OBSERVATIONS OF SEDIMENT PARTICLE MOVEMENTS UNDER ACCRETIVE WAVE CONDITIONS

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INTRODUCTION

From the aspect of beach management, understanding of sediment movement from the outer-surf zone to the swash zone during recovery duration is important. In this study, field observations were conducted during accretive wave conditions to investigate the sediment movement from the outer side of the bar to the swash zone using fluorescent sand tracers.

DATA DESCRIPTION AND METHOD

The field observations were conducted for 20 days from May 13 to June 2, 2016, at the Hasaki Oceanographical Research Station, a research facility on the Hasaki coast of Japan. In the observations, five different colored fluorescent sand tracers were installed on the seabed at five locations, 250 kg for each location, from the surf zone to the offshore side of the bar (Fig. 2a, colored squares). The wave data and ground elevation profile data were collected during the observation. The M.W.L. is D.L., +0.78 m, and the mean shoreline location is approximately x =16 m. Fig. 1 shows the wave condition at the tip of the pier during the observation period.
For the core sampling, ten vertical sand cores were collected at the middle (May 24) and at the end (June 2) of the observation. The averaged sampled core length was 92 cm. The cores were subdivided into 5 cm after scanning by an X-ray scanner, the vertical distributions of sediment diameter and the number of fluorescent sand tracers were investigated.

RESULTS AND DISCUSSION

The observation analysis results for cores May 24 are shown in Fig 2. From the panel (b), volume change between the May 13 and 24, sediment accumulation occurred at the outer bar area, x = 150 - 240 m. In the inner surf zone, both accumulation and erosion occurred. The panel (c) shows the accretion and mixing depth based on the lowest ground elevation, solid line in panel (a), for each core sampled location, dotted line i.e. the numbered x-axis. The accretion depth is calculated from the survey data and the mixing depth is estimated based on the fluorescent sand tracers. The panel (d) shows the number of fluorescent sand tracers found in the accretion and mixing layer, which shows in the panel (c). The locations of the colored square indicate where the tracers were installed.
Regarding the results, pink and yellow tracers tended to move both on and offshore-wards. However, these tracers also moved until the offshore end of the trough area by the undertow. The red tracers were collected only at the onshore side of the installation point, and found at the outer bar. However, we could not found any red tracer in the surf or swash zones, suggesting a limitation to the onshore migration of sediments.
From these results, there was no correlation between the sediment movement in the onshore region and offshore region of the outer-bar. However, the outer-bar was formed by sediment from both regions.
Further discussion of the cross-shore sediment transport dynamics including the results of the second core sampling data (June 2) will be presented in the full text.

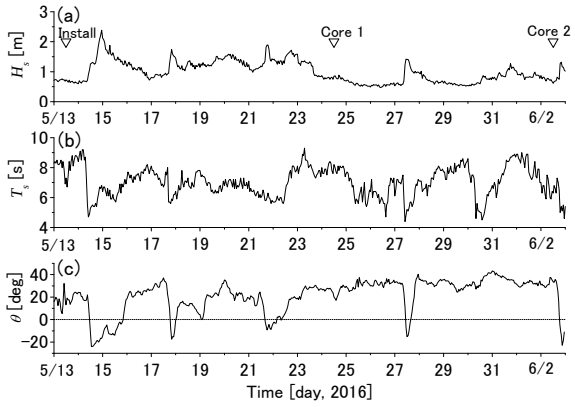

Figure 1. Wave conditions during the observation period

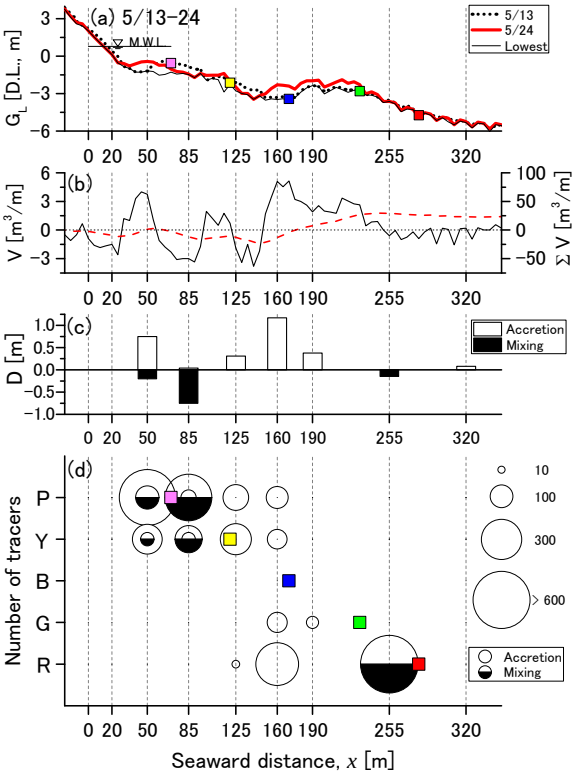

Figure 2. (a) Ground elevation, (b) volume change, (c) accretion and mixing depth and (d) collected fluorescent sand particles in the accretion and mixing layers.