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The influence of temporally varying noise from seismic air guns on the detection of underwater sounds by seals. Invited talk. 6th International Meeting on the Effects of Sound in the Ocean on Marine Mammals and 3rd Programme Review Meeting of the E&P Sound & Marine Life Joint Industry Programme, The Hague, The Netherlands, September 2018

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Standard audiometric data are often applied to predict how noise influences hearing. With regard to auditory masking, critical ratios—obtained using tonal signals and flat-spectrum maskers—can be combined with noise spectral density levels derived from 1/3-octave band levels to predict signal amplitudes required for detection. However, the efficacy of this conventional model of masking may vary based on features of the signal and noise in question. The ability of resource managers to quantify masking from intermittent seismic noise is relevant due to widespread geophysical exploration. To address this, spotted and ringed seals with previously measured critical ratios were trained to detect low-frequency tonal signals within seismic pulses recorded 1 and 30 km from an operational air gun array. The conventional model of masking accurately predicted the extent of masking only in certain cases. When noise amplitude varied significantly in time, the results suggested that detection was driven by higher signal-to-noise ratios within time windows shorter than the full signal duration. This study evaluates when it is appropriate to use average noise levels and critical ratios to predict auditory masking experienced by marine mammals, and suggests how masking models can be improved by incorporating time-based analyses of signals and noise. [Research supported by the IOGP's E&P Joint Industry Programme on Sound and Marine Life; reprinted from J. Acoust. Soc. Am. 141 (2), pgs. 996-1008].