IEEE Indonesia Section
Oceanic Engineering, Technology, and Engineering Management Joint Societies Chapter (IEEE OETEM)

APPLICATION AND DEVELOPMENT OF COASTAL ACOUSTIC TOMOGRAPHY SYSTEM (CATS) IN INDONESIA

SPEAKERS

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AGENDA

1. Definitions and Understanding CATS
2. Application of CATS and data result
3. Development of CATS
4. Conclusion
A BRIEF OVERVIEW OF THE COASTAL ACOUSTIC TOMOGRAPHY SYSTEM (CATS)

- The coastal acoustic tomography system is called “CATS” in acronym. A couple of CATSs can measure travel times in a reciprocal direction between two acoustic transmission and reception stations (acoustic stations). The mean travel time is converted into the path-average sound speed (mainly proportional to temperature because of smaller effects due to salinity), and the travel time difference is converted to the path-average current. The 2D and 3D mappings of current and sound speed (temperature) fields are obtained through an appropriate inverse analysis when the observation domain is surrounded by a mult-acoustic stations. (Kaneko, 2015)
Set of CATS Equipment in BPPT

- **10 KHz CATS**
- **5 KHz MCATS**
- **50 KHz RCATS**
- **4 KHz TCATS**
CATS Installation

1. Jetty Placement

2. Floater Placement

3. Buoy Placement
FLOWCHART OF DATA ACQUISITION
MARINE PHYSICAL PARAMETER DATA SURVEY IN BALI STRAIT

2014-2015

Temperature Reconstruction

Ray Diagram and Profile Simulation

B4 Ray Diagram (March 19, 2014)

B3

Java

Bali

Bali Strait

V_{se}

B4

B2

V_{al}

B3

Waktu Tempuh Gelombang (detik)
CURRENT RECONSTRUCTION IN BALI STRAIT
USING MULTI PAIR CATS DATA

2016

Waterfall Diagram

Temperature Variation from 1 pair

Travel Time Difference from 1 pair

2D Current Reconstruction
MARINE PHYSICAL PARAMETER DATA IN PENAJAM STRAIT

2016

Current Speed Reconstruction

Tidal Data

Temperature Reconstruction

Waterfall Diagram

Time: 01.00

Time: 03.00

Time: 05.00

Time: 07.00

Time: 09.00

Time: 11.00

Time: 11.00
CATS TRIALS FOR SUBMARINE DETECTION IN SUNDA STRAIT
OBSERVING INTERNAL SOLITARY WAVES IN LOMBOK

2019

Bathymetric Chart for Lombok Strait

Geophysical Research Letters

Observing Internal Solitary Waves in the Lombok Strait by Coastal Acoustic Tomography
SEDIMENT MONITORING IN LAKE PONDOK JAGUNG

2020
TSUNAMI CATS IN LOMBOK STRAIT

2020 - now

Environmental Sound Noise Data

Normalized Tide vs Normalized ESN Using Z-Score
DEVELOPMENT OF CATS
DEVELOPMENT OF CATS IN BPPT (RISET PRO PROGRAM)
INDONESIAN RIVER ACOUSTIC TOMOGRAPHY (RAT)

2017

2019
TELEMETRY, DATA PROCESSING, AND WEBSITE

2020 - now

Telemetry

Data Processing Automation

Website
CONCLUSION

1. Almost all marine physical parameters can be proceed using CATS data
2. CATS application for submarine detection is possible with further development
3. CATS data can be used for other water purposes such as lake monitoring and flood monitoring
4. There is some modifications of CATS hardware and frequencies for specific applications
5. TCATS has successfully acquired data and continues to be developed
6. CATS development in Indonesia took time and still continuous
THANK YOU

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