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Modelling the Southern Ocean micronekton and estimating its biomass from bio-acoustic data

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SEAPODYM-MTL is a parsimonious model simulating functional groups of micronekton (organisms from 1 to 30cm like myctophids, krill...) at the mid-trophic level according to their diel vertical migration behaviour. Temperature and oceanic currents drive the dynamics of the groups. Recruitment in each group is seen as a transfer of energy from primary production. Model parameters defining the amount of energy allocated to each micronekton functional group are estimated with help of acoustic data assimilation. Thanks to the project MESOPP (Mesopelagic Southern Ocean Prey and Predators) that is fostering collaborations between European and Australian Institutes, a large bioacoustic dataset is now available to optimize and validate SEAPODYM-MTL in the Southern Ocean. Here we present data assimilation experiments with global and regional estimates, assuming that different eco-regions are characterized by relatively homogeneous acoustic communities of species. We also try to estimate the mean target strength associated to these communities, thus allowing a global biomass estimation of mesopelagic micronekton. Simulation results show that despite a parsimonious and simple representation of the system, the model can predict a large diversity of acoustic responses that are in agreement with observations.