2011 Fall Meeting
Search Results

Cite abstracts as **Author(s) (2011), Title, Abstract xxxxx-xxxx presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.**

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os21a-1609

HR: 0800h
AN: **OS21A-1609** ***Poster***
TI: Classification of Water Masses and Targeted Sampling of Ocean Plankton Populations by an Autonomous Underwater Vehicle

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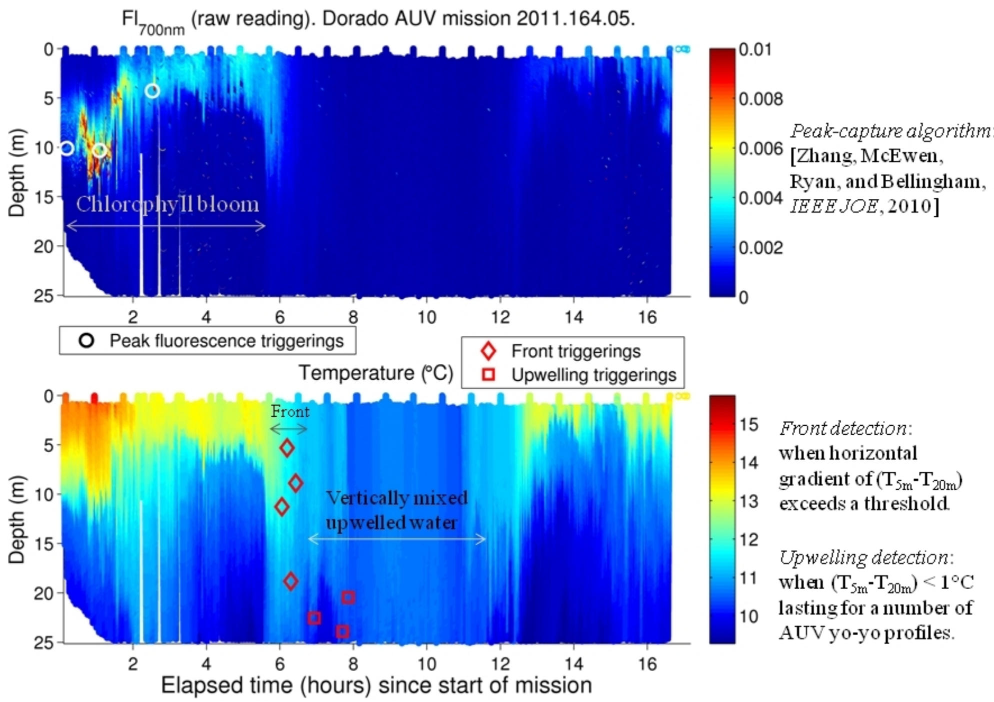
AB: Autonomous underwater vehicles (AUVs) are playing an increasingly active role in oceanographic surveys due to their mobility, efficiency, and growing intelligence. The Dorado AUV is equipped with a comprehensive suite of in situ sensors and ten 1.8-liter water samplers (called “gulpers”). During an October 2010 experiment in Monterey Bay, the AUV ran our autonomous peak-capture algorithm to acquire chlorophyll/backscatter peak samples from a phytoplankton bloom, allowing biologists to successfully monitor fluctuations in harmful microalgae (Psuedo-nitzschia spp.), the toxin they produce (domoic acid), and co-occurring zooplankton (invertebrate larvae and copepods) over space and time. For further investigations of the complex marine ecosystem in northern Monterey Bay, we set a more challenging goal: when the AUV flies from an upwelling shadow region (stratified water column) through an upwelling front into newly upwelled water, can it autonomously distinguish among water columns with different vertical structures and accordingly sample plankton populations on either side of, as well as within, the upwelling front? To achieve this goal, we have developed two new algorithms, one for distinguishing upwelling water columns from stratified water columns based on the vertical homogeneity of temperature, and the other for detecting an upwelling front based on the horizontal gradient of temperature. For acquiring targeted water samples, the 10 gulpers are appropriately allocated to the two distinct water columns and the front. Lockout time intervals between triggerings are set to prevent “dense triggerings”. During our June 2011 experiment, the Dorado AUV flew westward from an upwelling shadow region (stratified water column) through an upwelling front, and into an upwelling water column. Three gulpers were allocated to the stratified water column, four to the front, and the remaining three to the upwelling water column. The AUV successfully detected and acquired targeted samples from the two distinct water masses and within the front, as shown in the attached figure. The water samples are currently being processed. In particular, the samples from the front, acquired with very high precision, will be analyzed to corroborate prior findings that calanoid copepod abundances are much greater in fronts compared with surrounding waters.



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