



## **Achievements of IGCP 350 “Cretaceous Environmental Change in East and South Asia”: summary**

HAKUYU OKADA

Oyo Corporation Kyushu Office, 2-21-36 Ijiri  
Minami-ku, Fukuoka 811-1302  
Japan

**Abstract:** The IGCP 350 activity (1993–1997; OET: 1998) has been successfully achieved by participation of more than 200 scientists from 23 countries. Major achievements of the activity are summarized regarding international meetings, publications, and scientific results on stratigraphy and correlation, plume-related events, biological, physical, and chemical aspects of environmental change, climate environments, and natural resources.

### **INTRODUCTION**

The activity of IGCP 350 “Cretaceous Environmental Change in East and South Asia” (1993–1997; on-extended-term 1998) has successfully come to the goal with participation of 23 countries and more than 200 scientists. This project, launched in 1993 as a successor to IGCP Project 245 “Nonmarine Cretaceous Correlations” (1986–1991; Co-leaders: N.J. Mateer and Chen Pei-ji), has aimed to better understand environmental and biological changes in eastern and southern Asia (including southeastern Asia) during the Cretaceous Period by coordinated inter- and multi-disciplinary research in sedimentology, paleontology, geochemistry, tectonics and geophysics. In order to confirm synchronicity of environmental change events, the integrated study of bio-, litho-, magneto-, and chemostratigraphy has been encouraged. For this purpose, the approaches from tectonics, sedimentation, stratigraphic correlation, biotic analysis, igneous activity and resources were adopted.

The project has also attempted to link the Tethyan, proto-Pacific and Boreal realms (Okada, 1995a). In addition, the project has encouraged all the efforts to collect event-like features that may have been related to large-scale igneous activity during the Cretaceous (Okada, 1995b).

In order to facilitate the organization of the project, regional coordinators have been designated for several important regions. Thus, plenty of fruitful results have been achieved as summarized below. I am afraid many important papers are not

included in this summary, but it is solely on my own responsibility.

### **RESULTS OF ACTIVITIES**

#### **1. Participating countries and the working groups**

23 countries have participated in the activity of IGCP 350. They are Afghanistan, Australia\*, Bhutan, Canada, China\*, France, India\*, Indonesia\*, Japan\*, Korea\*, Malaysia\*, Mongolia\*, Myanmar, New Zealand\*, Pakistan\*, Papua New Guinea\*, Philippines\*, Russia\*, Spain\*, Thailand\*, U.K., U.S.A. and Viet Nam\*. The national working groups have been established in the countries with asterisk listed above.

#### **2. International Meetings**

Seven international meetings were held as follows:

- 1) 1st Meeting for the Regional Coordinators in Fukuoka, Japan (Nov. 3–8, 1993)  
*Convened by Prof. H. Okada (Kyushu Univ.)*
- 2) 2nd Meeting (Symposium) in Taegu, Korea (Aug. 24–29, 1994)  
*Convened by Prof. K.H. Chang (Kyungpook Natl. Univ.)*
- 3) 3rd Meeting (Symposium) in Quezon City, Philippines (May 7–14, 1995)  
*Convened by Prof. P.J. Militante-Matias (Univ. Philippines)*
- 4) 4th Meeting (Symposium) in Beijing, China (Aug. 3–8, 1996)

Convened by Prof. Chen Pei-ji (Nanjing Inst. Geol. Palaeont., Academia Sinica)

- 5) 5th Meeting (Field Meeting) in Jabalpur-Gandhinagar (Ahmedabad), India (Dec. 8–16, 1997)  
Convened by Prof. A. Sahni (Panjab Univ.), Prof. S.K. Tandon (Univ. Delhi) and Prof. M.P. Singh (Lucknow Univ.)
- 6) 6th Meeting (Symposium) in Kuala Lumpur, Malaysia (Aug. 19–21, 1998)  
Convened by Dr. R.M. Banda (Geol. Surv. Malaysia)
- 7) Special Field Meeting in Thailand (Aug. 22–26, 1998)  
Convened by Dr. A. Meesook (Department of Mineral Resources, Thailand)

### 3. Publications

Major publications of IGCP 350 are listed below:

#### (1) Eleven newsletters

1) Newsletter 1 (12p., May, 1993), 2) Newsletter 2 (33p., March, 1994), 3) Newsletter 3 (32p., November, 1994), 4) Newsletter 4 (38p., June, 1995), 5) Newsletter 5 (33p., December, 1995), 6) Newsletter 6 (42p., June, 1996), 7) Newsletter 7 (41p., December, 1996), 8) Newsletter 8 (37p., June, 1997), 9) Newsletter 9 (31p., December, 1997), 10) Newsletter 10 (45p., June, 1998), and 11) Newsletter 11 (48p., October, 1998).

