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High data rate coherent underwater acoustic communications
during KauaiEx and MakaiEx

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During two acoustic communications experiments conducted around Kauai Island, Hawaii (KauaiEx, 2003 and MakaiEx, 2005), various coherent communications data with concurrent environmental measurements were collected under different experimental settings. The collected communications data are processed by a newly proposed receiver, which consists of time-reversal multichannel combining followed by a single channel DFE. Continuous channel updates along with Doppler tracking are used prior to time reversal combining to combat fast channel variations. The receiver can successfully demodulate different types of coherent communications signals, including phase shift keying (PSK) and quadrature amplitude modulation (QAM) signals, at different symbols rates for different source/receiver settings, such as fixed source/receiver, drifting source/receiver, and towed source. Selected high data rate communication results will be presented to show the effectiveness of the receiver. The receiver performance in relation to the environmental variability also will be shown.