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Preface

"Biogeochemistry and ecosystems in the western north Pacific continental margins under climate change and anthropogenic forcing"

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The special issue on "Biogeochemistry and ecosystems in the western north Pacific continental margins under climate change and anthropogenic forcing" is a product of collaboration between different fields in ocean sciences from many communities bordering the western North Pacific Ocean. The collaboration transcends not only disciplinary boundaries but also geographical borderlines. This special issue has drawn outcomes from regional research projects, including CHOICE-C, CREAMS, LORECS and SEATS, which are closely related to international research projects on global environment change such as IMBER, LOICZ and SOLAS (See Table 1 for acronyms and abbreviations).

It has been widely recognized that continental margins, which include coastal zones, continental shelves, boundary current systems and marginal seas (Liu et al., 2010), are the hot spots in the ocean with the most active biogeochemical processes where the ecosystems are vulnerable to multiple stressors from both climate change and direct anthropogenic disturbances (e.g., Doney, 2010). The marginal seas of the western North Pacific Ocean are especially sensitive to climate variation, because they are adjacent to the western Pacific warm pool, and subject to the climate-responsive forcings of the East Asian monsoons, the buoyancy forcing of several large rivers, and oscillations of the atmosphere–ocean coupled system, such as the El Niño–Southern Oscillation (ENSO). Continental margins in this region are bordered by the world's most densely populated coastal communities and receive runoffs from highly populated large river basins, such as the Chang Jiang, Pearl and Mekong rivers. It is conceivable that considerable anthropogenic chemical loadings are being discharged to continental margins via the large rivers. Aside from river loads, the airborne fluxes of materials, including macro- and micronutrients, as well as the ever-increasing atmospheric CO_2, all exert increasing stresses on this region.

In order to address the aforementioned issues related to marine ecosystems and biogeochemistry, we organized a special session at the 2012 Ocean Sciences Meeting in Salt Lake City, USA. Based on the contributions, we proposed a special issue of the collected papers to be published in *Biogeosciences*. We have also invited additional contributions on interactions between physical–biogeochemical processes and the ecosystem and consequences of human perturbations on these margins.

Most of the contributions are output from a few well-organized regional integrated research projects. CHOICE-C, endorsed by SOLAS, is a multiple-PI project sponsored by the China National Basic Research Program (973), with the funding period from 2009 to 2013. CHOICE-C focuses on the carbon budget, controls, ecological responses and future changes in coastal ocean systems. The focal area includes, but is not limited to, the continental shelves in both the South and East China seas. Through an integrated study of the carbon cycling via field observations, remote sensing and numerical modeling with a contrast/comparison strategy, CHOICE-C aims to determine the source and sink terms of

Table 1. List of acronyms and abbreviations.

CHOICE-C	Carbon cycling in China Seas – budget, controls and ocean acidification
CREAMS	Circulation Research of the East Asian Marginal Seas
EAST	East Asian Seas Time-series
ECOBEST	Effects of Global Change on Ocean Biogeochemistry and Ecosystems in the Seas surrounding Taiwan in the Northwest Pacific
IMBER	Integrated Marine Biogeochemical and Ecosystem Research
LOICZ	Land-Ocean Interaction in the Coastal Zone
LORECS	Long-term Observations and Research of the East China Sea
MOST	Ministry of Science and Technology
NSFC	National Natural Science Foundation of China
PICES	North Pacific Marine Science Organization
SEATS	South East Asian Time-series Study
SOLAS	Surface Ocean Lower Atmosphere Study

atmospheric CO_2 (e.g., Zhai et al., 2013) and their associated controlling processes (e.g., Dai et al., 2013). What follows concentrates on the ecological response of the uptake of anthropogenic CO_2 (e.g., Gao et al., 2012).

CREAMS began in 1993 as a Japan–Korea–Russia international research program to understand the water mass structure and circulation in the Japan/East Sea (e.g., Kang et al., 2003). As the countries involved in CREAMS research are all members of PICES, the necessity for strong ties between PICES and CREAMS was recognized. As a result, an official CREAMS/PICES study over the Japan/East Sea was approved as the EAST-I project in 2005. Within the scope of CREAMS/PICES, close cooperation has been expanded over the Yellow Sea and East China Sea area for the EAST-II project at the present time.

The LORECS project, which was carried out from August 2000 to July 2009 with the support of the National Science Council of Taiwan, which has recently become MOST, aimed to investigate the impacts of external forcing (including typhoons, dusts and water impoundment) on biological production (e.g., Gong et al., 2011) and the interaction between ecosystem structure and the carbon cycle. It is now followed up by the ECOBEST project. The SEATS project was initiated in 1998 by the National Center for Ocean Research, which has now been replaced by the Taiwan Ocean Research Institute. The SEATS station has been situated in the vicinity of 18° N, 116° E in the South China Sea since 1999. The primary goals of SEATS (Wong et al., 2007) were to investigate the interactions between the upper water column and the atmosphere, and how such processes drive the biogeochemistry and the ecosystem in the northern South China Sea.

As summarized in the latest IPCC assessment report, "ocean properties of relevance to climate have changed during the past 40 years, including temperature, salinity, sea level, carbon, pH, and oxygen" (Rhein et al., 2013). It is arguable that continental margins are the most impacted marine environments, not just by climate change but also by direct human disturbances. This special issue will likely be succeeded by more publications of its kind with wider scopes and more profound inquiries into the interactions between physics, chemistry, biology and societies for better governance of continental margins so as to sustain the ecosystem services and functions crucial to the survival of human beings.

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