#### (2) Three special issues

- 1) Okada, H. and Mateer, N.J. (Eds.), 1994. *The Cretaceous System in East and South Asia*. Research Summary 1994. Newsletter Special Issue IGCP 350, No. 1, Kyushu Univ., 68p.
- 2) Okada, H. and Mateer, N.J. (Eds.), 1995. *The Cretaceous System in East and South Asia*. Research Summary 1994. Newsletter Special Issue IGCP 350, No. 2, Kyushu Univ., 69p.
- 3) Okada, H. and Mateer, N.J. (Eds.), 1996. *The Cretaceous System in East and South Asia*. Research Summary 1994. Newsletter Special Issue IGCP 350, No. 3, Kyushu Univ., 24p.

#### (3) Four abstracts books of the international meetings

The 1st (Fukuoka, Japan, 1993), 2nd (Taegu, Korea, 1994), 3rd (Quezon City, Philippines, 1995) and 4th Meetings (Beijing, China, 1996).

#### (4) Seven guidebooks for field excursions

The 1st ((Fukuoka, Japan, 1993), 2nd (Taegu, Korea, 1994), 3rd (Quezon City, Philippines, 1995) and 4th (Beijing, China, 1996), 5th (Jabalpur-Ahmedabad, India, 1997) and 6th Meetings (Kuching, Sarawak, 1998) and Special

Field Trip (Khorat Plateau in Thailand (1998).

#### (5) Three proceedings

- 1) Chang, K.H. and Park, S.O. (Eds.), 1995. *Environmental and tectonic history of East and South Asia with emphasis on Cretaceous correlation (IGCP 350)*. Proc. 15th Intern. Symp. Kyungpook Natl. Univ., Taegu, Korea, 434p.
- 2) Militante-Matias, P.J. (Ed.), 1997. *International Geological Correlation Program (IGCP) Project 350 "Cretaceous Environmental Change in East and South Asia"*. Third Intern. Symp., Univ. Philippines, Quezon City, May 7–14, 1995, *Jour. Geol. Soc. Philippines*, 52(3–4), 99–296.
- 3) Okada, H., Leereveld, H., Chen, P.J. and Mateer, N.J. (Eds.), (in press). *Cretaceous global events and correlation*. PalaeoPalaeoPalaeo, special issue.

#### (6) Five special publications

- 1) Sahni, A. (Ed.), 1996. Cretaceous stratigraphy and palaeoenvironments. Contribution to the International Geological Correlation Programme 350. *Mem. Geol. Soc. India*, 37, x + 433p.
- 2) Matsukawa, M., Hirano, H. and Okada, H. (Eds.), 1995. Cretaceous environmental change and correlation. *Jour. Geol. Soc. Japan*, 101(1), 1–85.
- 3) Okada, H., Hirano, H., Matsukawa, M. and Kiminami, K. (Ed.), 1997. Cretaceous Environmental Change in East and South Asia (IGCP 350) — Contributions from Japan. *Mem. Geol. Soc. Japan*, 48, 1–188.
- 4) Okada, H. and Sakai, T. (Eds.), (in press). Cretaceous tectonic events in the border region between the Asian continent and the proto-Pacific. *The Island Arc*, special issue.
- 5) Kirillova, G.L. (Ed.), 1997. Cretaceous Environmental Change in East and South Asia (IGCP 350) — Contributions from Russia. *Tikhookeanskaya Geologiya*, 16(6), 1–160 (in Russian).

## SCIENTIFIC ACHIEVEMENTS

Major scientific achievements of the activity of IGCP 350 from 1993 to 1997 are summarized below.

### 1. Stratigraphy and correlation

#### (1) Establishment of standard biostratigraphy, magneto-stratigraphy and chemo-stratigraphy

The biostratigraphic study was most active in China, India, Indonesia, Japan, Korea, Malaysia, Mongolia, New Zealand, Philippines, Russia, Spain,

Thailand, and Vietnam. In Japan, Toshimitsu and others have contributed much to the establishment and integration of mega-, micro- and magnetostratigraphy of the Upper Cretaceous (Toshimitsu *et al.*, 1995; Toshimitsu and Kikawa, 1997). Foraminiferan biostratigraphy (Militante-Matias, 1995), radiolarian biostratigraphy (Matsuoka, 1995a, b; Takahashi and Ishii, 1995; Kemkin *et al.*, 1997), and conchostracan biostratigraphy (Chen, 1994) are important.

