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Tropical moored buoy array: TRITON buoy array in the western Pacific and eastern Indian Oceans

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The TRITON surface buoy array in the western Pacific was born in 1999 with inter-comparison to TAO ATLAS buoy in the western Pacific, and started its operation in January 1st 2000 as of one wing of Pacific TAO/TRITON buoy array. In the eastern Indian Ocean, two TRITON buoys deployed in October 2001 were the initiation of the current RAMA array at 1.5S-90E and 5S-95E. At present, JAMSTEC is operating fifteen surface buoys in the western Pacific Ocean and three surface buoys in the eastern Indian Ocean. Only counted from our science team of JAMSTEC, we published about 60 scientific papers using TAO/TRITON and RAMA array data. As an example of recent achievements in JAMSTEC, the time series analysis of the mooring buoy in the eastern equatorial Indian Ocean observed details of subsurface ocean conditions associated with IOD events in 2006, 2007, and 2008. IOD is one of the inter-annual climate variability in the Indian Ocean, associated with the negative (positive) SST (Sea Surface Temperature) anomaly in the eastern (western) equatorial region developing during boreal summer/autumn seasons. In the 2006 IOD event, large-scale sea surface signals in the tropical Indian Ocean associated with the positive IOD started in August 2006, and the anomalous conditions continued until December 2006. Data from the mooring buoys, indeed, captured the first appearance of the negative temperature anomaly at the thermocline depth with strong westward current anomalies in May 2006, about three months earlier than the development of the surface signatures. Similar appearance of negative temperature anomalies in the subsurface were also observed in 2007 and 2008, while the amplitude, the timing, and the relation to the surface layer were different among the events. These subsurface evolutions within the ocean would be a key factor for better understanding of IOD mechanisms and its predictability. Engineering developments in JAMSTEC are also essential to contribute sustaining and developing ocean observations. The TRITON buoy, which has been used since 2000, is tough to various oceanic and atmospheric conditions, and its data recovery rate from whole array in 2000-2005 was high (average is more than 90% in average). Because of several disadvantages such as difficulties to deploy and recover by a smaller vessel etc., we have developed a new smaller and lower cost surface buoy system with flexibility in modifying electric system, named m-TRITON buoy system. This new m-TRITON buoys were already placed at Indian Ocean TRITON buoy sites at 1.5S-90E and 5S-95E, which is the site of RAMA array, under the financial support of MEXT (Ministry of Education, Culture, Sports, Science and Technology). Several CLIVAR-endorsed projects such as NPOCE and SPICE in the western Pacific, and CINDY in the Indian Ocean have started for better understanding of ocean circulation and climate system. Those projects are being designed based on sustained ocean observing systems of RAMA, TAO/TRITON, Argo and so on. Implications of current sustained observing system are not only for original scientific purpose of each system, but also for promoting new scientific projects. Furthermore, such new CLIVAR projects will bring new insights to the existing observing systems to develop and modify these.