

Abstract:
Marine snow, composed of macroscopic aggregates of organic detritus, living organisms, and inorganic particles, plays a crucial role in ocean ecosystems as both a unique microhabitat and a major vehicle for transporting surface-derived material to the deep ocean and seafloor.
These aggregates host enriched microbial communities and steep chemical gradients, supporting elevated rates of decomposition, nutrient regeneration, and occasionally photosynthesis.
Marine snow forms through biological production, particularly mucus secretion by planktonic organisms, or through the aggregation of smaller particles, including phytoplankton, fecal pellets, organic debris, and minerals. Aggregation is driven by differential settling, turbulence, and biologically produced adhesive compounds. Diatom flocculation may represent a globally significant but still poorly understood formation mechanism.

Despite its importance for ocean carbon cycling, rates of marine snow formation, transformation, and degradation remain poorly constrained, limiting our ability to predict particle fluxes and biogeochemical processes. The morphology of marine snow, a property that can now be sensed in the ocean, reflects these processes the same way that snowflakes geometry on earth reflects temperature and humidity conditions.

This presentation will highlight recent advances in observing and understanding marine snow dynamics drawing on field observations, and numerical modelling approaches.

Bio:

Professor Lars Stemmann is Professor of Marine Sciences at Sorbonne University, France, where he is based at the Laboratoire d'Océanographie de Villefranche (LOV). He obtained his PhD from Pierre and Marie Curie University in Paris in 1998 and subsequently conducted postdoctoral research at Texas A&M University, USA (2000–2002). He joined Sorbonne University as an Associate Professor in 2003 and became Full Professor in 2013. In 2012, he was awarded a prestigious research chair jointly supported by the CNRS and the university, focusing on the use of advanced imaging technologies to investigate pelagic ecosystems. He has held several research leadership positions and is actively involved in international scientific collaborations and postgraduate education. He is particularly recognised for his work in marine sciences and the development of innovative ocean-observation technologies. Professor Stemmann has authored or co-authored more than 400 scientific publications, including highly cited contributions published in prestigious journals such as *Nature, Science, Cell* and *Nature Communications*.