

ABSTRACT FORM (for new projects only)

Project Title: 901807 Next generation bioacoustic sensing from Dorado

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Project Description: The unification of acoustical and imaging tools has been a goal of the community at least since the first descriptions of the deep scattering layer were made in the 1940s. These two approaches have complementary strengths, providing measurements with different resolution, coverage, and scale. Combined, these tools have the potential to answer challenging questions about life in the ocean's interior. This integrated view, however, has largely remained a challenge, one that recent developments leave MBARI uniquely poised to address. During 2017, we began the process of developing integrated acoustical-optical methods using the ROV Ventana. This work is beginning to provide critical information for interpretation of both acoustic data and visual survey data. We propose to extend this new perspective to the i2MAP payload, integrating a broadband echosounder with two transducers to cover frequencies extending from 50 to 250 kHz. One pair of transducers will be oriented parallel to the high resolution camera. A similar pair will ensonify the field directly below the vehicle to provide biological context in depth space. We have three immediate goals for these integrated measurements:

- Quantify the behavioural responses of animals to the survey platform (avoidance/attraction) and compare them to responses to Ventana as the midwater time series shifts platforms
- Obtain broadband backscatter measurements from individuals identified and sized with the camera system to improve acoustic classification.
- Measure the spatial distribution of organisms in midwater to address at what scales animals are aggregated, if those aggregations are organized by taxonomy size or other features, and what role variation in the habitat plays in structuring the biota.

This integration effort will require tasks related to mounting new sensors and cabling in the payload, designing a subsea housing with an electronics chassis supporting control and data storage, and input power noise rejection.

Future extensions of this work include: **(1)** deployments in new locations to examine epipelagic and semi-demersal animals, **(2)** experimental manipulations of the platform (speed, light type, etc.) to minimize behavioral disturbances, **(3)** use of the acoustic payload in other Dorado configurations (CTD, gulper), and **(4)** real time onboard processing of acoustic data for adaptive mission actions. The proposed research will address several themes of the MBARI strategic plan, exploring the deep sea as well as providing new ways to visualize the variability in the abundance, distribution, and activity of biota in the water column by leveraging and building upon existing MBARI investments in order to enhance understanding of the fluctuations and fate of forage species from the surface to the upper bathypelagic using new tools to image the ocean while contributing new sensors and approaches for adaptive sampling.