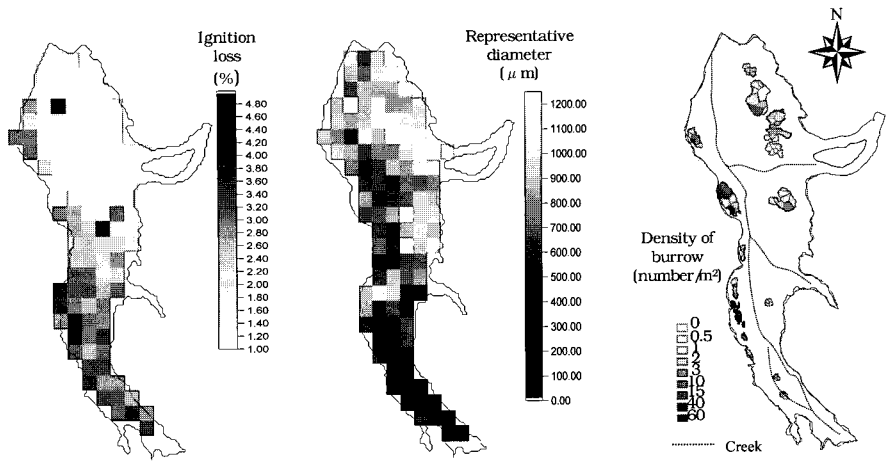
DYNAMICS OF SUSPENDED SEDIMENT IN A TIDAL LAGOON DURING FLOOD

YOHIHISA AKAMATSU[1], MITSUTERU IRIE [2] and TADAHARU ISHIKAWA[3]

[1] JSPS Research Associate, Department of Environmental physics and Engineering, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, 4259 Nagatsutacho, Midoriku, Yokohama, 226-8502, Japan
(Tel: +81-45-924-5515, Fax: +81-45-924-5549, e-mail: akamatsu@fluid.cv.titech.ac.jp)
[2] Research Associate, Department of Environmental physics and Engineering, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, 4259 Nagatsutacho, Midoriku, Yokohama, 226-8502, Japan
(Tel: +81-45-924-5515, Fax: +81-45-924-5549, e-mail: irie@depe.titech.ac.jp)
[3] Professor, Department of Environmental physics and Engineering, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, 4259 Nagatsutacho, Midoriku, Yokohama, 226-8502, Japan
(Tel: +81-45-924-5515, Fax: +81-45-924-5549)

A large tidal lagoon on the west coast of Ishigaki Island, Japan, which is situated at the west part of Ryukyu Islands chain close to Taiwan, is a precious habitat for a variety of aquatic lives. Among these creatures, crabs distribute all over the lagoon and have an important role in the food chain of the lagoon. The crab's food is particulate organic materials, which are supplied to the lagoon with the movement of suspended sediment, so that the understanding of suspended sediment dynamics is essential to conserve the ecosystem in the lagoon.

In the present study, the field observation for the spatial distribution of crabs, organic materials and sediment diameter in the surface soil were carried out and the results are represented in Figure 1a, b and c. The area that the fine sediment deposits and the surface soil contain a large amount of organic materials is seen in theinner (south) part of the lagoon. Additionally, the dynamics of suspended sediment in a lagoon was studied by a numerical simulation model. Figure 2 shows the spatial distributions of the amount of suspended sediment deposited and eroded on the bed, resulted from the numerical calculation for a typical flood. The erosion is occurred mainly in the main creek from the mouth of Ngura-river to Nagura-Oohashi Bridge. On the contrary, the deposition area of suspended sediment is found in the inner (south) part of lagoon. This result indicates that the fine suspended sediment, flushed to the coastal area during the flood, returns to the lagoon by high tide. This causes the deposition of fine sediment in the inner (south) part of the lagoon, where the surface soil contains a lot of organic materials. This supply of the fine sediment enables crabs to make their habitat all over the lagoon.



(a) Ignition loss of the surface soil

(b) Representative diameter of the surface soil

(c) Density of crab burrow

Fig. 1a, b and c Spatial distribution of crab's burrow density, organic contents (ig nition loss) per unit dry weight of the surface soil and representative diameter (accumulative 65 % diameter) in the surface soil of the lagoon

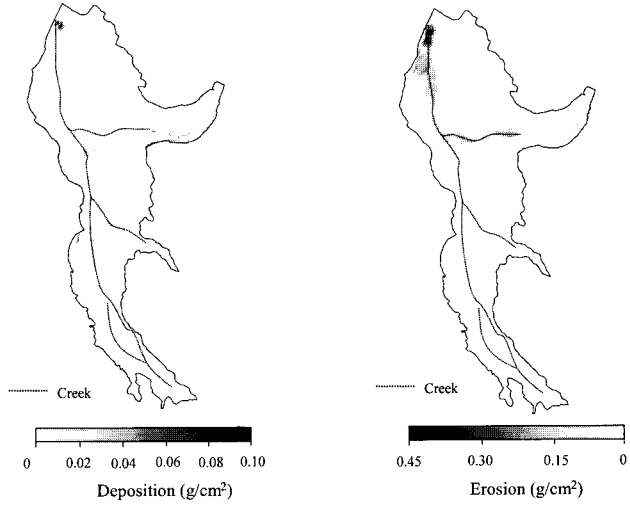


Fig. 2 Spatial distributions of the amount of suspended sediment deposited and eroded on the bed