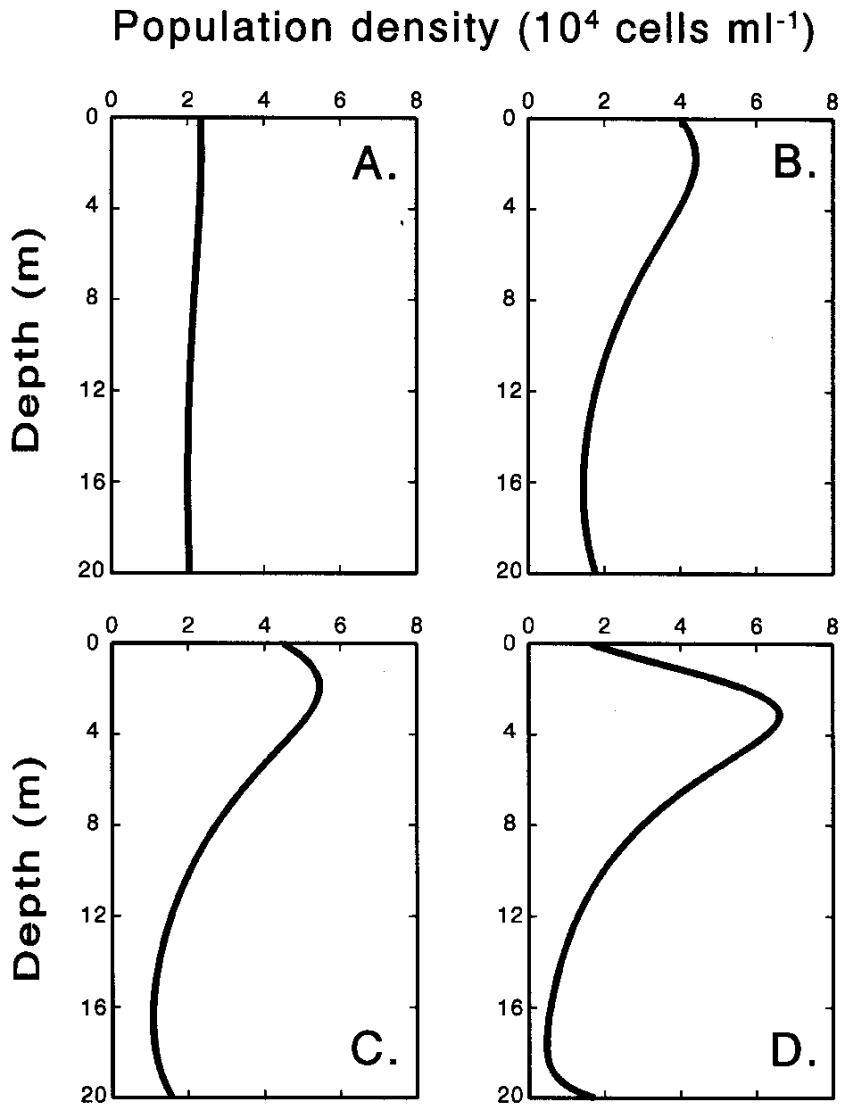
$$g(z,n) = \lambda \frac{I(z,t)}{I(z,t) + h}$$

