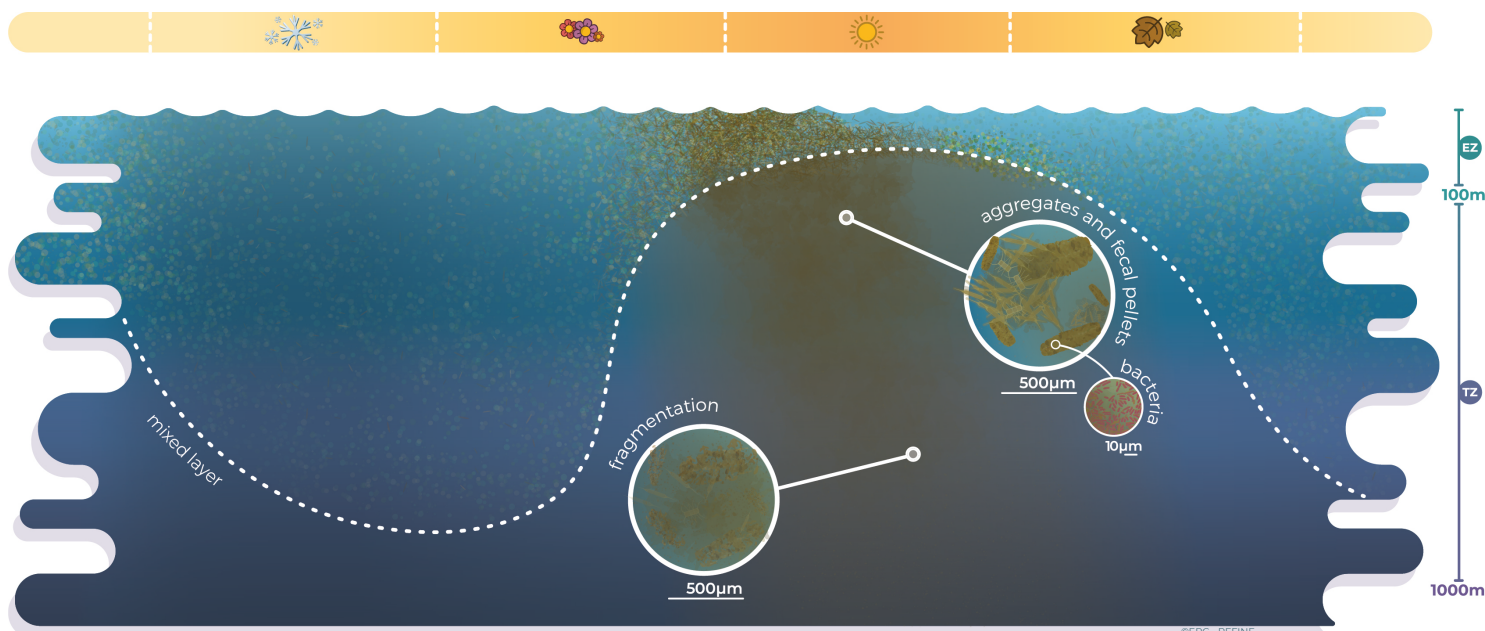


## THE GRAVITATIONAL PUMP 3/3



### The Twilight Zone: the area where the Gravitational Pump's strength is regulated.

The journey of fecal pellets and phytoplankton aggregates towards the dark ocean is not necessarily untroubled. Despite sinking rapidly (~100 m per day), these large particles can have “unfriendly” encounters.

For example, bacteria can colonize them, consume their organic material for their own growth, and in return produce  $\text{CO}_2$  through respiration. The result is that both fecal pellets and phytoplankton aggregates can become more fragile and progressively fragmented. This fragmentation can be further amplified by the grazing of animals living in the TZ.

In addition, fragmentation reduces the particles' sinking velocity, so increasing their residence time in the TZ. As a consequence, they are more subject to colonization, ensuing further organic content loss and respiratory  $\text{CO}_2$  release.

Overall, fragmentation of large into small particles influences the amount of organic carbon that will leave the TZ to reach the depths where carbon can ultimately be sequestered.

Note that in anoxic (oxygen-deficient) layers, which generally correspond to a similar depth domain to the TZ, the GP is usually more efficient in the transferal of organic carbon to depths, and hence in its sequestration. Indeed, animals can rarely survive in these environments, so large particles stay more protected from consumption and fragmentation.