## **Changing Climate in Indo-Pacific Sector**

<sup>1,2</sup>Swadhin Behera, <sup>1,2</sup>Jing-Jia Luo, <sup>1,3</sup>Yukio Masumoto and <sup>2,3</sup>Toshio Yamagata
<sup>1</sup>Climate Variation Predictability and Applicability Research Program, Research Institute for Global Change, JAMSTEC, Japan
<sup>2</sup>Application Laboratory, JAMSTEC, Japan
<sup>3</sup>Earth and Planetary Science, University of Tokyo, Japan

Our society is increasingly getting aware of the threat of global warming. While it remained a challenge for the mankind to develop resilience against this threat, there is a further need for us to pay attention to the natural climate variations and associated disasters that are expected to rise under the global warming stress. The world oceans play an important role in the Earth's climate system. The tropical oceans give rise to modes of climate variations such as the El Nino/Southern Oscillation (ENSO) and the Indian Ocean Dipole (IOD) and the recently recognized ENSO Modoki mode in the Pacific.

The IOD influences the East African region so much so that it overwhelms the influence arising from ENSO. On the eastern side of the Indian Ocean, IOD and ENSO have comparable impacts on Indonesia. During positive IOD and El Nino events, Indonesia suffers from severe droughts and forest fires. Most rivers run dry. These climate phenomena also influence high-frequency weather events by either favoring or destroying their generation mechanisms. It is therefore very important to study the physical and dynamical processes of tropical oceans and atmosphere, to understand and predict these climate modes and their influences.

Interestingly, changes in the characteristics of IOD and ENSO are recognized recently. A rare case of three consecutive IODs was observed in the Indian Ocean during 2006-2008. The El Nino of 2009 was quite unusual as the peak SST warming was observed in the central Pacific, which a characteristic of El Nino Modoki. As found in recent analyses, most recent events in the Pacific appear as El Nino Modoki rather than El Nino. Therefore, the influences arising from the tropical Pacific during these events have changed dramatically. In addition, the interaction between Indian and Pacific Oceans have also changed favoring conducive conditions for the IOD formations.