### **(2) Correlation between marine and non-marine stratigraphy**

Much progress has been made in China (Chen and Chang, 1994; Chen, 1996), Japan (Matsukawa *et al.*, 1997a, b) and Russia (Markevich and Kovalov, 1997).

### **(3) Correlation between the proto-Pacific, Tethyan and Boreal realms**

Great efforts have been made in China (Wan *et al.*, 1997), Japan (Toshimitsu *et al.*, 1995), India, New Zealand (Crampton, 1995), Pakistan (Sheikh and Naseem, in press), Russia (Sey and Kalacheva, in press), and Spain (Lamolda and Mao, in press).

### **(4) J-K boundary**

Intensive studies have been made by Matsuoka (1995a, b) and Konovalov and Konovalova (1997).

### **(5) Cenomanian-Turonian boundary**

Good advancement has been made by Hirano and Takagi (1995), Arai and Hirano (1996), Hirano and Fukuju (1997), Hirano *et al.* (1997), Lamolda and Gorostidi (1996), Lamolda and Mao (in press), and Paul *et al.* (in press).

### **(6) Santonian-Campanian boundary**

Japanese workers (Toshimitsu and Kikawa, 1997) have made a contribution to this problem.

### **(7) K-T boundary**

The K-T boundary problem has been discussed by Bajpai (1996) as regards the iridium anomaly and on the influence of the Deccan volcanic activity on contemporary biota.

## **2. Plume-related events**

Relationship between basin development and plume magmatic events has been discussed by Yano and Wu (1995, 1997) and Okada (in press) as to the large igneous province during the Cretaceous at the East Asian continental margin. Okada (in press) insists that the large igneous rocks in the Early Cretaceous were not related to the subduction

of oceanic plates but to the plume activity, because there was no clear subduction at that time.

## **3. Biological aspects of environmental change**

### **(1) Taphonomic study of dinosaur habitats**

Many interesting studies have been carried out by Khosla and Sahni (1995), Jerzykiewicz (1995, 1996, 1998), Lim *et al.* (1995), Srinivasan (1996), Matsukawa *et al.* (1997b), Buffetaut and Suteethorn (in press), Khosla (in press), Lockley and Matsukawa (in press).

### **(2) Vegetation, phytogeography and climatological environments**

Markevich and Bugdayeva (1997), Ohana and Kimura (1995), Takahashi (1995), Wu (1995), and Golozoubov *et al.* (in press) have discussed this problem in interesting ways.

### **(3) Bio-diversity analysis**

Many interesting studies have been carried out by Chen (1994, 1996) on conchostracans and Lin (1994) on molluscs, Takahashi (1995) and Sun and Dilcher (1996) on angiosperms, Kimura and Ohana (1997) on plants, Yabumoto (1994) on nonmarine fish, and Lin (1994) and Zhang (1996) on insects.

### **(4) Paleogeography based on faunal data**

Japanese and Russian scientists have made some paleogeographic approaches (Kirillova *et al.*, 1997, in press; Matsukawa *et al.*, 1997a).

### **(5) Origin of primitive birds**

A very important work has been made by Chen (1998).

### **(6) Origin of angiosperms**

Sun and Dilcher (1996) has clarified the site of origin of angiosperms. It is very interesting that the sites of both the angiosperms and the primitive birds are overlapped with each other.

## **4. Physical aspects of environmental change**

### **(1) Genetic environments of red beds**

A nice review of the origin of red beds has been made by Miki and Nakamuta (1997).

### **(2) Chromian spinels and their tectonic implication**

Timing of suturing of Cretaceous basins has been clarified by the study of detrital chromian spinels in Japan (Hisada *et al.*, 1995; Hisada *et al.*, 1997a, 1997b; Asiedu *et al.*, 1997).

### **(3) Tectonic environments of basin development, especially in relation to strike-slip fault movements**

Large scale tectonic features characteristic of the East Asia continental margin have been studied with many important results by Otoh and Yamakita (1995), Jafar (1996), Okada (1996), Banda and Ambun (1997), Dong *et al.* (1997) and Sakai and Okada (1997a).

