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Internal Wave Attenuation by Coastal Kelp Stands

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ABSTRACT

Coastal kelp stands are a unique physical environment having high drag distributed throughout the water column. Temperature records from locations at increasing distances into the kelp show a damping of high-frequency variance and a slowing of wave propagation at low frequencies. This behavior at low frequencies is more a diffusion than a wave process. Linearized internal wave models incorporating linear drag successfully explain the frequency response of phase velocity but are less successful with the attenuation coefficient. The attenuation coefficient is well explained by the model of the outer area of the kelp but is overestimated in the kelp stand interior. In the outer area phase velocity is about 0.12 m s^{-1} at 100 cpd (cycles per day), a third of that at 1 cpd; attenuation coefficient is 7.5 km^{-1} at 100 cpd, 1.5 km^{-1} at 1 cpd.

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