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Analysis of wind generated shallow water ambient noise

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Underwater ambient noise measurements were carried out in very shallow water (10-20 m) in the archipelago of the Gulf of Finland during the full year. Weather conditions varied from calm sea to near gale winds. The lowest spectral levels were obtained under the ice cover during the coldest winter months. No seasonal effect was observed in the measured spectra. The role of water depth was modelled with several bottom sediments in order to identify possible channel effects at lower frequencies of the noise spectra. The ambient noise spectra are typically band-limited. A band-pass filter model was thus fitted to the noise spectra. The filter model provides several useful parameters to characterize the effect of wind speed on the noise spectra. The cut-off frequency of the high-pass part of the spectra decreases from ca 400 Hz down to below 200 Hz as wind increases from light breeze to near gale force. The corresponding spectral slopes get steeper with increasing winds saturating to the value of 12 dB/oct already in fresh breeze. The other parameters used in the analysis are high frequency (low-pass) spectral slope, the frequency of maximum spectral level, noise bandwidth and total power in the band.