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Modelling the mesopelagic ecosystem: how far details are important ?

The role played by carbon in the global change led researchers to focus on its cycle within the biosphere. Since 70% of the earth surface is covered by the ocean, understanding the remineralization processes occurring among oceanic realms is crucial. However our knowledge of the mesopelagic layer is still poor and if logistical issues can partially explain this lack, our limited capacity in modelling marine ecosystems are responsible as well. Thus we need to improve our way to model marine ecosystems and more precisely, how they behave. An analysis of the role played by details in ecological modelling is essential, and if some works have been done on simple model (Fussmann and Blazius, 2005; Poggiale et al., 2010), it appears interesting to study more complex systems, such as a mesopelagic model. A few models already exist (Anderson and Tang, 2010; Jackson et al., 2001; Stemmann et al., 2004) but none of them have used the DEB theory in their construction hypotheses, which leads in a complexification of the model at the physiological scale.

Since we aim to understand the role played by details in modelling the mesopelagic layer, we here work on both different level of physiological complexity and trophic web organization. Thus, we have built 3 mesopelagic model of different trophic web complexity, all using DEB theory and compare it to non-mecanistic approaches. Our results shows the details required in modelling the mesopelagic ecosystem and enhance our knowledge of trophic web modelling.

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