Diving Under the Big-Ice: Bridging Engineering and Science through Environmental Field Robotics

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Abstract

The greatest contribution to current mass loss from the Antarctic is the melting of ice shelves. These bodies of ice create a buttressing force that hold back the flow of surrounding glaciers. Their disintegration is predicted to cause irreversible retreat of some of the most vulnerable areas of the Antarctic potentially resulting in meters to global sea level rise. Coupling this with recent collapse of polar ice shelves and the predicted 33 ± 9% reduction of sea ice area by 2100 around much of Antarctica emphasizes the urgent need to better understand and predict the response of the ocean-ice system to climate change. On April 7, 2016, two large (~10km long by 5 km wide) fragments broke off the Nansen Ice Shelf in the Ross Sea, Antarctica in a single mass-wasting event hypothesized to result from hydraulic fracturing resulting from subglacial channel formation. In 2017, UCDavis, in collaboration with the Korean Polar Research Institute, led a team using two Autonomous Underwater Vehicles (AUVs) to sample supercooled water coming from underneath the ice shelf. Initial results will be presented in this talk of the fate of supercooled water in addition to the engineering challenges associated with working with autonomous robotics under cold conditions. Advancing the use of these platforms for use in Polar Regions is critical as these vehicles are one of the only ways to safely and logistically feasible sample under-ice. Bridging engineering and science through environmental field robotics advances our understanding of these highly complex and under-sampled environments in a changing climate.

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About presenter

Dr. Forrest has been working for over a decade on environmental field robotics. Specifically, his expertise is in quantifying the influence that lakebed and seafloor features have on localized hydrodynamic flow. From temperate reef systems in Australia to under-ice fluid dynamics in Antarctica, his research is focused on using acoustic mapping techniques and water column measurements to interpret the dynamics of each system.