

## 2016 SMALL GRANT IN AID OF RESEARCH – ANNUAL SUMMARY REPORT

### **Characteristics of ship noise in a critical habitat of the world's second largest humpback dolphin population: Implications for conservation**

Mingming LIU ([liuming@idsse.ac.cn](mailto:liuming@idsse.ac.cn), or [liu-xiaming@foxmail.com](mailto:liu-xiaming@foxmail.com))

Sanya Key Laboratory of Marine Mammal and Marine Bioacoustics, Institute of Deep-sea Science and Engineering, Chinese Academy of Sciences  
#28 Luhuitou Road, Sanya, 572000, China

#### **SUMMARY REPORT**

Ship noise pollution has raised concerns among regulatory agencies and cetacean researchers worldwide. There is an urgent need to quantify ship noise in coastal areas and assess its potential biological impacts. In this proposal, we recorded and analyzed broadband underwater noise from commercial shipping operations with typical ship speeds  $> 15 \text{ km/h}$  and ship lengths  $> 50 \text{ m}$  in a traffic-intense Indo-Pacific humpback dolphin (*Sousa chinensis*, Osbeck 1765) habitat. The objective of our proposal was to provide insight into broadband ship noise characteristics and their potential impacts on the Indo-Pacific humpback dolphin to strengthen the baseline data used for conservation and management. Data analysis indicated that the ship noise caused by the investigated commercial ships with an average length of  $134 \pm 81 \text{ m}$ , traveling at  $18.8 \pm 2.5 \text{ km/h}$  (mean  $\pm$  SD,  $n = 21$ ) is comprising mid-to-high components with frequencies approaching and exceeding  $100 \text{ kHz}$ , and the ship noise could be sensed auditorily by Indo-Pacific humpback dolphins within most of their sensitive frequency range. The contributions of ship noise to ambient noise were highest in two third-octave bands with center frequencies of 8 and  $50 \text{ kHz}$ , which are within the sensitive hearing range of Indo-Pacific humpback dolphins and overlap the frequency of sounds that are biologically significant to the dolphins. We estimate that ship noise in these third-octave bands can be auditorily sensed by and potentially affect the dolphins within  $2290 \pm 1172 \text{ m}$  and  $848 \pm 358 \text{ m}$  (mean  $\pm$  SD,  $n = 21$ ),

respectively. Overall, commercial ship operations conservatively should keep the above distance from the Indo-Pacific humpback dolphins to mitigate impacts on hearing, vocalization, and behavior.

The major results and discussions have been made into a manuscript that has been submitted to the JASA (The Journal of the Acoustical Society of America). It will be published soon if successful peer review. Here, I express our sincere thanks to the Small Grant in Aid of Research from the Society for Marine Mammalogy again. I hope more small projects from developing countries especially from Asian could be proposed and taken into consideration for funds. In the next three years, I will pursue a PhD degree in IDSSE-CAS, and do more things related to Indo-Pacific humpback dolphins and other marine mammals in the South China Sea. Please contact me or my supervisor (Prof. Songhai LI, [lish@idsse.ac.cn](mailto:lish@idsse.ac.cn)) if anyone who have interests or ideas.