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## Seasonal fluctuations in the secondary microseism wavefield recorded offshore Ireland

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Generated in the ocean, secondary microseisms result from the interaction of opposing ocean wave fronts and represent the strongest ambient seismic noise level measured on land. The recorded noise energy will vary with seasons due to changes in storm activity and associated secondary microseism source locations. Here, ocean bottom seismometer (OBS) data collected offshore Ireland in 2016 have been processed to look into the seasonal variations of the ambient noise wavefield recorded at the seafloor. Daily cross-correlations of OBS pairs located on top of thick sediments in deep water highlight seasonal changes between Rayleigh waves fundamental mode and first overtone for winter and summer months. Comparisons with ocean wave directional spectrum data derived from ocean wave model hindcasts suggest those variations are correlated with changing patterns in ocean waves interactions and therefore microseism source locations. In order to understand those observations in detail, we use 3D numerical simulations to show how the water column but also the subsurface structure below the sea bottom will affect the recorded wavefield at the seafloor for different stations and sources locations. Compared to land stations, the secondary microseism wavefield observed in the ocean and in particular changes in the excitation of Rayleigh modes due to site effects can help characterize the microseism source locations that fluctuate through the seasons.