### **(4) Sequence stratigraphy and sea-level change**

Interesting data of sequence stratigraphy have been presented in Japan by Ando (1997), Ito and Matsukawa (1997), Okada (1997a) and Yagishita (1997).

### **(5) Provenance and depositional environments**

Mohabey (1996), Mohabey and Udhoji (1996), Tandon *et al.* (1995), Chang and Park (1995), Prasad and Khajuria (1996), Kwon and Yu (1997), Okada (1997b), Suzuki and Asiedu (1995), Suzuki *et al.* (1997), and Likht (1997) have presented nice data.

### **(6) Magmatism**

Filatova (1995), Yumul (1995), Kinoshita (1997), and Utkin (1997) have added new data on the nature of magmatism, among whom Filatova (1995) presented informative data on the North Korean volcanic rocks.

### **(7) Ridge subduction**

Kiminami *et al.* (1994) and Kinoshita (1995, 1997) have shown the relation between the oblique subduction of ridges and the migration of magmatism.

## **5. Chemical aspects of environmental change**

### **(1) Isotopic composition and environments**

Bhattacharya *et al.* (1997), Ghosh *et al.* (1995) and Lee (in press) have presented isotopic data in relation to chemical environments.

### **(2) Oceanic anoxic events (OAE 1 and OAE 2)**

Remarkable achievements on the oceanic anoxic events have been made by Hirano and Takagi (1995), Arai and Hirano (1996), Hirano and Fukuju (1997), and Hirano *et al.* (in press).

### **(3) Chemical features**

Some chemical features of sediments have been shown by Ishiga *et al.* (1997) and Kumon *et al.* (1997).

## **6. Climate environments**

### **(1) Sedimentological aspect**

Paik and Lee (1995) have presented a sedimentological environment of red-bed deposition.

### **(2) Faunal aspect**

Kaiho (1998) has discussed climatic environments through foraminiferal analysis.

### **(3) Floral aspect**

Spicer *et al.* (1996) and Golozoubov *et al.* (in press) have made a good summary of climatic environments based on vegetation characteristics.

## **7. Natural resources**

### **(1) Petroleum**

Potentiality of Cretaceous petroleum and gas resources in Pakistan has been discussed by Seikh and Naseem (in press).

### **(2) Uranium deposits**

D'Cruz *et al.* (1996) have discussed the genesis of sandstone-type uranium mineralization.

## **CONCLUDING REMARKS**

IGCP 350 has achieved great deal of study results as summarized above along the pre-designed lines. The most important are the establishment of correlation of many geological events by means of various methods and the recognition of the cessation of subduction at the East Asian continental margin in the Early Cretaceous. The latter fact suggests that the intense igneous activity in the Early Cretaceous may have been due to the plume activity. Environmental features of the regions covered by IGCP 350 have been assessed on many sides, which will separately be published in the final volume of IGCP 350.

I very much hope that the regional study in Southeast Asia and Russian Far East will develop more in the near future, which are the key areas between the Tethys and proto-Pacific and between the proto-Pacific and Boreal.

## **ACKNOWLEDGEMENTS**

I wish to express my sincere thanks to UNESCO-IGCP and the IGCP National Committee of Japan for their constant support. The Regional Coordinators of IGCP 350 have always extended their cooperation and support throughout the activity of the project. My deep gratitude is due to Prof. Emeritus T. Matsumoto, Fellow of the Japan

Academy, for his constant encouragements. Drs. Futoshi Nanayama and Takashi Sakai and Ms. Seiko Hayakawa on the secretariat of IGCP 350 are also gratefully acknowledged for their help in many ways. Finally I wish to thank the Organizing Committee of the GEOSEA '98 for inviting this report to be included in the Proceedings GEOSEA '98.

