# Effect of the drill cuttings discharged from the scientific drilling on the surrounding meiofaunal assemblage–comparison with results obtained by an imaging flow cytometer

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Submarine resources, such as seafloor massive sulfide deposits, are expected to become developed in the near future. Mining activities would affect the surrounding seafloor environment and benthic ecosystem and it is necessary to evaluate such mining impacts in order to minimize the adverse effects on the ecosystems. Meiofauna are usually defined as benthic animals that pass through a 500–1000 μm sieve and are retained on a 32–63 μm sieve and widely recognized as a useful indicator for assessing the effect of anthropogenic and natural disturbances on deep-sea ecosystems. In this study, we analyzed the effect of the scientific drilling of D/V *Chikyu* at the Noho site in the middle of the Okinawa Trough, on the surrounding meiofaunal assemblages.

The scientific drilling of D/V *Chikyu* was carried out from February to March 2016 at the Noho site (CK16-01 cruise). At the same site, we collected the sediment samples during the research cruises of the R/V *Kairei*, KR15-17 and KR-16-15 in November 2015 and in November 2016, respectively, using a push corer on the ROV *KAIKO Mk-IV*. During the KR15-17 cruise before the drilling, three stations were established at 300 m and 600 m intervals (St. 1, St. 2, St. 3) and we collected sediment samples at three points at 10 m intervals at each station (total nine points). During the KR16-17 cruise after the drilling, we collected the sediment samples at the side of the drill hole (St. 2-4) in the vicinity of St. 2 and at the same points in the previous year (St. 1-4 and St. 2-5). We analyzed meiofaunal assemblages in these sediment samples (6 layers: 0–0.5, 0.5–1, 1–2, 2–3, 3–4, 4–5 cm). At St. 2-4 and St. 2-5, sediments samples below 5 cm (up to 15 cm at 1 cm intervals) were also analyzed because the deposit of the drill cuttings seems to affect the surrounding meiofaunal assemblages.

As a result, the vertical distribution pattern of meiofauna showed the typical pattern at the all analyzed points, regardless of the before and after the drilling; meiofauna aggregated in the surface layers of the sediments. On the other side, the meiofaunal density in the 13–14 cm and 14–15 cm layers at St. 2-4 were higher compared to those at St. 2-5. In addition, the mieofaunal assemblages at St. 1-4 and St. 2-4 were different from those before the drilling. These results would suggest that the surrounding meiofauna were buried with the drill cuttings and meiofaunal assemblages changed due to the deposit od the drill cuttings.

In the presentation, we will show the result obtained with the method using an imaging flow cytometer, which can rapidly deal with an abundance of meiofaunal samples, in addition to those obtained with traditional methods, which includes counting under a microscope, and discus the utility of this novel method.

Keywords: meiofauna, scientific drilling, imaging flow cytometer, environmental monitoring

 