
Preface

The idea of publishing a monograph on the Changjiang (Yangtze River) Estuary came to us about 5 years ago, when a research team of State Key Laboratory of Estuarine and Coastal Research, East China Normal University (Shanghai) was awarded by the Natural Sciences Foundation of China (NSFC) with the title “Creative Research Group”. This award offered an opportunity for creating a network for cross-disciplinary study from watersheds of Changjiang to the continental margin of East China Sea through joint efforts of East China Normal University with collaborations of other research institutions in China.

Among the top five largest rivers on this planet, Changjiang is unique in several aspects. For instance, the population density of Changjiang watersheds is on average ca. 250/km², which is high relative to other river systems like the Amazon, Congo, Orinoco, and Brahmaputra. Hydraulic engineering is also very extensive in the watersheds of Changjiang, more than 50×10^3 reservoirs have been created through dam constructions over the past 60 years; agricultural activities are intensive with application of huge amount of chemical fertilizers that cause continuous increase in the concentration of plant nutrients (e.g. dissolved inorganic nitrogen) in river water over the past five decades. Therefore, if someone would like to know how human activities affect the river drainage basin with consequences of change in seaward fluxes, the lessons we have learned through cross-disciplinary studies in the Changjiang would be an example to refer to.

The East China Sea has 71 % of shelf area, which is among the top 10 largest continental margins of the world. The western boundary current of the Pacific Ocean at sub-tropical and temperate region, i.e. Kuroshio, flows through the East China Sea with a water flux of 25–30 Sv (1 Sv = 10^6 m³/s), similar to the Gulf Stream of the North Atlantic Ocean. So if a colleague would like to examine how the interaction between boundary current and large rivers over a wide shelf area can affect the coastal ecosystems through biogeochemical dynamics, the results from the East China Sea can be an illustration. Indeed, when examining the complex aspects of land-ocean interactions, watersheds of the river and the recipient coastal environment have to be taken into consideration together, both for the merit of scientific research and for the purpose of adaptive management of ecosystems.

People may believe that rivers have an important effect on the coastal environment, indeed standing by the bank and/or on the bridge, one can be deeply impressed by the large quantity of water and sediments carried by the river flow to the ocean; for example, the Changjiang has a water flux of ca. 30×10^3 m³/s and a river mouth 90 km wide. This impression is, however, not necessarily true. In the case of East China Sea, the exchange of Kuroshio with shelf amounts to 3–4 Sv of water, including the water flow through Taiwan Strait, which is almost two orders of magnitude higher than the collective fresh water influx in which Changjiang accounts for 90 %. Thus, the exchange of energy and materials across the shelf break can have a dramatic impact not only on the circulation and biogeochemical cycles of coastal environment that drives the function of ecosystem through bottom-up mechanism, but also the fate of terrestrial pollutants over the shelf, and the export flux into the open ocean, with strong feedback to the atmosphere as well (e.g. uptake and/or emission of CO₂). In this aspect, the

multidisciplinary studies of East China Sea have provided the audience with knowledge and experience.

The systematic research activities of Changjiang started in the 1950s, and the Institute of Estuarine and Coastal Research at East China Normal University was established in 1957, among the first groups of research institutions focusing on the estuarine and coastal sciences. In the 1990s, the Institute of Estuarine and Coastal Research at East China Normal University was promoted to be the State Key Laboratory of Estuarine and Coastal Research with three cross-linked foci: geomorphology and climate change, hydrography and sedimentary dynamics, biogeochemistry and ecology, with broad collaborations with other research institutions in China. Thus, the results presented in this book show the recent research progress that is based on the synthesis of existing knowledge and digestion of data generated by a multidisciplinary team. It should be kept in mind, however, that this monograph provides by no means a historical overview of scientific approaches on the “Ecological Continuum from the Changjiang (Yangtze River) Watersheds to the East China Sea Continental Margin” nor a summary of previous research results. Rather, in this book we tried to examine the very dynamic system in the continuum from the watersheds of Changjiang to the continental margin of East China Sea through the critical point of view of ecosystem function, which needs absolutely an approach of cross-disciplinary studies. As the reader can see from this work, the individual chapters of this monograph cover the research disciplines of hydrodynamics, sedimentary geology, geography and geo-morphology, ecology, fishery, as well as biogeochemistry and environmental sciences, etc.

We believe that knowledge generated from the watersheds of Changjiang across to the East China Sea is useful as reference to the scholar of land-ocean studies in the continuum of the river drainage basin to the continental margins. We hope that the lessons learned from the Changjiang watersheds and East China Sea will help colleagues to avoid having similar negative effects when promoting economic innovations in other places in the world.

Undertaking cross-disciplinary studies is a team work and needs continuous financial and logistic countenance. Although at the end of individual chapters my colleagues have expressed their gratitude to their colleagues, I would like to thank those people again, including our friends and students who have helped in the elaboration of field and sea-going observations as well as the generation of data in the laboratory. Also, I appreciate very much our funding agencies, particularly the Natural Sciences Foundation of China (NSFC), Ministry of Education (MOE), Ministry of Science and Technology (MOST) as well as the Municipality of Shanghai through its Commission of Science and Technology, for their continuous supports to the research efforts in this monograph.

Before ending this preface, we would like to take this opportunity to express our gratitude to Prof. Jean-Paul Ducrotoy who guided us in preparing for this monograph. Colleagues from Springer, including Alexandrine Cheronet, Judith Terpos, and Betty van Herk, etc., are acknowledged for their very kind support in publishing this work.

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