## REFERENCES

- ANDO, H., 1997. Apparent stacking patterns of depositional sequences in the Early Cretaceous shallow-marine to fluvial successions, Northeast Japan. *Geol. Soc. Japan Mem.*, 48, 43–59.
- ARAI, Z. AND HIRANO, H., 1996. Geochemical study of the Cenomanian-Turonian Boundary Oceanic Anoxic Event in the Northwestern Pacific forearc basin — An example from the Cretaceous Yezo Supergroup, Hokkaido, Japan. *Geol. Soc. India, Mem.*, 37, 231–249.
- ASIEDU, D.K., SUZUKI, S. AND SHIBATA, T., 1997. Composition and provenance of detrital chromian spinels from Lower Cretaceous sediments, Okayama Prefecture. *Geol. Soc. Japan Mem.*, 48, 92–99.
- BAJPAI, S., 1996. Iridium anomaly in Anjar Intertrappean Beds and the K/T Boundary. *Geol. Soc. India, Mem.*, 37, 313–319.
- BANDA, R.M. AND AMBUN, A.U., 1997. Major geological events since Cretaceous in Sarawak, Malaysia. *Jour. Geol. Soc. Philippines*, 52(3–4), 198–215.
- BHATTACHARYA, S.K., JAIN, R.A., TRIPATHI, S.C. AND LAHIRI, T.C., 1997. Carbon and oxygen isotopic compositions of infratrappean limestones from central and western India and their depositional environment. *Jour. Geol. Soc. India*, 50, 289–196.
- BUFFETAUT, B. AND SUTEETHORN, V., (in press). The dinosaur fauna of the Sao Khua Formation of Thailand and the beginning of the Cretaceous radiation of dinosaurs in Asia. *PalaeoPalaeoPalaeo*.
- CHANG, K.H. AND PARK, S.O., 1995. Cretaceous stratigraphy and geologic history of Taegu-Kyongju area, Korea. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 75–91.
- CHEN, P.J., 1994. Cretaceous conchostracan fauna of China. *Cret. Res.*, 15, 259–269.
- CHEN, P.J., 1996. Freshwater biotas, stratigraphic correlation of Late Cretaceous of China. *Geol. Soc. India, Mem.*, 37, 35–62.
- CHEN, P.J., 1998. An exceptionally well-preserved theropod dinosaur from the Yixian Formation of China. *Nature* 391, 147–152.
- CHEN, P.J. AND CHANG, Z.L., 1994. Nonmarine Cretaceous stratigraphy of eastern China. *Cret. Res.*, 15, 245–257.
- CRAMPTON, J.S., 1995. Revised inoceramid bivalve zonation and correlations for the Cenomanian to Santonian stages (Late Cretaceous) in New Zealand. In: Okada, H. and Mateer, N.J. (Eds.), *The Cretaceous System in East and South Asia. IGCP 350 Newsletter Special Issue 2*, Kyushu Univ., Fukuoka, 49–59.
- D'CRUZ, E., MATHUR, S.K., SACHAN, A.S., SEN, D.B. AND DWIVEDI, K.K., 1996. Depositional systems and their bearing on ore grade mineralization in the Cretaceous Domiasiat uranium deposit, West Khasi Hills district, Meghalaya. *Geol. Soc. India, Mem.*, 37, 387–403.
- DONG, H.G., GUO, M.S., LU, H.F. AND SHI, Y.S., 1997. Seismic sequences and deposition configurations of the Xihu Basin in the continental shelf, East China Sea. *Jour. Geol. Soc. Philippines*, 52(3–4), 272–284.
- FILATOVA, N.I., 1995. Development of the northern Korean volcanic belt. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 75–91.
- GHOSH, P., BHATTACHARYA, S.K. AND JAIN, R.A., 1995. Palaeoclimate and palaeovegetation in central India during the Upper Cretaceous based on stable isotope composition of the palaeosol carbonate. *PalaeoPalaeoPalaeo*, 114, 285–296.
- GOLOZOUBOV, V.V., MARKEVICH, V.S. AND BUGDAEVA, E.V., (in press). Early Cretaceous changes of vegetation and environment in East Asia. *PalaeoPalaeoPalaeo*.
- HIRANO, H. AND FUKUJU, T., 1997. Lower Cretaceous oceanic anoxic event in the Lower Yezo Group, Hokkaido, Japan. *Jour. Geol. Soc. Philippines*, 52(3–4), 173–182.
- HIRANO, H., KOIZUMI, M., MATSUKI, H. AND ITAYA, T., 1997. K-Ar age study on the Cenomanian/Turonian boundary of the Yezo Supergroup, Hokkaido, Japan, with special reference to OAE-2 and biostratigraphic correlation. *Geol. Soc. Japan Mem.*, 48, 132–141.
- HIRANO, H. AND TAKAGI, K., 1995. Cretaceous oceanic anoxias in northwestern Pacific — current conditions and prospect of research. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 161–176.
- HIRANO, H., TAKAHASHI, K., FUKUJU, T., MITSUGI, T. AND KAWABE, F., (in press). Lower Cretaceous isotope events and dysoxia/anoxia in the Yezo Supergroup, Hokkaido, Japan. *PalaeoPalaeoPalaeo*.
- HISADA, K., ARAI, S., NEGORO, A. AND MARUYAMA, T., 1995. Cretaceous serpentinite protrusion along eastern border of Asian continent deduced from detrital chromian spinels. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 161–176.
- HISADA, K., AIHARA, K. AND ARAI, S., 1997a. Significance of detrital chromian spinels from the Cretaceous Atokura Formation, Kanto Mountains, central Japan. *Geol. Soc. Japan Mem.*, 48, 85–91.
- HISADA, K., AIHARA, K. AND ARAI, S., 1997b. Mesozoic peridotite protrusion in the Joetsu Belt, central Japan. *Jour. Geol. Soc. Philippines*, 52(3–4), 224–234.
- ISHIGA, H., DOZEN, K., FURUYA, H., SAMPEI, Y. AND MUSASHINO, M., 1997. Geochemical indication of provenance linkage and sedimentary environment of the Lower Cretaceous of Southwest Japan and Kyeongsang Supergroup, Korean Peninsula. *Geol. Soc. Japan Mem.*, 48, 120–131.
- ITO, M. AND MATSUKAWA, M., 1997. Diachronous evolution of third-order depositional sequences in the Early Cretaceous forearc basins: shallow marine and paralic successions in the Sanchu and Choshi Basins, Japan. *Geol. Soc. Japan Mem.* 48, 60–75.
- JAFAR, S.A., 1996. The evolution of marine Cretaceous basins of India: calibration with nannofossil zones. *Geol. Soc. India, Mem.*, 37, 121–134.
- JERZYKIEWICZ, T., 1995. Cretaceous vertebrate-bearing strata of the Gobi and Ordos basins — a demise of the Central Asian lacustrine dinosaur habitat. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 233–256.
- JERZYKIEWICZ, T., 1996. Late Cretaceous dinosaurian habitats of Western Canada and Central Asia — A comparison from a geological standpoint. *Geol. Soc. India, Mem.*, 37,

