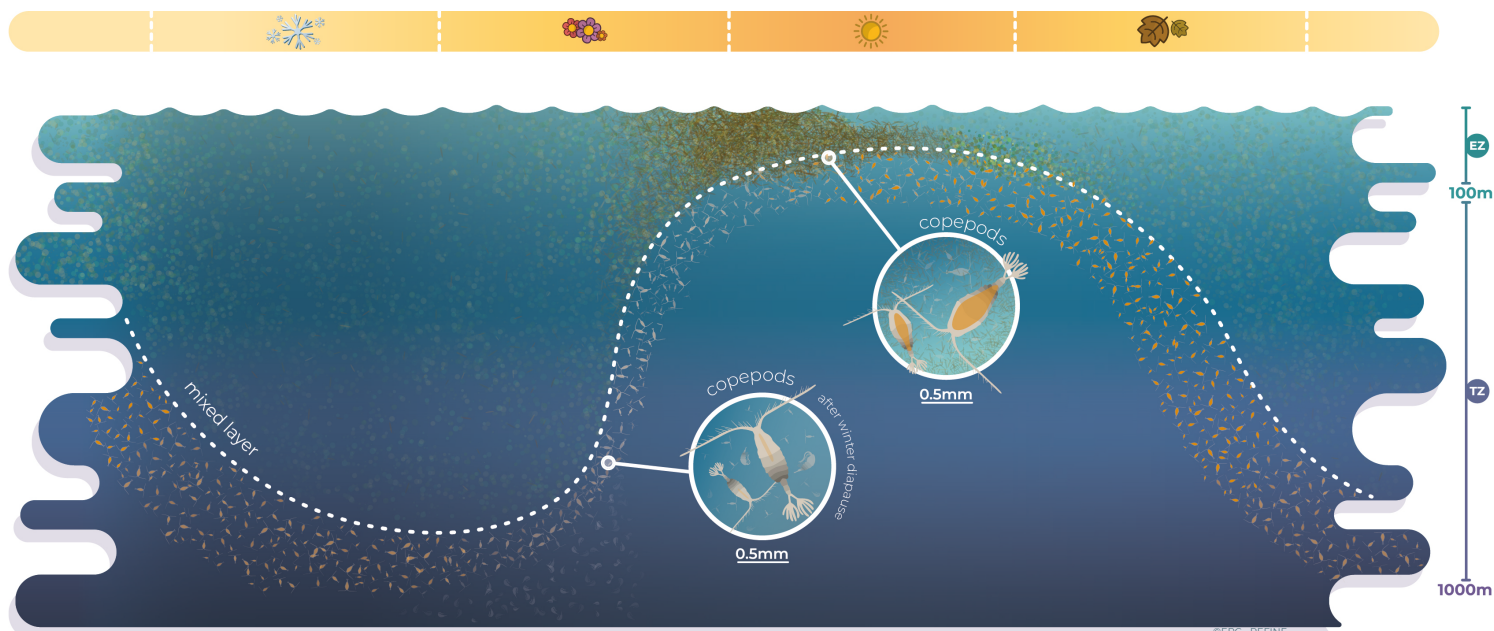


THE SEASONAL MIGRATION PUMP



The Seasonal Migration Pump.

In high-latitude environments, certain zooplankton like copepods (e.g. *Calanus finmarchicus*) have a peculiar life cycle comparable to that of hibernating animals, creating an impact on the Biological Carbon Pump.

This life cycle hinges on their twice-yearly migration between the base of the TZ and the ocean surface, then back to depth. When these copepods wake up in spring from their winter diapause, they migrate to the surface where food is generally plentiful thanks to the phytoplankton bloom. They will stay there throughout the favorable summer period, eating and accumulating large quantities of lipids, extremely rich in organic carbon.

In fall, the first storms signal the end of the favorable season, and the mixed layer progressively deepens. The animals begin their migration back to depth. They will choose as their final destination for their winter diapause a depth below the mixed layer. There, the quieter waters mean that they do not risk being shaken and stirred by ocean turbulence during their winter rest. During this period of extremely weak activity, they survive on their lipid reserves and release CO₂ through respiration. Some may die, and their carcasses will gradually sink deeper.

Such seasonal migration below the winter mixed layer boosts the potential for carbon sequestration by allowing significant quantities of organic carbon to be actively transported from surface to deep layers. This pump is sometimes also referred to as the “ontogenic pump” or the “lipid shunt”.