

## **From scatters to processes.**

**Arnaud Bertrand, Institut de Recherche pour le Développement (IRD), France.**

Living organisms follow non-random yet non-uniform distributions and tend to aggregate in patches. Both physical forcing and organism behaviour are implicit in the initiation and maintenance of this patchiness, with the latter increasing in importance with each step up the trophic chain. Observations on fine scale ocean dynamics (10 m to kms) do exist but are too fragmented to facilitate the development of comprehensive models over a range of scales. For this reason, the incorporation of these processes in models of marine ecosystem dynamics is still in its infancy, particularly at scales below the mesoscale. Underwater acoustic techniques have an unrealized potential for multi-component observations of abiotic and biotic characteristics that can overcome previous limitations. A growing number of studies is taking advantage of recent improvements (e.g. multifrequency, broad band) to simultaneously characterise physical structures (e.g. thin layers, internal waves, submeso- and mesoscale eddies) and organisms patterns of distribution across scales from meters to thousands of kilometres. From several examples, this presentation aims at illustrating the potential of acoustics to obtain simultaneous information on ecosystems abiotic and biotic structures, which permit to study genuine processes (i.e. not simple correlations). We will see how across-scale structures that create hotspots, which concentrate organisms ranging from zooplankton to seabirds, and that behaviour can magnify this physically-induced bottom-up spatial structuring.