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MEASURING SAND TRACER MOVEMENT IN A STRONG RIP CURRENT

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On August 21, 1980, the author and colleagues performed a trial sand tracer experiment in a strong rip current at Ajigaura Beach, Japan, facing the Pacific Ocean. Significant wave height was about 1 m, and current meters recorded speeds exceeding 0.5 m/sec in areas where instruments could be placed. The experiences and results of this experiment have not been published and may be of interest for both the procedure and findings.

The synoptic observation of the rip current took place during a time of opportunity while conducting a series of longshore transport sand tracer experiments as documented in Kraus et al. (1982). Reconnaissance water current surveys accomplished by hand-tethered floats indicated a persistent rip current throughout the day, and so it was decided to instrument the rip and inject sand tracers. Divers (professional salvage divers) and the author, all in full wet suits because of the cold water, placed instruments, injected the tracer, and sampled the bottom with ropes around their waists tied to screw anchors on shore. The ropes prevented divers from being ejected from the experiment by the rip, which would eliminate that person from participating until he could swim around and back to the site. A bathymetry survey was also made.

Eight electromagnet current meters were deployed, of which five returned usable records. A capacitance wave gauge placed in the breakers malfunctioned, but an 8-mm memo-motion movie camera gave some quantitative indication of wave height. Three colors of sand tracer were injected, and ten fixed stations were sampled at 15-min intervals for 180 min. The sand cores were split into 1-cm segments and tracer grains counted under ultraviolet light. Depth of disturbance calculated as by Kraus (1985) and tracer movement could then be determined. The greatest depth of disturbance was found at the root of the rip, where the feeder currents turned to flow offshore. Apparent pulsations in tracer movement were observed at 45-60 min interval, and interpretations were made concerning mode of transport as bed load or suspended load.