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Found at the link https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/downloade.web&search1=R=296443

For each 10 minute segment, the power spectral density (PSD) of the infrasonic (HDF) and vertical seismic(HHZ) data were computed using the method of Welch (1967) with a one minute long Hanning window and a 50% overlap. All computed PSD spectra for the two channels were then sorted into wind speed groups with 1 m/s increments from 1 m/s to 20 m/s, encompassing the majority of wind speeds encountered during the monitoring period and operational specifications of the V-90 turbines (Vestas, 2006).

With the computation of many PSD spectra from time segments under similar wind conditions, the spectra are stacked and averaged to substantially reduce the amount of variance in spectral information (THIS MEANS AMPLITUDE.) observed in any singular spectrum. Localized turbulence, changes in ambient conditions (such as humidity, temperature, large scale weather), or transient sources (such as vehicular traffic, earthquakes, severe storms etc.) (BUT MOSTLY IWT PULSES.) can all contribute to increased spectral variance in any individual PSD spectrum. Thus by grouping and then averaging over a large number of common spectra, a significantly smoother and robust spectrum can be achieved with a variance reduction that approaches a factor $1/\sqrt{N}$. After grouping the various spectra falling within a common wind speed, the spectral distribution was computed at each frequency and the upper 75th and lower 25th percentiles were removed prior to computation of a mean or average. As infrasonic and seismic spectral power may vary over several orders of magnitude and as such are often represented on logarithmic scales, the removal of the upper and lower 25th percentiles helps to ensure that any mean spectrum is not adversely affected by extreme spectral outliers, (WHAT DOES THIS REALLY MEAN? IT MEANS " NOT AFFECTED BY IWT PULSES") making the final inner-quartile mean a more robust measure of the average spectrum during each wind condition than the explicit mean of all spectra.

(I REGRET TO HAVE TO SAY THAT THIS IS ALL MEANINGLESS NONSENSE IF YOUR GOAL IS TO FIND OUT WHAT AMPLITUDES OF NOISE AN IMPULSIVE NOISE SOURCE PRODUCES. YOU CANNOT AVERAGE THE SOUND WAVES BEFORE ANALYSING THE SOUNDS.... THIS JUST CANCELS DATA AND CREATE ARTIFACTS AND ARTIFICIAL EFFECTS)

This process was repeated for each wind speed category. For the following analysis, the number of spectra used to compute each inner-quartile mean is given in Table 4. All measurements in the following analysis are then taken in reference to the inner-quartile mean spectrum for a specific wind speed category. Use of the upper 75th and lower 25th percentile spectra are used to provide upper and lower limits on these measurements respectively.

Processing Flow that was implemented before "Analyzing The IWT Noise "

1. Window 1 minute segments of time-series with a 50% Overlap.
   This is like smoothing.
   Also the overlap creates more cancellation of the IWT pulses during stacking of Freq. Spectra.
2. Freq. Spectra are created For the overlapping 1 min. windows.
3. 18 Freq. Spectra are stacked and normalized to represent 10 minutes of the time-series.
   This is the same as summation in the Time domain according to the rules of Fourier Transform Equivalent Operations. This cancels out much of the data and creates Artifacts. See References on slide 4.
4. The Freq Spectra for each 10-Min time segment are sorted into "wind speed bins". The segments in each bin are then not continuous in time but the time segments range over one year.

Wind Speed	HC1P HDF	HC1P HHZ	HC2P HDF	HC2P HHZ	HC3P HDF	HC3P HHZ	HC4P HDF	HC4P H HZ
- 1 m/s	326	325	321	331	324	325	316	330
1 – 2 m/s	1697	1706	1643	1695	1658	1709	1626	1715
2 – 3 m/s	1994	1992	1926	1998	1919	2016	1894	2010
3 – 4 m/s	2479	2477	2390	2484	2362	2520	2329	2498
4 – 5 m/s	2405	2388	2365	2422	2351	2429	2297	2427
5 – 6 m/s	2225	2234	2197	2261	2201	2268	2185	2291
6 – 7 m/s	2354	2334	2296	2382	2307	2383	2307	2391
7 – 8 m/s	2353	2367	2296	2368	2308	2400	2268	2416
8 – 9 m/s	2268	2291	2216	2275	2195	2306	2183	2355
9 – 10 m/s	2035	2058	2004	2044	1972	2077	1987	2106
10 – 11 m/s	1818	1829	1793	1805	1750	1860	1780	1887
11 – 12 m/s	1685	1684	1659	1685	1647	1705	1642	1724
12 – 13 m/s	1413	1403	1402	1397	1369	1399	1374	1425
13 – 14 m/s	1196	1179	1186	1194	1161	1187	1151	1195
14 – 15 m/s	800	791	787	799	779	795	748	799
15 – 16 m/s	669	658	670	671	665	665	643	668
16 – 17 m/s	517	515	514	516	507	514	499	516
17 – 18 m/s	413	416	422	423	413	411	418	426
18 – 19 m/s	328	331	321	328	322	326	319	327
19 – 20 m/s	267	267	256	266	254	265	248	258

Table 4: Number of individual 10 minute data windows used to compute the inner-quartile mean for each wind speed category for each monitoring station and channel. Each 10 minute data window was segmented into nineteen, 1 minute windows overlapped by 50% and used to compute a power spectral estimate. These estimates were then averaged to obtain a mean spectrum with which to describe the 10 minute data window, following the procedure of Welch(1967).

