

## **Acoustic detection of marine mammal vocalizations in snapping-shrimp infested noisy waters**

Hari Vishnu, V. R. Soorya, Mandar Chitre, Koay Teong Beng, Abel Ho, Y. M. Too, Karenne Tun, Karen Lim

The warm shallow waters near Singapore are known to be inhabited by marine mammals including dolphins, porpoises and dugongs. While sightings of their presence have been reported, a rigorous quantification of their numbers in these waters is yet to be done. Passive Acoustic Monitoring (PAM) can be used as an effective tool for quantifying their numbers in this region because acoustic data is relatively easy to acquire and store, and can provide large area of coverage. However, in Singapore waters, acoustic detection of vocalizations of marine mammals is impeded by the severe ambient noise which arises predominantly due to snapping shrimp snaps. This forms an impulsive noise background that often masks signals of interest. Shipping also contributes to the noise background. Detection in such challenging circumstances are less discussed in the literature.

We have been developing a PAM that uses a machine-learning (ML) based detector designed to work in these noisy waters. The current detector shortlists sounds of interest that are potentially from marine mammals, and is trained to maximize the probability of detection at a set probability of false alarm. ML model architectures based on LeNet and VGG have been explored using training data consisting of online-available as well as locally recorded data, and their performance will be highlighted in this work. Using robust methods to deal with impulsive noise shows a dramatic improvement in detection performance, indicating that use of such techniques will be key in achieving effective monitoring in these waters.