Feeding and exchange flows produced by soft corals and upside down jellyfish

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Understanding how the morphology of soft marine invertebrates affects the hydrodynamics of feeding and nutrient exchange is important for understanding this diversity of life and predicting how climate change will alter the distributions of these organisms. Soft coral of the family Xeniidae pulse with their tentacles to enhance the photosynthetic rates of symbiotic zooxanthellae. Bell pulsations of the upside down jellyfish *Cassiopea spp.* create feeding currents and may also enhance photosynthesis. Other soft invertebrates use active movements for efficient low speed cruising or alternatively for quick swimming bursts.

In this presentation, we use videography to quantify the movement of soft corals and upside down jellyfish. We also use particle image velocimetry to reveal the flow fields these movements create. Numerical simulations of simplified models of jellyfish and soft corals are used then to quantify and compare exchange mechanisms associated with pulsations. Numerical models allow us to isolate fundamental effects of different parameters as well as to extend the examination beyond experimental feasibility or even biological possibilities. In this way computational studies present an opportunity to explore fundamental physical limits on biological mechanisms.