- 63–83.
- JERZYKIEWICZ, T., 1998. Okavango Oasis, Kalahari Desert: a contemporary analogue for the Late Cretaceous vertebrate habitat of the Gobi Basin, Mongolia. *Geoscience Canada*, 25(1), 15–26.
- KAIHO, K., 1998. Global climatic forcing of deep-sea benthic foraminiferal test size during the past 120 m.y. *Geology*, 26(6), 491–494.
- KEMIGN, I.V., RUDENKO, V.S. AND TAKETANI, Y., 1997. Some Jurassic and Early Cretaceous radiolarians from chert-terrigenous sequence of the Taukha Terrane, southern Sikhote-Alin. *Geol. Soc. Japan, Mem.*, 48, 163–175.
- KHOSLA, A., (in press). Parataxonomy and taphonomic studies of Indian Late Cretaceous dinosaur eggs and eggshell fragments. *PalaeoPalaeoPalaeo*.
- KHOSLA, A. AND SAHNI, A., 1995. Parataxonomic classification of Late Cretaceous dinosaur eggshells from India. *Jour. Geol. Soc. India*, 40, 87–102.
- KIMINAMI, K., MIYASHITA, S. AND KAWABATA, K., 1994. Ridge collision and in situ greenstones in accretionary complexes: An example from the Late Cretaceous Ryukyu Islands and southwest Japan margin. *The Island Arc*, 3, 103–111.
- KIMURA, T. AND OHANA, T., 1997. Catalogue of the Late Jurassic and Early Cretaceous plant-taxa in Japan. *Geol. Soc. Japan Mem.*, 48, 176–188.
- KINOSHITA, O., 1995. Migration of igneous activities related to ridge subduction in Southwest Japan and the East Asian continental margin from the Mesozoic to the Paleogene. *Tectonophysics*, 245, 25–35.
- KINOSHITA, O., 1997. A migration model of magmatism relating to ridge subduction based on the granite ages in Southwest Japan and the further application to the East Eurasia margin from the Mesozoic to Paleogene. *Jour. Geol. Soc. Philippines*, 52(3–4), 216–223.
- KIRILOVA, G.L., MARKEVITCH, V.C. AND BUGDAEVA, E.V., 1997. Correlation of the geologic and biologic events in the Cretaceous basins of south-eastern Russia. *Jour. Geol. Soc. Philippines*, 52(3–4), 129–142.
- KIRILOVA, G.L., (in press). Correlation of the Cretaceous events in East Russia with the global record. *PalaeoPalaeoPalaeo*.
- KONOVALOV, V.P. AND KONOVALOVA, I.V., 1997. The problem of the Jurassic-Cretaceous boundary in the Sikhote-Alin. *Tikhookean. Geol.*, 16(6), 125–134.
- KUMON, F., MATSUYAMA, H. AND MUSASHINO, M., 1997. An oceanic fragment in the Upper Cretaceous Miyama Formation of the Shimanto Belt, Kii Peninsula, Japan. *Geol. Soc. Japan Mem.*, 48, 100–109.
- KWON, Y.I. AND YU, K.M., 1997. Stratigraphy and provenance of non-marine sediments from the Myogog Formation. *Jour. Geol. Soc. Philippines*, 52(3–4), 160–172.
- LAMOLDA, M.A. AND GOROSTIDI, A., 1996. Calcareous nannofossils at the Cenomanian-Turonian Boundary Event in the Ganuza section, northern Spain. *Geol. Soc. India, Mem.*, 37, 251–265.
- LAMOLDA, M.A. AND MAO, S.Z., (in press). The Cenomanian-Turonian Event and dinocyst record at Ganuza (northern Spain). *PalaeoPalaeoPalaeo*.
- LEE, Y.I., (in press). Stable isotopic composition of calcic paleosols of the Early Cretaceous Hasandong Formation, southeastern Korea. *PalaeoPalaeoPalaeo*.
