DOI: 10.1111/iar.12290

WILEY Island Arc

PREFACE

Virtual issue: Land-ocean linkages and biotic evolution during the Cretaceous: Contribution from Asia and Western Pacific (IGCP608)

1 | OUTLINE OF IGCP PROJECT 608

The International Geoscience Programme (IGCP) Project 608 entitled '*Cretaceous ecosystems and their responses to paleoenvironmental changes in Asia and the Western Pacific*', was started in March 2013 after approval by the IGCP Scientific Council. It has lasted for 6 years until 2018 including the official 5 years and an extension year, 2018. The project was aimed at delineating Cretaceous ecosystems and their response to the paleo-environmental changes that affected the South-East Asian and adjacent Western Pacific region, as enunciated in IUGS *Episodes* (vol. 36, no. 2, p. 138). This project comprises two major research components that were to be undertaken during the project tenure of 6 years: (i) variations of Cretaceous terrestrial and marine environments and (ii) evolution of Cretaceous terrestrial and marine ecosystems in Asia and the Western Pacific. The members have continuously carried out detailed investigations to gather paleoenvironmental and biotic information from terrestrial and marine strata based on studies of stratigraphic frameworks, lithological, geochemical and biogenic indicators, and characteristic of marine and terrestrial fossils. IGCP608 has an important role in promoting geoscience communication among various Asian countries, and also in some countries outside Asia, following the preceding East Asian Cretaceous IGCP projects 350 (Okada & Mateer, 2000), 434 (Hirano & Johnson, 2003) and 507 (Hasegawa & Ando, 2011; Lee & Weissert, 2010).

We held six international symposiums of IGCP608 since 2013 at (i) Birbal Sahni Institute of Palaeosciences, in Lucknow, India, 20–22 December 2013; (ii) Waseda University in Tokyo, Japan, 4–6 September 2014; (iii) Liaoning Mansion Hotel, Shenyangon, China, 15–17 August 2015; (iv) Trofimuk Institute of Petroleum Geology and Geophysics of Siberian Branch of Russian Academy of Sciences, Nobosibirsk, Russia, 15–17 August 2016; (v) International Convention Center Jeju, Jeju Island, Korea, 26 October 2017; and Charoen Thani Hotel, Khon Kaen, Thailand, 15–16 November 2018.

This virtual issue '*Land-Ocean Linkages and Biotic Evolution during the Cretaceous: Contribution from Asia and Western Pacific (IGCP608)*' presents our scientific results as proceedings of the First and Second Symposiums at Lucknow, India in 2013, and Tokyo, Japan in 2014, respectively.

2 | CONTENTS OF THIS ISSUE

This issue contains a total of 14 articles that deal with stratigraphy (article number 13 as listed below), geochronology (7, 13, 14), sedimentology (13), paleobotany (5, 6, 10, 11), vertebrate paleontology (1, 2, 3, 8), micropaleontology (9, 10, 11), organic geochemistry (4), tectonics (12), etc. in South and East Asia and the Western Pacific region. The main research areas range across seven countries: China (10), India (2, 3, 6, 8), Japan (1, 4, 7), Korea (14), Mongolia (13), Philippines (9), and Russia (5, 11, 12). These articles offer a wide range of new data and new perspectives on paleogeography, paleobiogeography, paleoenvironment, paleoclimates, biotic evolution, geologic history, and so on. This issue will surely contribute to a better understanding of (i) variations in Cretaceous terrestrial and marine environments and (ii) evolution of Cretaceous terrestrial and marine ecosystems in Asia and the Western Pacific. The total number of authors who contributed to this issue is 60, representing 10 countries including two European nations. A brief summary of each article is given below:

1. Nao Kusuhashi and others describe a mammalian dentary discovered in the Coniacian Ashizawa Formation, Futaba Group, northeastern Japan. Although this specimen is a small fragmentary horizontal ramus of a left edentulous dentary, X-ray microcomputed tomography images show the dentary and root structure of a therian mammal. This first discovery of a Mesozoic therian mammal in northeastern Japan suggests the potential for further mammal discoveries in the Cretaceous System in northeastern Japan. This paper will be a milestone for the future understanding of the mammalian evolution in East Asia during the Late Cretaceous.
2. Guntupalli V. R. Prasad and Indian co-authors discovered three isolated fragmentary archosaur teeth from the upper part of marine Cretaceous rocks of the Bagh Group in the lower Narmada valley, central Western India. The two teeth are identified with abelisaurid dinosaurs and the third one with an indeterminate crocodile. The abelisaurid teeth conform to the premaxillary and maxillary tooth morphology of *Majungasaurus* and *Indosuchus*. Although no associated age diagnostic fossils are found,

these specimens are considered to represent a pre-Late to Late Maastrichtian age. The two dinosaur teeth, therefore, constrain the stratigraphic range for abelisaurid dinosaurs from the Indian subcontinent.

