

DEVELOPMENT OF NEW INTERNATIONAL RESEARCH LABORATORY FOR MARITIME CONTINENT SEAS CLIMATE RESEARCH, AND CONTRIBUTIONS TO GLOBAL SURFACE MOORED BUOY ARRAY

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ABSTRACT

Based on the long-term collaborations of more than 12 years between JAMSTEC (Japan Agency for Marine Earth Science and Technology)/Japan and BPPT (Agency for the Assessment and Application of Technology)/Indonesia, the proposal on the development of Indonesia Maritime Continent (IMC) climate research laboratory (MCCOE, Maritime Continent Center of Excellence) for enhancement of atmospheric and oceanic study for societal benefits in Indonesia was temporally accepted by the JICA (Japan International Cooperation Agency)-JST (Japan Science and Technology Agency) matching funds of the Japanese Government (SATREPS, Science and Technology Research Partnership for Sustainable Development). In this project as one of temporally selected twenty SATREPS projects, BPPT and JAMSTEC plan to develop collaboratively three functions in the laboratory, by using JICA-ODA (Official Development Assistance) fund and JST fund, respectively. The three functions are planned, a) “a science research center (Research Center)” to study the climatic variability and change phenomena, b) “observational technology center (Technology Center)” to develop Indonesian land-atmosphere-ocean observing system, and c) “observation information center (Information Center)” for the societal benefits and scientific research in Indonesia.

1. BACKGROUND

In the oceanic research field, the historical long-term collaboration between BPPT and JAMSTEC has started in 1999 for the purpose to study on the ocean climate variations, to conduct collaborative cruise and to provide logistic support for maintaining TRITON buoys in Indonesian EEZ (Exclusive Economic Zone). In the atmospheric field, the strong collaboration named HARIMAU (Hydrometeorological ARray for ISV-Monsoon AUtomonitoring), which aims to research atmospheric variations using radar observation array along the equator in the Indonesian Maritime Continent region has been conducted for longer period (see Figure 1). These two projects have started by scientific motivations of Japanese side, therefore from the early stage of these projects major scientific outcomes have been produced mainly by Japanese side. Recently, due

to the rapid economic growth and frequent natural disasters in Indonesia, the government has made its national policy on environmental researches. The governmental action by the policy can be noticed by hosting the recent biggest event of the IPCC (Intergovernmental Panel for Climate Change) general meeting in Bali in 2007 (see Bali declaration at <http://www.crc.unsw.edu.au/news/2007/Bali.html>). The policy also makes BPPT and other agencies active to promote environmental research by the Indonesian purposes. One example is the Indonesian coastal Tsunami buoy array system (Ina-buoy array), which was developed in collaboration with German and United States. The Indonesian government is now maintaining the whole array system. In addition, Indonesian original Tsunami buoy (Ina-buoy) consists a part of the array.

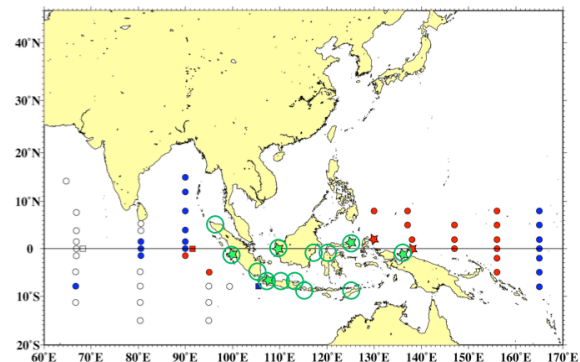


Figure 1 Locations of ocean climate buoys and atmospheric radar arrays in and around the IMC (Indonesian), which are targeted in this project. Red marks show the surface buoy locations operated by JAMSTEC, blue marks show the surface buoy locations occupied by NOAA ATLAS buoys. Green circles show the locations of Indonesian radar by Indonesian government, and green stars show location of HARIMAU atmospheric radars operated by BPPT and JAMSTEC. Red star-shaped marks indicate the targeted surface buoys that aim to replace by Indonesian buoys.

In Japan, simultaneously, JICA-ODA and JST matching funds have founded in 2008 for supporting and promoting science and technology in developing countries by collaborating with Japanese universities and institutions. The concrete discussion among BPPT scientists and JAMSTEC scientists was made, and we, BPPT and JAMSTEC, made similar proposals to JICA in Indonesian Side and JST in Japanese side in 2008, respectively. Among 170 proposals in 2008, our proposal was selected temporarily that should start in November 2009 as one of STREPS project. In this paper, we will describe our plan based on our accepted proposal, and also describe the possible contribution by Indonesian government to the Global Tropical Moored Buoy array [1].

The current situation of the project as of September 2009 is under negotiation between Japanese side and Indonesian side, therefore the plan described below may change due to future discussion.

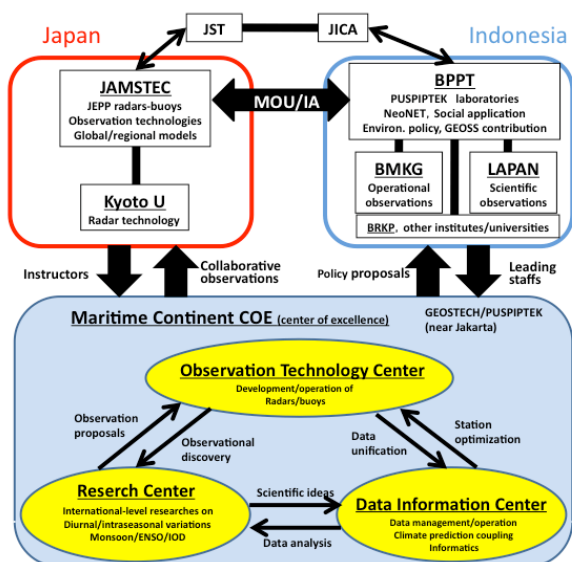


Figure 2 Structure of the project.