- LIKHT, F.R., 1997. Sedimentological features of the Cretaceous basins of the western Sikhote-Alin. *Tikhookean. Geol.*, 16(6), 92–101.
- LIM, S.K., LOCKLEY, M.G. AND YANG, S.Y., 1995. Dinosaur trackways from Haman Formation, Cretaceous, South Korea: evidence and implications. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 329–336.
- LIN, Q.B., 1994. Cretaceous insects of China. *Cret. Res.*, 15(3), 305–316.
- LOCKLEY, M.G. AND MATSUKAWA, M., (in press). Some observations on trackway evidence for gregarious behavior among small bipedal dinosaurs. *PalaeoPalaeoPalaeo*.
- MARKEVICH, P.V. AND KONOVALOV, V.P., 1997. Early Cretaceous deposits of Sikhote-Alin: certain of the results of sedimentological investigations. *Tikhookean. Geol.*, 16(6), 80–91.
- MARKEVICH, V.S. AND BUGDAYEVA, Y.V., 1997. Flora and correlation of layers with dinosaur fossil remains in Russia's Far East. *Tikhookean. Geol.*, 16(6), 114–124.
- MATSUKAWA, M., TAKAHASHI, O., HAYASHI, K., ITO, M. AND KONOVALOV, V.P., 1997a. Early Cretaceous paleogeography of Japan, based on tectonic and faunal data. *Geol. Soc. Japan Mem.*, 48, 29–42.
- MATSUKAWA, M., NAGATA, H., TAKETANI, Y., KHANDA, YO, KHOSBAJAR, P., BADAMGARAV, D. AND OBATA, I., 1997b. Dinosaur bearing Lower Cretaceous deposits in the Choir basin, S.E. Mongolia — Stratigraphy and sedimentary environments. *Jour. Geol. Soc. Philippines*, 52(3–4), 99–114.
- MATSUOKA, A., 1995a. Radiolaria-based Jurassic/Cretaceous boundary in Japan. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 219–232.
- MATSUOKA, A., 1995b. Jurassic and Lower Cretaceous radiolarian zonation in Japan and in the western Pacific. *The Island Arc*, 4, 140–153.
- MIKI, M. AND NAKAMUTA, Y., 1997. Sedimentary petrography of Cretaceous red beds in Central Kyushu, Japan. *Geol. Soc. Japan Mem.*, 48, 110–119.
- MILITANTE-MATIAS, P.J., 1995. Orbitolina-bearing rocks of the Philippines. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 257–264.
- MOHABEY, D.M., 1996. Depositional environment of Lameta Formation (Late Cretaceous) of Nand-Dongargaon Inland Basin, Maharashtra: The fossil and lithological evidence. *Geol. Soc. India, Mem.*, 37, 363–386.
- MOHABEY, D.M. AND UDHOJI, S.G., 1996. Pycnodus lametae (Pycnodontidae), a holostean fish from freshwater Upper Cretaceous Lameta Formation of Maharashtra. *Jour. Geol. Soc. India*, 47, 593–598.
- OHANA, T. AND KIMURA, T., 1995. Late Mesozoic phytogeography in eastern Eurasia, with special reference to the origin of angiosperms in time and site. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 293–328.
- OKADA, H., 1995a. Cretaceous environmental change in East and South Asia (IGCP 350): background and a new insight. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 5–9.
- OKADA, H., 1995b. Interactions between the proto-Pacific, Tethyan-Boreal regions in the Cretaceous. *Geologica Carpathica*, 46(5), 321–323.
- OKADA, H., 1996. Nature and tectonic significance of Cretaceous sediments in the Japanese Islands. *Geol. Soc. India, Mem.*, 37, 85–103.
- OKADA, H., 1997a. Cretaceous petroprovinces in the Japanese

