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14. ABSTRACT

The major focus of the work is an experiment using a towed CTD chain as part of the SW06 experiment. A number of events were measured. Most of the time we were following some wave packet, repeatedly measuring it. We had intended to follow each packet for a long distance, but packets were frequently merging with others, and the resulting merged packet had more energy than the one we had been following, preventing us from measuring the long-time energetics of an isolated packet.

One packet was followed from before it had any waves. We crossed the internal tidal bore twice with no waves, the third crossing showed one wave, and successive passes showed additional numbers of waves. These data are shown in the figure, which shows the ship track, two dimensions of the formation of the waves out of the initial bore, and the propagation of the wave train toward shore.

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Coastal Internal Waves

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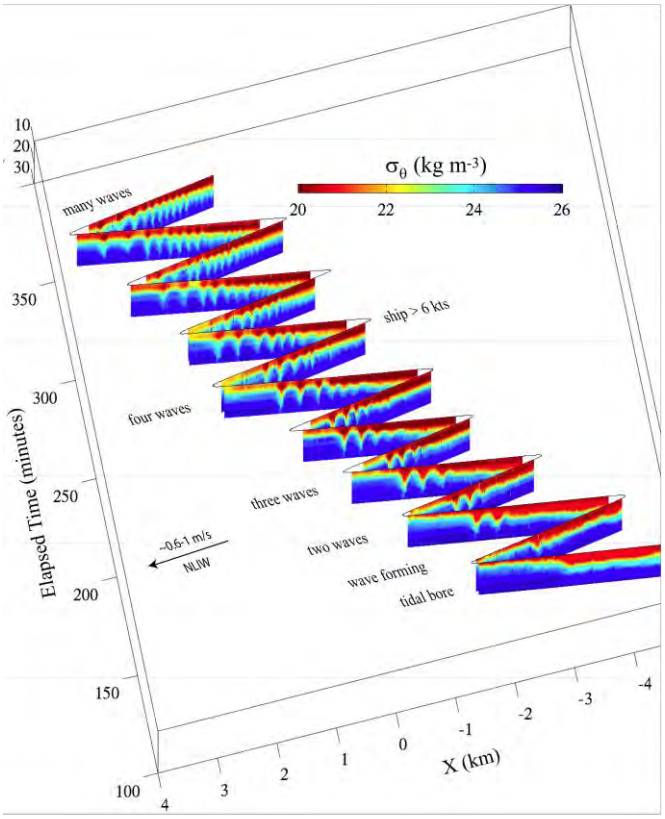

On another occasion, we measured the merging of two wave packets. We first passed right through the join point of the leading waves, as nearly as I could determine, and then examined both sides of the join -- before the waves merged, and through the merged wave side, after which we continued to follow the merged packet. A merged wave packet has less entropy than the two

packets that produced it, so I expect a significant dissipation event during the join. The merged wave should have less energy than the sum of the energies of the two incoming packets.

We found examples of the leading wave separating itself from the rest of the packet. When that happens, it is likely that the Dubreil-Jacotin-Long (DJL) equation will model the wave accurately. The DJL equation works moderately well for the first wave even when it has not detached. The speed of the wave train observed by multiple crossings was always consistent with the DJL value for the solution with the observed amplitude and stratification. (An alternative attempt failed, which was to estimate the speed based on the assumption that wave trains formed a tidal period apart retained that separation. Either the amplitude or the stratification for the following wave differs significantly from that of the first wave.)

On two occasions, the towed CTD supported the ocean acoustics part of SW06. These two tow events totaled 8 hours. One paper using these data has been published, and another is in preparation.

The towed CTD chain did not work well. The pressure data was the poorest. After a number of attempts, an algorithm was developed to correct the pressure, and determine the depth of all the CTD units. The resulting corrected depth is consistent except during ship turns, and all the data has been corrected to give more correct depths.