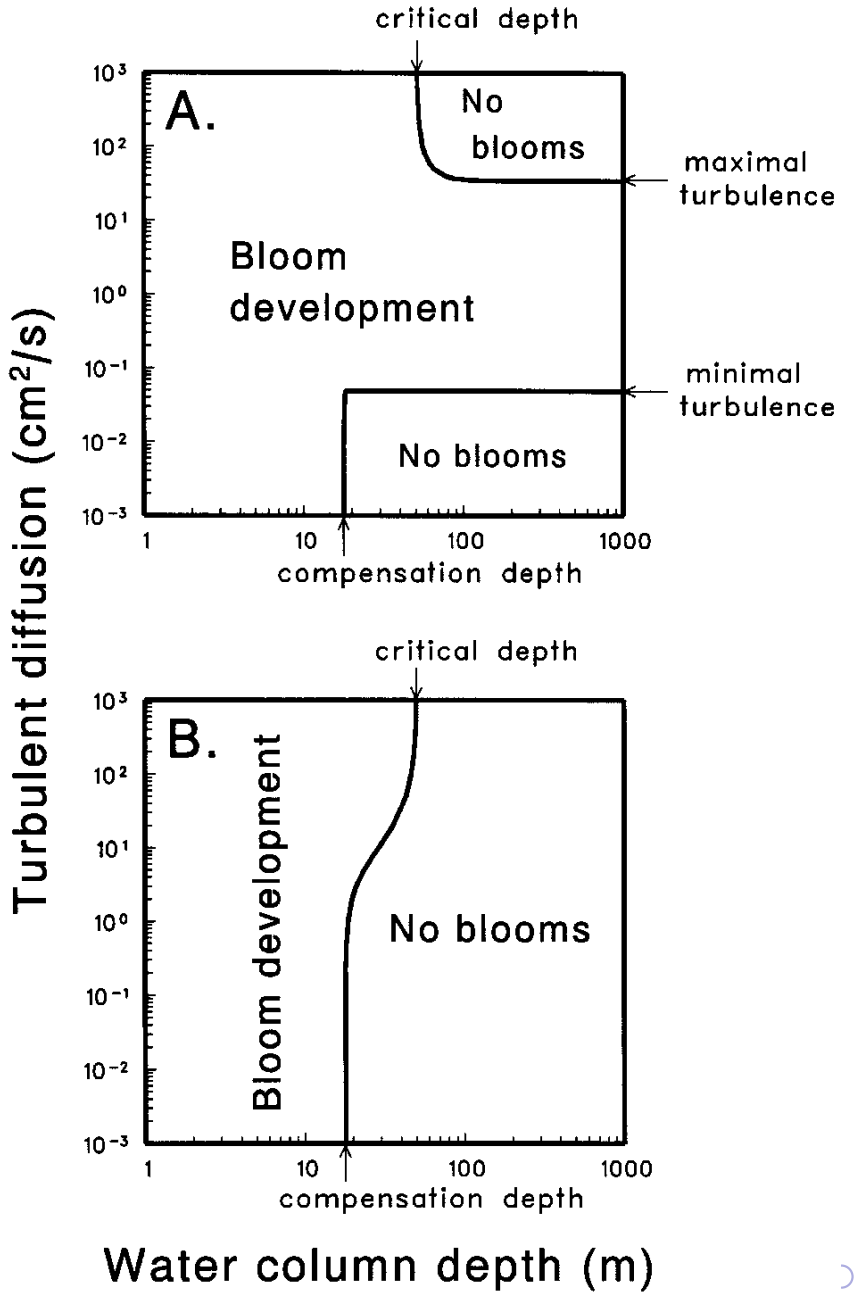
$$I(z,t) = e^{-k_{bg} z - k_{as} \int_0^z n(z,t)}$$

Condizioni al contorno

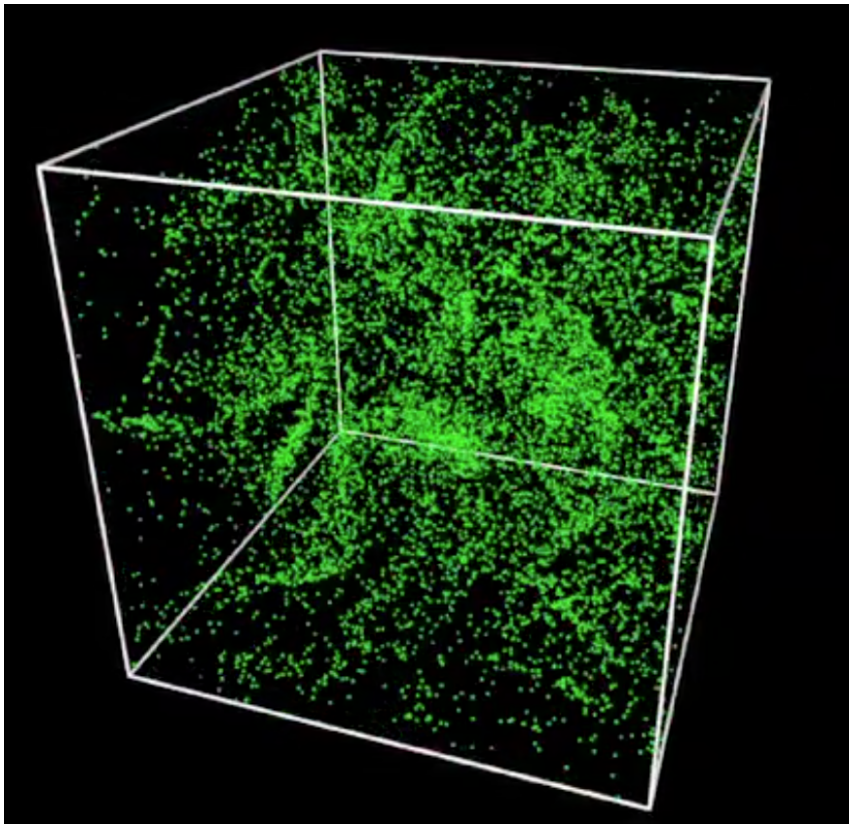
No-flux: $vn - D\partial_z n = 0$

Modello Huisman (2002)





Modello a particelle attive



$$\Delta\vec{x} = (\vec{u} + v_{drift}\hat{z})\,\Delta t$$

$$p_{morte} = \mu = \text{cost}$$

$$p_{nascita} = g(z, t)$$

nessun plankter è stato maltrattato durante le simulazioni