2. INTERNATIONAL LABORATORY

We plan to develop new International Research Laboratory for Climate variability and change research around Indonesian Maritime Continent (IMC) region, which is planned to construct near Jakarta, Indonesia (Figure 2). In this laboratory, the three functions are planned to be a) “a science research center (Research Center)” to study the climatic variability and change phenomena in the IMC both on land and in the sea around IMC, b) “observational technology center (Technology Center)” to develop Indonesian land-atmosphere-ocean observing system for monitoring climate variability, and c) “observation information center (Information Center)” for the societal benefits and scientific research in Indonesia by using data from the TAO/TRITON (Tropical Atmosphere and Ocean

array/Triangle Trans-Ocean Buoy Network array) buoy array, HARIMAU atmospheric radar-profiler network, RAMA (Research Moored Buoy Array for African-Asian-Australian Monsoon Analysis and Prediction) buoy array, current NEONET (Nusantara Earth Observation Network) information system, and other available data in public. At the final stage of this JICA-JST SATREPS project, we expect that Indonesian government operate the laboratory for Indonesian people as well as human beings.

a. Development of main framework

In this project, we firstly plan to develop the framework of the new laboratory for other Indonesian agencies to be able to participate or contribute to the laboratory, and for coordination among three functions. The domestic framework will be established in 2010 as the Joint Coordination Committee (JCC) with Japanese side. In the JCC, we plan to invite several institutes in Indonesia (BMKG, LAPAN and RISTEK) for smooth operations of the laboratory from the early stage of the project. The JCC will end at the final stage of the project, and the Indonesian domestic part of JCC will be the main body after the project. BPPT, the center player in Indonesia, expects that the laboratory will be designed to have capability to accept various kinds of resource supports from international community as well as Japan after and during the project. We, BPPT and JAMSTEC, recognize that the laboratory can be the center of excellence for research on climate variability and change in and around the IMC region, where is one of the most important regions that human being could not have enough scientific knowledge on climate research.

b. Scientific research activity in “Research Center”

The main purpose of scientific research is to understand the affect of El Nino and IOD to the IMC, and as one of activities in the laboratory, we will expand ability of basic research that should be compatible to international level. To achieve the goal, we plan invite scientists to do special lecture for short-term period to the laboratory from international community for exiting young Indonesian scientists. We will also try to collaborate with international partners to promote scientific researches of atmosphere and ocean in the IMC.

c. Observational Technology Development in “Technology Center”

The second planned activity is the technological development in Indonesia. In the ocean part, the technology of surface buoy system will be transferred from JAMSTEC to BPPT. The goal of the technology transfer is the replacement of TRITON buoys in the Indonesian EEZ in the western Pacific at Eq.-138E by Indonesian original surface buoy and by Indonesian research ship. This means that the present TAO/TRITON buoy array will not be maintained only by the US and Japan at the final stage of the project. In

the atmospheric part, JAMSTEC will transfer technology of maintenance and operation of atmospheric radar systems, which have already installed in several locations in the IMC. Figure 1 shows the locations of buoys and radar, which we target to replace of maintenance to Indonesia.

d. Information dissemination in “Data Information Center”

The third important activity is to collect data in one place (NEONET data system), to control and manage data quality, and to change data into useful information for Indonesian people in Indonesian language as well as English together with climate variation forecast model data available. This activity will let Indonesian decision makers notice that atmospheric and oceanic observation and modeling analysis by Indonesia are useful for Indonesia and also contribute substantially to GEOSS (Global Earth Observation System of Systems).

c. Ultimate goals and its future

The laboratory will be initially managed and operated by scientists from the two countries. However, recognizing the importance of its location for global climate variations and change, we welcome participations and contributions from other institutes in other countries. We believe that scientific understandings of atmosphere and ocean in the IMC region by multinational collaboration can benefit to Indonesia as well as world scientists and human beings thorough societal application study. As the ultimate goal, it is expected that at least ten scientific papers per year will be published, in which Indonesian scientists will contribute at least as co-author.

3. POSSIBLE CONTRIBUTIONS TO GROBAL TROPICAL MOORED BUOY ARRAYS (GTMBA) AND GROBAL OCEAN OBSERVATION

The project, if success, will impact to the way to maintain and operate GTMBA (McPhaden, et al 2009), because existing surface buoys for climate monitoring in the open ocean have been developed, maintained, and operated only by US/NOAA and Japan/JAMSTEC as ATLAS (Automated Temperature Line Acquisition Sytem) buoy and TRITON (or m-TRITON) buoy, respectively, and this is the first project that ODA funding support to develop surface moored buoy system for climate monitoring. If Indonesia success development and operation without any support after the project, Indonesia will be the third buoy provider to GTMBA. The success will encourage other interested countries to participate GTMBA by their technology. After the project, our ultimate goal is that our international laboratory will be able to support other Asian countries to develop surface buoy technology.

Finally, we welcome any comments on the roles of the planned new laboratory to GTMBA and global ocean observations. Especially we believe that

this laboratory will contribute to the RAMA array and the TAO/TRITON array as one of the important ocean observational bases and one of surface buoy technological development bases.

ACKNOWLEDGEMENT

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REFERENCES

1. McPhaden et al, 2009: Global Tropical Moored Buoy Array, in Proceedings of the “OceanObs’09: Sustained Ocean Observations and Information for Society” Conference Vol.2, Venice, Italy, 21-25 September 2009, Hall, J., Harrison D.E., and Stammer, D., Eds., ESA Publication WPP-306, 2010.