ABSTRACT: Different from many aerial and ground robots, underwater robots operate in a communication and localization-limited environment where their dynamics are tightly coupled with the environmental dynamics. While the tight-coupling between vehicle and environment dynamics makes control challenging, it provides a unique opportunity for robots to exploit the environmental forces to improve and prolong their autonomy. In this talk, I'll show the limitations of existing air and ground based strategies and present our efforts in improving vehicle autonomy by better understanding the dynamics of the geophysical fluid environment. The talk will describe our efforts in using robot teams to track coherent structures. Coherent structures are of great importance since they give us a way to map and represent the dynamics of the fluid environment. I will then show how this information can then be exploited to develop more efficient control and coordination strategies for networks of AUVs/ASVs operating in these environments.

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