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**Proceedings of the 7th National Radar Seminar And International Conference On
Radar, Antenna, Microwave, Electronics And Telecommunications (ICRAMET) 2013**
“Developing Regional and International Scientific Cooperations”

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PREFACE

Dear colleagues,

On behalf of the Chairman Organizing Committee of The 7th National Radar Seminar and the 2nd International Conference on Radar, Antenna, Microwave, Electronics and Telecommunications (ICRAMET) 2013, I would like to thank to all the participants for their participation during the Seminar and Conference that was hold in Surabaya on March 27th & 28th, 2013.

I would like to specifically express my gratitude to the Chairman of Indonesian Institute of Sciences (LIPI) Prof Dr. Lukman Hakim, who was officially opened the Seminar and Conference. To the distinguished speakers : Mr. Hari Purwanto, he is the advisor to the Defense and Security of The State Ministry of Research and Technology, Republic of Indonesia; to Mr. Asif Q Moosa (Director Business Development and Strategy), Northrop Grumman Corporation Electronic System, ISR Systems Division, USA; to Prof. Josaphat Tetuko Sri Sumantyo Ph.D, he is from Center for Environmental Remote Sensing, Chiba University, Japan; to Dr. Andaya Lestari, from International Research Centre for Telecommunications and Radar-Indonesia and to Dr. Wolfgang-Martin Boerner, he is the director UIC-ECE Communications, Sensing & Navigation Laboratory, Chicago, USA.

This proceeding consists of 32 scientific papers. Some of these papers were presented as oral presentations and the rests were presented as poster presentations. This Seminar and Conference would not be hold successfully without contribution of the Speakers, the Authors, the Advisory Committees and the members of the Organizing Committees. Therefore, I would like to take this opportunity to express my sincere appreciation to all of them for their active participation in The 7th National Radar Seminar and the 2nd International Conference on Radar, Antenna, Microwave, Electronics and Telecommunications (ICRAMET) 2013.

Bandung, 23 April, 2013
Chairman of the Organizing Committee

Yadi Radiansah

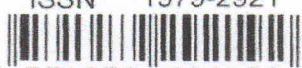
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Irrawaddy Dolphin Monitoring Using SSBL System in Mahakam River

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Abstract—Irrawaddy dolphin's (*Orcaella brevirostris*) community known as Pesut Mahakam, they use bio-sonar clicks for echolocation. This system catch their echo-location with passive Super Short Baseline (SSBL) type hydrophones, which can determine their 3-D location of click distribution.

Keywords—component; Irrawaddy dolphin; Mahakam river; SSBL system

I. INTRODUCTION

Irrawaddy dolphin's (Lat. *Orcaella brevirostris*) known as Pesut Mahakam is in the list of IUCN (International Union for Conservation of Nature) Red list 2010 as critically endangered spesies. The importance of conservations of this species in Indonesia has to be considered since the population mean around 43 individuals at 2002. In Indonesia it is only found at one Mahakam River which at in Kalimantan Island.



Figure 1. Pesut (Lat.: *Orcaella brevirostris*)

Like other small toothed whales, they use bio-sonar clicks for echolocation. Like other small toothed whales, they use bio-sonar clicks for echolocation. Dolphin's utilize clicks to sense their environment and to catch prey. Using this system, their click (echo-location) will be recorded and determine their 3-D location with some calculation.

The hydrophones pick up the direct click and other reflected signals of dolphin click from river surface and bottom. The Irrawaddy dolphins click is a very short pulse of about 20 micro-second duration and typically occupies the band between 30 to 130 kHz. The dolphin phonate frequently, with a typical inter click interval of about 40 milliseconds. The

click envelope shows significant modulation observable over a period of about half a second.

Irrawaddy dolphin's monitoring of the Mahakam river estimated around 70-80 number, inhabit a 100 Km upstream along the river.

II. RESEARCH METHODS

A. Equipment

SSBL system has 3 passive array, plotting in the floating house in Mahakam river, East Kalimantan. Each array contains 3 hydrophone, except array-2 (contains 4 hydrophone). This system plotting in the floating house. This array can record the frequency of bio-sonar clicks which the dolphins emit, and estimate their 3-D location by calculating relative time delay of clicks recorded at each hydrophone.



Figure 2. Three pieces of hydrophones

B. Calculating and recording system

The recording system and data transmission system are common to the observatories. The dolphin's click received on each hydrophone of the array are amplified over a -3dB bandwidth of 10 kHz - 200 kHz, and digitized at a sampling rate of 500 kHz with 16 bits resolution through an A/D converter. The system calculates each dolphin's real time 3-D location and transmits the 3-D data to the host server through the data card. The click data i.e. the dolphin's 3-D location, and sensor data are stored in a hard disk for further analysis.

Dolphin's direction is calculated by time difference between the hydrophones of three SSB system and dolphin horizontal

position P (XY) is calculated by the intersection of the straight line.

