Stormquakes

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Seismic signals from ocean-solid Earth interactions are ubiquitously recorded on our planet. However, these wavefields are typically incoherent in the time domain limiting their utilization for understanding ocean dynamics or solid Earth properties. In contrast, we find that during large storms such as hurricanes and Nor'easters the interaction of long-period ocean waves with shallow seafloor features located near the edge of continental shelves, known as ocean banks, excites coherent transcontinental Rayleigh wave packets in the 20 to 50 s period band. These ``stormquakes'' migrate coincident with the storms, but are effectively spatiotemporally focused seismic point sources with equivalent earthquake magnitudes that can be greater than 3.5. Stormquakes thus provide new coherent sources to investigate Earth structure in locations that typically lack both seismic instrumentation and earthquakes. Moreover, they provide a new geophysical observable with high spatial and temporal resolution with which to investigate ocean wave dynamics during large storms.