3.1 Infrasound Observations of Noise

Using the methodology outlined in the previous section, the inner-quartile mean was calculated for winds ranging from calm conditions (winds < 1 m/s or 3.6 km/h) to a maximum of 20 m/s or 72 km/h for the four monitoring stations located approximately 0.125, 2.5, 5.0 and 10.0 km from the Summerside wind turbines. These mean spectra are shown in Figs. 13 – 16 alongside the high and low global infrasonic noise spectra of Bowman et al. (2005). In all cases, noise associated

Processing Flow That was implemented before "Analyzing The IWT Noise "

5. For each of the wind speed bins all of the amplitude data for each frequency "bin" are sorted in increasing order and the amplitudes in the outer quartiles (the lowest 25% of the values and highest 25% of the values) are thrown out of the dataset! This removes much of the data pertaining to the high-amplitude short period IWT pulses
6. For each wind speed, hundreds or thousands of 10 min. Freq. Spectra over the period of 1 year, are stacked as per Table 4. THIS IS ANOTHER STACKING OF SPECTRA PROCESS This is the same as summation in the Time domain according to rules of Fourier Transform Equivalent Operations. This cancels out more of the data and creates even bigger Processing Artifacts. See References on slide 4.
7. Display the resulting Freq. Spectra and misinterpret the peaks. These peaks are just the Blade Pass Frequency "Stacking in" plus Gibb's Phenomenon creating other peaks misinterpreted as "harmonics" The BPF is merely the occurrence rate of the IWT Pulse.

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with the operation of the wind turbines is limited to frequencies between 0.1 and ~10 Hz. (THIS IS INCORRECT BECAUSE IT CAME FROM PROCESSING ARTIFACTS)
The character of the noise observed from the V-90 wind turbines within the infrasound band appears to be that associated with the rotation of the turbine blades and are comprised of several harmonic peaks associated with a fundamental frequency of 0.513 Hz at low wind speeds less than ~8 m/s, and transitioning quickly to 0.806 Hz at higher wind speeds (Fig. 13). (THIS IS INCORRECT BECAUSE THE PEAKS ON THE FREQUENCY SPECTRUM DISPLAY ARE PROCESSING ARTIFACTS MOSTLY RESULTING FROM THE STACKING OF FREQ. SPECTRA THAT ARE MADE FROM SEGMENTS OF A SINGLE RECORDING OR TIME-SERIES.)

Comments in red by Michael West, P. Geoph, BSc, GDM., BC, Canada, June 2021.

More Comments

The only processing that should be done before analyzing the events, the amplitude and frequency of the events, what is their source etc.... is Equalization for the microphone response and the recording instrument response if required.

This GSC file 7763 report involves a complicated list of unnecessary data processing procedures if your purpose is just to identify and ”analyze” recorded events for amplitude and frequency content.

One big problem with this report is that there is no stated “Purpose”, as would be expected for any science report. However, from the data processing flow, the true purpose of this report seems to be confusion.... either that or the processing flow is just a long list of errors.

Michael West, P. Geoph, BSc, GDM., BC, Canada, June 2021

References for Fourier Transforms Equivalent Operations in Time and Freq. Domains

Yilmaz, Ozdogan, 1987; Seismic Data Processing, pg. 417, Appendix A, Table A-1

Sheriff, R.E., 1981; Encyclopedic Dictionary of Exploration Geophysics, pg. 89

Or at https://wiki.seg.org/wiki/Dictionary:Fig_F-20

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Dictionary:Fig F-20

Time operation	Frequency operation	Significance
Linear addition $ag(t) - bh(t)$	Linear addition $aG(f) - bH(f)$	Linearity and superposition apply in both domains. The spectrum of a linear sum of functions is the linear sum of their spectra (if spectra are complex, rules of addition of complex quantities apply). Any function may be regarded as a sum of component parts and the spectrum is the sum of the component spectra.
Scale change $g(kt)$	Reverse scale change $\frac{1}{k} G\left(\frac{f}{k}\right)$	Time-bandwidth invariance. Compressing a time function expands its spectrum in frequency and reduces it in amplitude by the same factor. The amplitude reduces because less energy is spread over a greater bandwidth. The case where $k = -1$ reverses the function in time, interchanging positive and negative frequencies, and for real time functions, reversing the phase.
Convolution $g(t) * h(t)$	Multiplication $G(f)H(f)$	The spectrum of the convolution of two time functions is the product of their spectra. If the spectra are complex, multiplication is equivalent to multiplying amplitude spectra and adding phase spectra.