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# Acoustic Remote Sensing of Extreme Sea States

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Extreme sea states from storms, landslides, ice-quakes, meteorite fall, submarines explosions, and earthquakes, are associated with a sudden change in water pressure. Consequently, acoustic-gravity waves (AGWs) may radiate carrying information on those states at the speed of sound. Using remote sensing of AGWs, we propose an early detection system for such extreme sea states. We show that the AGW pressure signature for a small circularly symmetric sinusoidal component of oscillation of the free surface preserves the frequency but modifies the amplitude of the component. Further tests indicate that this amplitude is independent of the frequency but depends on the radial distance from the source, as expected. Therefore, an input spectrum for a sea state will give rise to a similar spectrum shape for the AGW pressure signal with an amplitude modulation function that can be estimated from the model. This then leads to a robust method to remote sense sea state spectra from measurements of their induced AGW pressure spectra.