3. Ranjit Singh Lourembam and two co-authors recovered a rich microvertebrate fauna represented by fish, amphibians, crocodiles, snakes, and dinosaurs, from the Upper Cretaceous intertrappean beds of Deccan Volcanic Province, Central India. They describe an ichthyofauna consisting of rays, gars, bony tongues, catfish, and ray-finned fish (Pycnodontidae). The composition of this ichthyofauna is suggestive of a nearshore, deltaic, or estuarine palaeoenvironment and Late Cretaceous (Maastrichtian) age for the intertrappean beds. Based on the faunal similarity with other intertrappean beds, they had suggested that the investigated intertrappean beds were deposited in a coastal-plain environment and a marine seaway connecting Central India with the southeastern coast existed along the Godavari graben during the Late Cretaceous.
4. Takuto Ando and Japanese co-authors demonstrate the utility of biomarker analyses for evaluating maturity of organic matter and depositional environments such as redox conditions for two offshore-marine mudstone-dominated sections across the Cenomanian–Turonian boundary (CTB) in the Saku Formation of the Yezo Group, northern Hokkaido, Japan. Their results suggest that the redox variations were basically related to a local environmental setting rather than to global anoxia. However, the prominent anoxic signals observed in another biomarker index of a section can be a distinctive, and possibly global, event in the Northwest Pacific just before the OAE2.
5. Elena Volynets and Eugenia Bugdaeva discuss the taxonomic composition of the Aptian–Cenomanian macroflora collected from the Razdolnaya coal Basin, Primorye, Russian Far East. They show the stratigraphic changes in relative abundances of the main plant groups including angiosperms along seven substages from the lower Aptian to upper Cenomanian. These changes may reflect climatic and paleoenvironmental changes in the studied region. They report the fossil angiosperms of *Dicotylophyllum* sp. and some indeterminable platanoids in the upper part of the Aptian–lower Albian Lipovtsy Formation (Late Lipovtsy floral assemblage).
6. Neeru Prakash and Neelam Das propose a new species of Caytoniales, pteridosperms (seed ferns) for the well-preserved fossil microsporophyll organ from the Lower Cretaceous Bansa Formation, South Rewa Basin, Central India. This occurrence provides important information for the origin of Caytoniales and the paleophytogeography during the Mesozoic in the Gondwana realm.
7. Yukiyasu Tsutsumi and two co-authors investigated the numerical depositional age of the Upper Cretaceous Himenoura Group in the Amakusa-Kamishima Island area, southwest Japan. Their measured zircon U–Pb ages for acidic tuff samples show that the group was mainly deposited during the early Santonian to early Campanian which is consistent with biostratigraphic ages. Since not all zircons in tuff samples indicate depositional ages of the two tuff beds, they point out that statistical evaluation of the age data is very important to determine depositional ages of the tuff beds.
8. Guntupalli V. R. Prasad and Indian co-authors describe a newly found shark fauna recovered from the upper part of the marine Cretaceous Bagh Group (Coniacian to Late Maastrichtian), in the lower Narmada valley, Western India. The fauna includes *Ptychodus*, *Scapanorhynchus*, *Cretodus*, *Cretalamna*, and *Squalicorax*, namely, previously widely documented genera from the Cretaceous deposits worldwide. This demonstrates a clear change in elasmobranch faunal composition of India from cool-temperate water forms in the early Late Cretaceous to cosmopolitan forms in the Late Cretaceous, consistent with the change in latitudinal position of India.
9. Karlo L. Queaño and co-authors investigated radiolarian assemblages of chert within the serpentinite matrix of the Dos Hermanos Mélange, the northwestern marginal region of Luzon Island, Philippines. The radiolarian biostratigraphy constrains the stratigraphic ranges of the chert units to the uppermost Jurassic to Lower Cretaceous. These results provide evidence for the existence of a Mesozoic basinal source from which the cherts and associated rocks were derived. Furthermore, by comparison with other mélanges of the Central Philippines in age and lithologic composition, arc–continent collision processes are better explained for the western part of the Central Philippine archipelago.
10. Peihong Jin and Chinese co-authors successfully described a megafloral and diverse palynomorph assemblage from the Lower Cretaceous Guyang Formation in Inner Mongolia, China. A total of 56 genera were identified, dominated by Taxodiaceae of Coniferales, Cycadophyta, and Ginkgopsida among gymnosperms, and Lygodiaceae and Cyatheaceae among pteridophytes. Quantitative analysis indicates the presence of a closed coniferous forest dominated by Podozamitales, *Picea* and *Podocarpus* with understory vegetation comprising ferns. These lines of evidence suggest that Inner Mongolia was under warm and humid subtropical climate during the Early Cretaceous.
11. Eugenia V. Bagdaeva and Valentina S. Markevich describe the palynomorph composition and dispersed cuticles derived from plant leaves in seven Early Cretaceous coal-forming successions of East Siberia and the Russian Far east. Their results demonstrate that the Early Cretaceous plant communities in swamp and nearby of the Transbaikalia, Amur River, and Primore regions, consist of the ginkgoaleans (*Pseudotorellia*, *Sphenobaiera*, and *Baierella*), bennettites, and conifers having pinaceous, taxodiaceous, araucariaceous affinity, as well as extinct cheirolepidiaceous and miroviaceous plants.
12. Galina Kirillova comprehensively reviewed the tectonic and biostratigraphic setting of the eastern continental margin of the Russian Far East. The tectonic background of several sedimentary basins of three major types and some tectonostratigraphic units are discussed for reconstructing the paleogeography and geological history of the Russian Far East. Three wide-scale paleobiogeographical maps showing faunal and floral provinces during the Valanginian, Albian, and Maastrichtian are valuable

