Seminar 1：「Plankton dynamics in a changing world. Compensatory dynamics and risks for ecological shifts 」

Resolving to what extent interannual changes in marine ecosystems are driven by climate is crucial for both theoretical and management reasons in a changing world ocean. Here we investigate the relative importance of the strength of climate forcing on the dynamics of marine pelagic ecosystems. We used a high-resolution dataset that covers three decades of climate, hydrology and biological records. Our approach is based on dynamic models and meta-analysis tools to quantify the effect size of climate on: i) the timing of seasonal zooplankton development; ii) predator-prey interactions; and iii) compensatory dynamics and risks for phase shifts. Dynamic models allowed identifying the dynamic nature of the relationship between climate and the seasonal zooplankton development (SZD) and emphasize a non-stationary feature in plankton dynamics. Scales of influence of climate forcing on SZD were further detected and thereby we provide a segmentation of the climate time series into significant and non-significant phases. The significant phase was associated to a generally high temperature regime under which the probability of massive developments of rapid-turnover species markedly improved. Consequently, shift in ecological predator-prey interactions yield a reorganization of the plankton community. Both the predator-prey relationship, as well as the compensatory dynamics evolve according to thresholds of external forcing (e.g., climate). Such thresholds suggest scenarios of a predominant role of climate versus ecological interactions as drivers of general patterns of plankton, and therefore help to understand coherent changes at population and community levels under such circumstances.

Seminar 2：「Climate variance envelope and non-stationary coupling in climate-plankton interactions」

We examined plankton responses to climate variance by using high temporal resolution data from 1988 to 2007 in the Western English Channel. We show that climate variability modified both the magnitude and length of the seasonal signal of sea surface temperature, as well as the timing and depth of the thermocline. These changes permeated the pelagic system yielding conspicuous modifications in the phenology of autotroph communities and zooplankton. These results show that the climate variance, thus far few considered in climate-plankton studies, is closely coupled with the transient dynamics of plankton, and sheds light on impending ecological shifts and plankton structural changes. Our study calls for the integration of the non-stationary relationship between climate and plankton in prognosis models on the productivity of marine ecosystems.