

Underwater operational noise from the PLAT-O tidal platform fitted with two 50 kW SIT SCHOTTEL Instream Turbines

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BACKGROUND

Tidal-stream energy devices will introduce underwater noise into the environment, the magnitude of which is of particular interest because of the potential effects on acoustically sensitive species. Thus, acoustic emissions of these devices need to be assessed in terms of their potential negative impact, as well as a means of device detection for collision avoidance by marine animals in these often naturally noisy environments. This study recorded the sound signature and noise levels of the PLAT-O tidal platform with two 50 kW SIT SCHOTTEL Instream turbines, each with a three bladed 5 m diameter horizontal axis rotor.

METHODS & RESULTS

- Acoustic recordings (79 minutes SR: 156 kHz) using 'Drifting Ears' (Fig. 1).
- 13 drifts at ebb tide and in variable sea states at Isle of Wight test site (Fig. 2).
- Drifts without or little boat noise selected for further analysis.
- Spectral analysis using PAMGuide

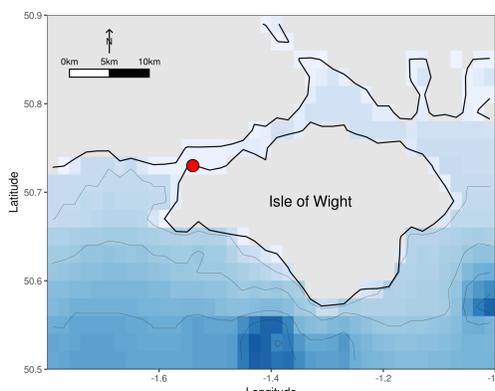


Fig 2. PLAT-O test site off the Isle of Wight.



Photo credit: SME

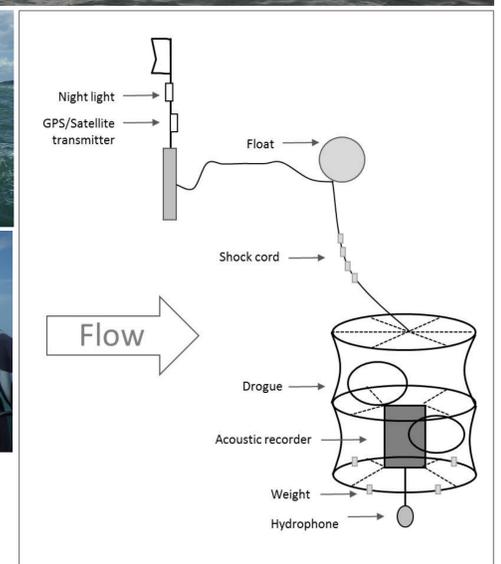


Fig 1. 'Drifting Ear': drogue mounted acoustic recorder (RTSYS EA-SDA14) with hydrophone (RESON TC4032) and satellite communication system.

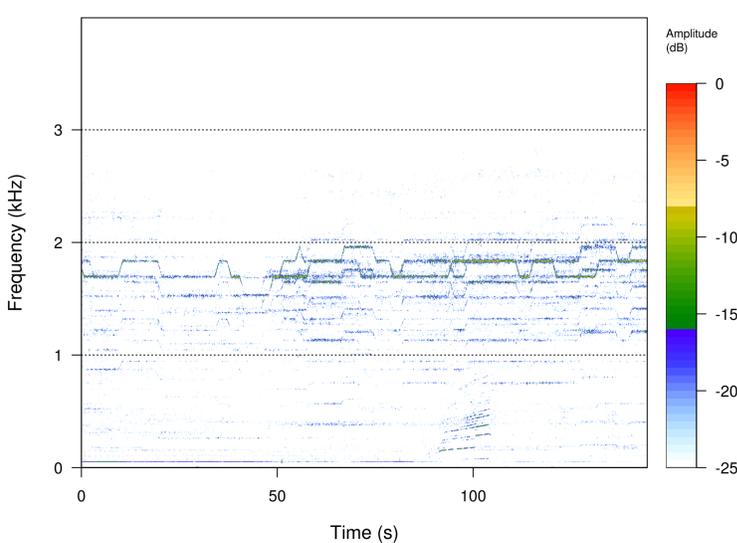


Fig 3. Spectrogram, showing sound signature of two operating Schottel turbines deployed on PLAT-O platform and recorded at a distance of ~ 300 m.

