

光ファイバーケーブルを用いた海底面変動および土砂輸送のモニタリングシステムの開発 Development of a monitoring system of bathymetric change and related sediment transport using optic fiber cables

吉河 秀郎^{1*}; 阪口 秀¹; 芥川 真一²; 町島 祐一³; 趙 越³
YOSHIKAWA, Shuro^{1*}; SAKAGUCHI, Hide¹; AKUTAGAWA, Shinichi²; MACHIJIMA, Yuichi³; YUE, Zhao³

¹ 海洋研究開発機構, ² 神戸大学, ³ 株式会社レーザック
¹JAMSTEC, ²Kobe University, ³LAZOC Inc.

A development of monitoring system is important for understanding more detailed process of the bathymetric change and sediment transport. At the nearshore zone, to monitor the nearshore features such as sand ripple migration, and the sediment suspension processes, optical back-scatter sensors (Downing et al., 1981), rotary sidescan sonar system (Traykovski et al., 1999), and sand ripple profiler (Masselink et al., 2007) were developed and used. Those systems can provide the very high-resolution morphological change and transportation, but not suitable for investigation of large-scale sediment erosion and deposition generated by high-energy waves in the surf zone. Where change in water depth is large (e.g. more than 1 m) in short span, the systems will be destroyed, lost, or submerged.

In the present study, we developed a new instrumentation for the monitoring of bathymetric change and related sediment transport in the high-energy shallow marine environment using optic fiber cables. The system consists mainly of four components: (1) an array of optical sediment sensors (OSSs); (2) a support structure (steel pipes); (3) an electronics unit that transmit and receive the LED through the optic fiber cables; and (4) a digital data acquisition system. The OSSs are mounted in a vertical steel pipe, 2 m long; and the spacing between the sensors is 10 cm. The steel pipe with OSSs was embedded to the seafloor at two places beneath a pier (427 m long) of Hazaki Oceanographical Research Station (HORS) owned by the Port and Airport Research Institute (PARI) at Sudahama Coast facing the Pacific Ocean, Japan. Both the electronics unit and the data acquisition system were installed in an observation room on the pier. In addition, those points of measurement are aligned perpendicular to the coastline in water depth approx. 4-5 m. Since active sediment transport that creates and deforms the longshore bar have been observed in this area (e.g., Kuriyama, 2010), detailed process of change in the cross section will be acquired by the present systems. In this presentation, we will show the system and data, and discuss those availability and future plan.

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