Next-generation Integrated Instrumentation for Environmental Monitoring

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Abstract

There is no individual sensor that can provide all of the information necessary to answer all of the environmental questions at marine energy sites. Passive acoustic, active acoustic, and optical data streams are required to understand the environmental risks presented to fish and marine mammals by the presence of a marine energy converter, which may include collision with a device or response to sound generated by a device [1]. To be effective, environmental monitoring must (1) not affect the environment through operation, (2) capture rare events, and (3) avoid accumulating an amount of data that cannot be readily stored and analyzed. The Adaptable Monitoring Package is an integrated instrumentation package that combines a multibeam sonar, acoustic camera, current profiler, stereo-camera system, and an array of hydrophones to provide comprehensive monitoring at marine energy sites.

Preliminary testing of the Adaptable Monitoring Package has demonstrated the capability of the system to meet the aforementioned objectives when real-time target detection and classification are used to control sensors and selectively archive data. For example, if no targets are within the optical camera field of view by the acoustic camera, artificial illumination should not be activated to minimize effect on the environment. Classification results can also be used to prioritize data acquisition if certain types of animals (e.g., marine mammals) are of particular environmental interest at a site. By integrating multiple data streams, it is possible to collect high-value data while minimizing impact on the surrounding environment and minimizing the collection of data containing no useful information. Use of this type of system will reduce the cost of retiring risk and facilitate the responsible deployment of marine energy conversion systems.

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References

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