additions to the basic database achieved by the efforts of Russian geologists over the years in this region.

13. Hitoshi Hasegawa, and co-authors including 10 Japanese, 5 Mongolian, 1 Chinese, and 1 German, present depositional ages and facies of Middle–Upper Jurassic and Lower Cretaceous, oil-shale bearing lacustrine strata in Gobi Desert, southeastern Mongolia. FT and U–Pb ages of zircons derived from intercalated tuffs and K-Ar ages of intercalated basalts indicate that the studied Eedemt and Shinekhudag Formations were deposited at around 165–158 Ma (Callovian–Oxfordian) and 124–118 Ma (early Aptian), respectively. Micrometer-scale lamination of dark gray shale and dolomite couplets observed in both the formations appear to record the multi-scale cyclicity of sedimentary environments controlled by precipitation, climatic changes, etc. within the intracontinental extensional basins of the paleo-Asian continent.
14. Tae-Ho Lee and his co-authors investigated the lower Nakdong Formation, the lowermost basin-infill sediments of the Early Cretaceous Gyeonsang Basin in southeastern Korea, through SHRIMP U–Pb dating of detrital zircon grains. They suggest that the youngest Cretaceous age populations from the southern, central, and northern regions, ca 127 Ma within the Barremian, show the depositional age of the Nakdong Formation which coincides with the timing of initiation of the Gyeongsang Basin. This geochronological study will improve the tectonic and paleogeographical reconstruction in East Asia.

ACKNOWLEDGEMENTS

We thank the contributors to this virtual issue for their support to IGCP Project 608 activities, and the Editor-in-Chief, M. Ito for his encouragement in planning this issue. We also thank F. Hirsch for time-consuming English correction and H. Nishi for his editorial support. We express our appreciation to all the authors for their remarkable contributions to IGCP608. We would also like to acknowledge the helpful work of all the reviewers of these articles and we thank, the Editor-in-Chief, M. Ito and T. Muto and the editorial office that supported us during the editorial processes of this issue. This study was supported by Grant-in-Aid for Scientific Research (B), JSPS Grant Numbers: 25302011.

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How to cite this article: Ando H, Hasegawa T, Wan X, Cheong D, Bajpai S, Prasad GVR. Virtual issue: Land-ocean linkages and biotic evolution during the Cretaceous: Contribution from Asia and Western Pacific (IGCP608). *Island Arc*. 2018;e12290. https://doi.org/10.1111/iar.12290