ACOUSTICS2008/1622
Blue whale calls characterization using chirplet transform

Mohammed Bahoura[a] and Yvan Simard[b]

[a]Eng. Dept., Université du Québec, 300 Allée des Ursulines, P.O. Box 3300, Rimouski, QC, Canada G5L-3A1

[b]Fisheries and Oceans Canada & ISMER-UQAR, 850 route de la Mer, P.O. Box 1000, Mont-Joli, QC, Canada G5H-3Z4

The blue whale, Balaenoptera musculus, frequently produce distinctive low-frequency (<100 Hz) signature calls that propagate over large distances in deep oceans. Their efficient detection and identification under variable noise conditions in long-term recordings is a basic requirement of passive acoustic monitoring systems used for studying distributional ecology and habitat selection of these large-scale migrant animals. In North Atlantic, blue whale signature calls are the A and B infrasounds (15-20 Hz), which often occur together in AB phrases, and the audible D-call (35-120 Hz), also known as arch sound. Given the distinction of these calls by their frequency band and rate of change in frequency, the chirplet transform appears well adapted to characterize such calls. We test here this new approach from subset of vocalizations of blue whale sounds recorded in St. Lawrence Estuary. The recordings are band-pass filtered and segmented to isolate individual calls. Then, a feature vector based on the chirplet transform is extracted from each call. Finally, vector quantization (VQ) is used to classify the calls into A, B and D vocalizations. The performance of the method is compared for various VQ code book sizes. Small code book sizes using only 3 features produced classification rates exceeding 92%.