CONCLUSIONS

- Step-wise, frequency modulated tonal sound signature
- Most energy between **1-2 kHz**
- At **~300 m** noise levels elevated **10-15 dB** above background
- additional broadband noise **>4 kHz** likely linked to support vessel machinery

Comparison of two drifts with turbines in inactive and active states show that noise levels in relevant 1/3-octave bands are elevated by 10-15 dB above ambient noise levels at ~300 m distance from the turbines (Figures 4 and 5). Recordings at different ranges from the platform indicate that at a distance of ~500-600 m turbine noise may be expected to be equal or below ambient noise levels in this environment.

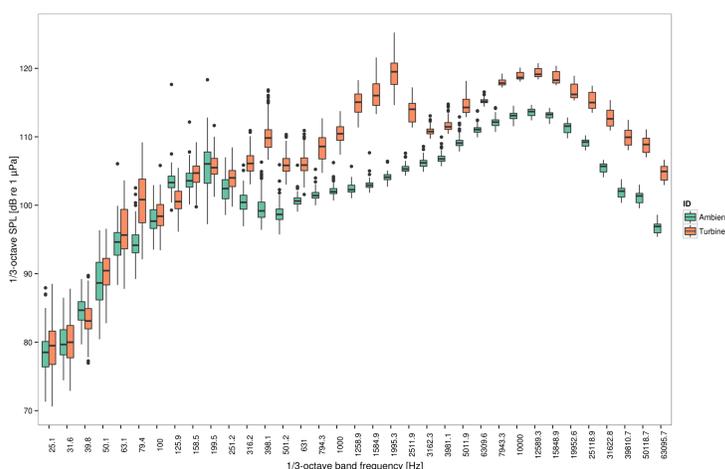


Fig 4. Boxplot showing 1/3-octave band SPL measurements for drifts with turbines in active (orange) and inactive (green) state.

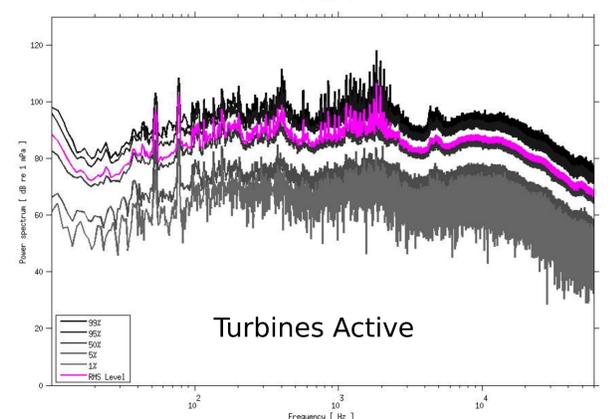
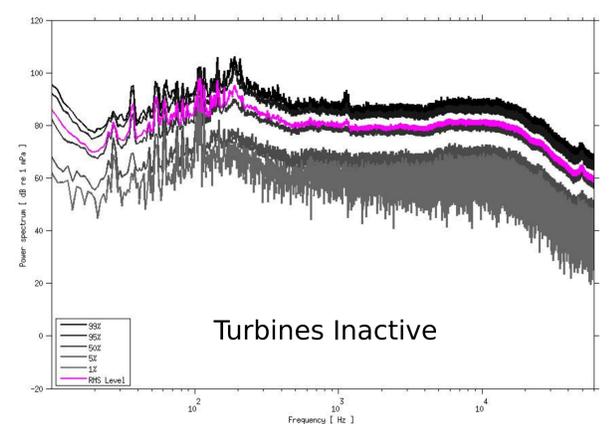


Fig 5. Examples of power spectrum levels calculated over 1 sec in 1 Hz bands for drifts with turbines inactive (upper panel) and turbines active (lower panel).

ACKNOWLEDGEMENTS

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