

Preface

National Basic Research Program of China (973 Program) Indo-Pacific Oceanic Channel Project Special Issue

Guest editors

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1 INTRODUCTION

The tropical Indo-Pacific Oceans span over two-thirds of the global tropical oceans. A major warm pool with the highest large-scale sea surface temperature of the global oceans is located in the western Pacific and eastern Indian Oceans. The climate systems over the tropical Pacific and Indian Oceans are subject to strong ocean-atmosphere coupling at multiple scales from intraseasonal to interannual, and to centennial. The strongest interannual variability of the global climate system, the El Niño and the Southern Oscillations (ENSO), is a result of the strong ocean-atmosphere coupling in the tropical Pacific Ocean. In addition, the tropical Indian Ocean is subject to the strong interannual variations associated with the Indian Ocean Dipole (IOD). The proximity of ENSO and IOD across the Indonesian maritime continent suggests that they interact with each other through the atmospheric bridge and/or the oceanic channel of the Indonesian Throughflow (ITF). These interactions between ENSO and IOD and their decadal to centennial variations have a strong impact on the East Asian Monsoon system.

Existing studies of the ENSO-IOD interactions have focused on the atmospheric bridge, i.e. the Walker Cell circulation over the tropical oceans. The interactions of the climate systems through the

oceanic channel, i.e. the variations of the ITF, have been overlooked in the past. Recent studies suggest that ENSO can be predicted at the one year lead time if IOD is used as a precursor. The dynamics behind the connectivity and predictability have not been disclosed before and the general impact of this predictability on the Indo-Pacific climate variability has not been studied.

2 INNOVATIVE STUDIES

The papers published in this Global Change 973 (GC973 in abbreviation) special issue originate from the scientific researches funded by the National Basic Research Program of China (973 Program) of the Ministry of Science and Technology of China with the title “Response of the Ocean to Global Warming and their impact on China Marginal Sea Carbon Storage and East Asian climate” (ROME in abbreviation). The special issue contains 14 full-length papers with the subjects of research covering the Indo-Pacific climate interactions, the cyclone studies in the northwestern Pacific, the Kuroshio and ecosystem studies in the East China Sea, and sediment analysis to understand the carbon storage in the marginal seas of northern China. Three of the papers

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focus on the dynamics of the oceanic channel teleconnection governing the precursory relation between IOD and ENSO (Yuan et al., 2018, this issue), on the northwestern Pacific tropical cyclones modulated by Indo-Pacific sea surface temperature anomalies (SSTA) during super El Niños (Zhan et al., 2018, this issue), and on the Indo-Pacific SSTA influenced by two types of El Niño events (Hu et al., 2018, this issue); one paper studies the spatial and temporal variations of the Kuroshio east of Taiwan (Qi et al., 2018, this issue); three on the nutrient and ecosystem dynamics of the marginal seas (Hu et al., 2018; Wang et al., 2018; Zhang et al., 2018, this issue); five on the carbon storage in the bottom sediments in the Yellow and East China Seas (Lin et al., 2018; Wang et al., 2018; Xu et al., 2018a, b; Zhu et al., 2018, this issue); and two papers on the analyses of sediment samples collected in the Xisha Islands in the South China Sea and at a location south of the Shandong Peninsula in the Yellow Sea are also collected to understand the processes of carbon deposition (Qiu et al., 2018; Xu et al., 2018, this issue).

The influence of IOD on ENSO is an important aspect of the Indo-Pacific climate variations. The disclosed dynamics of the IOD-ENSO precursory relation associated with the ITF changes suggest the predictability of about half of the SSTA variability in the cold tongue associated with ENSO beyond the one-year lead time if IOD is used as a precursor (Yuan et al., 2018, this issue). The primary hypothesis is that the ocean upwelling off Java associated with IOD should propagate through the Indonesian seas to reach the western Pacific Ocean to impact ENSO evolution. The papers in this special issue have presented evidence of the IOD-ENSO interactions and predictability, which are innovative studies over the Indo-Pacific Ocean (Yuan et al., 2018, this issue).

While the papers collected in this special issue are somewhat not as thematic as in the 973 project, due to the high standard of the Journal of Oceanology and Limnology that has turned down a number of manuscripts during the review process, the proposed hypothesis is to study the carbon storage in the Yellow and East China Seas based on the disclosed connectivity and dynamics of the monsoon and ocean currents over the marginal seas. We take two approaches: one is to study the carbon storage carried by the cross-shelf currents into the subsurface of the Kuroshio; the other is to estimate the carbon storage directly from the sediment core samples over the

shelf. The seven papers published in the GC973 special issue cover the second topic using the research methods of Cenozoic marine geology. All seven papers represent cutting-edge studies in their research fields. The first five papers focus on the centennial-scale records and sequestration of sedimentary carbon in the East China Seas (Lin et al., 2018; Wang et al., 2018; Xu et al., 2018a, b; Zhu et al., 2018, this issue). The other two papers deal with the sediments in the Yellow Sea and in the northern South China Sea (Qiu et al., 2018; Xu et al., 2018, this issue). In particular, one paper reports the novel discovery of ferroan dolomites in Miocene sediments in Xisha Islands in the South China Sea (Xu et al., 2018, this issue). We expect these papers to become mainstream directions in their research fields in the near future.

3 BACKGROUND

The Chinese Journal of Oceanology and Limnology is the primary scientific journal in China publishing original research results related to physical, geological, and biogeochemical processes in the oceans and lakes. The journal has been included by the international Scientific Citation Institute as an SCI-E journal in 2008. The name of the journal is changed into Journal of Oceanology and Limnology since 2018. We are glad that this GC973 special issue has become the first publication of this prestigious journal with a new name.

Traditionally, the scientific papers published in the Chinese Journal of Oceanology and Limnology focus primarily on the research results in the marginal seas of China. As more and more climate-related researches are funded in China and in the surrounding countries, there is a high demand for a journal with readers of focused interests to publish new research results associated with the regional impact of global climate change. This has given an impetus to the newly-named Journal of Oceanology and Limnology to organize a special issue related to climate variations and global change. Our GC973 special issue has come up at the right time.

4 ACKNOWLEDGMENT

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