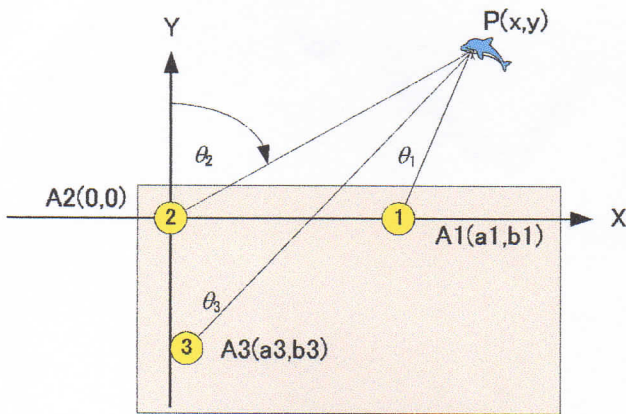


Figure 3. System configuration

TABLE I. SPESIFIKATION OF 3-PIECES SSBL SET

Item	Spesifikasi
Array of hydrophone	Orthogonal arrangement
Length of baseline	0.1 m
Number of hydrophone	3-Hydrophone: 2 pieces 4- Hydrophone: 1 piece
Frequency range	10 kHz - 200kHz
A/D Converter	16 bit 500kHz 10-ch simultaneous sampling
Processor	Intel Atom Z530(1.6 GHz)
OS	Windows Embedded Standard 2009
Storage	2.5' USB HDD (max. 1 TB)
Peripheral	GPS, Magnetic compass

In this system, dolphin's direction (θ_1 , θ_2 , and θ_3) is calculated by the time difference between the 10 hydrophones from this 3-pieces SSBL system.

C. Environmental condition

This system was plotted in a floating house, in Sangkuliman village that is located on the tributary from Semayang lake, and upstream of the river ("S 0°14'15.744" and E 116°33'35,658").



Figure 4. Floating House

III. PRELIMINARY EXPERIMENT

Preliminary experiment result in the system, Recording were made for 2 days from 20:02 on 10th August to 00:37 on 12nd August 2012. The system can record the click of pesut, both the distribution and the sound of click itself.

Here is the distribution from the click:

a. Non-filter:

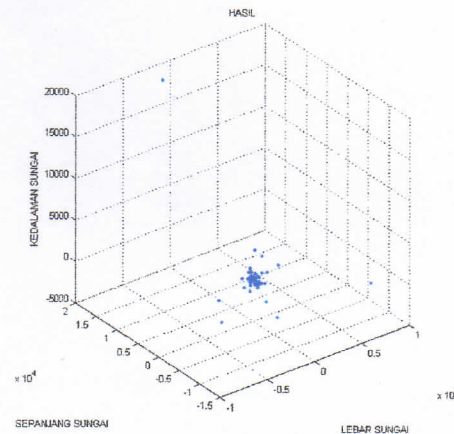


Figure 5. 3-D click with no filter

From figure 5, all data record has shown. We can see the click distribution spread in all widely area.

b. XYZ filter (X is between 500 and -500 meters, Y between 120 and -20 meters, and Z between 0 and -20 meters):

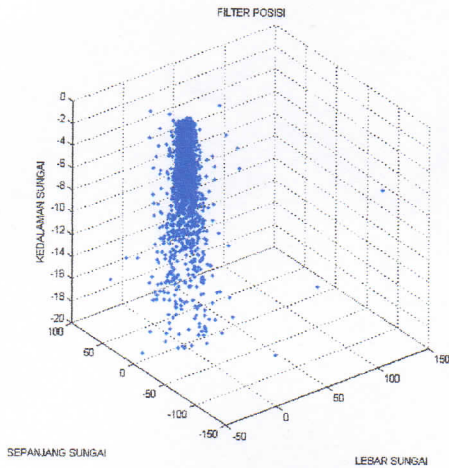


Figure 6. 3-D using XYZ filter

In this figure 6, with XYZ filter, click distribution cut by the condition of site.

c. Spectrum filter (peak frequency 80-100 kHz)

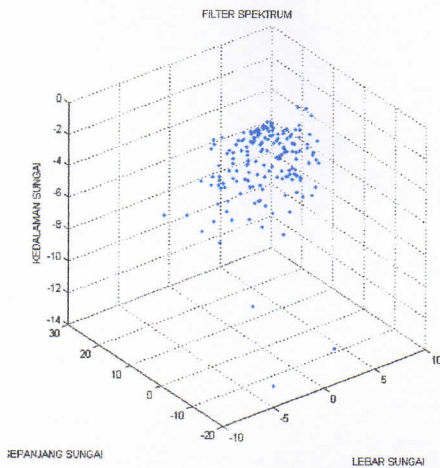


Figure 7. 3-D using XYZ filter

Finally, figure 7 describes the distribution of the dolphin's click based on the environment and the frequency spectrum.

ACKNOWLEDGMENT

We acknowledgements funding from Department of Education of East Kalimantan Government. Institute Of Industrial Science, The University Of Tokyo for the collaboration.

The preferred spelling of the word “acknowledgment” in America is without an “e” after the “g”. Avoid the stilted expression, “One of us (R. B. G.) thanks . . .” Instead, try “R. B. G. thanks”. Put sponsor acknowledgments in the unnumbered footnote on the first page.

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DISCUSSION

Prof. Dr. Wolfgang-Martin Boerner: Do you have the data?, do you separated the sound between dolphin dan boat?

Donny Fahrochi : 80-100 Irrawady Dolphin in all Mahakam river dan in my site 15-25 dolphin

Donny Fahrochi : Yes, I separated the sound on my project

Letkol Arief Meidyanto (BAKORKAMLA): How far from site to a dolphin ?

Donny Fahrochi : 500 meter depth water.

Letkol Arief Meidyanto (BAKORKAMLA): continue the research to detect the submarine in bali strait, because U.S. submarine use sound waves with a frequency of whales to communicate.