- Islands and their tectonic significance. *Jour. Geol. Soc. Philippines*, 52(3-4), 285-296.
- OKADA, H., 1997b. High sea-level vs. high sedimentation rates during the Cretaceous. *Geol. Soc. Japan Mem.*, (48), 1-6.
- OKADA, H., (in press). Plume-related sedimentary basins in East Asia during the Cretaceous. *PalaeoPalaeoPalaeo*.
- OTOH, S. AND YAMAKITA, S., 1995. Late Cretaceous structural features and tectonics of Southwest Japan. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 193-202.
- PAIK, I.S. AND LEE, Y.I., 1995. Short-term climatic changes recorded in Early Cretaceous floodbasin deposits, Korea. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 395-417.
- PAUL, C.R.C., LAMOLDA, M.A., MITCHELL, S.F., VAZIRI, M.R., GOROSTIDI, A. AND MARSHALL, J.D., (in press). The Cenomanian-Turonian boundary at Eastbourne (Sussex, UK): A proposed European reference section. *PalaeoPalaeoPalaeo*.
- PRASAD, G.V.R. AND KHAJURIA, C.K., 1996. Palaeoenvironments of the Late Cretaceous mammal-bearing Intertrappean Beds of Naskal, Andhra Pradesh, India. *Geol. Soc. India, Mem.*, 37, 337-362.
- SAKAI, T. AND OKADA, H., 1997. Sedimentation and tectonics of the Cretaceous sedimentary basins of the Axial and Kurosegawa Tectonic Zones in Kyushu, SW Japan. *Geol. Soc. Japan Mem.*, 48, 7-28.
- SEY, I.I. AND KALACHEVA, E.D., (in press). Lower Berriasian of southern Primorye (Far East Russia) and the problem of Boreal-Tethyan correlation. *PalaeoPalaeoPalaeo*.
- SHEIKH, S.A. AND NASEEM, S., (in press). Sedimentary environment and carbon potential of Cretaceous rocks of Indus Basin, Pakistan. *PalaeoPalaeoPalaeo*.
- SPICER, R.A., REES, P.M. AND HERMAN, A.B., 1996. The Cretaceous vegetation and climate of Asia: some insights. *Geol. Soc. India, Mem.*, 37, 405-433.
- SRINIVASAN, S., 1996. Late Cretaceous eggshells from the Deccan volcano-sedimentary sequences of Central India. *Geol. Soc. India, Mem.*, 37, 321-336.
- SUN, G. AND DILCHER, D.L., 1996. Early angiosperms from Lower Cretaceous of Jixi, China and their significance for study of the earliest occurrence of angiosperms in the world. *Palaeobotanist*, 45, 393-399.
- SUZUKI, S. AND ASIEDU, K., 1995. Alluvial fan and lacustrine delta deposits in Cretaceous volcanic rocks, southern Okayama Prefecture, Japan. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 371-381.
- SUZUKI, S. AND ASIEDU, K. AND SHIBATA, T., 1997. Compositions of sandstones of the Kenseki Formation and paleogeographic reconstruction in the Lower Cretaceous, inner side of Southwest Japan. *Jour. Geol. Soc. Philippines*, 52(3-4), 143-159.
- TAKAHASHI, K., 1995. Diversification of Late Cretaceous angiosperm pollen in East Asia. *Jour. Geol. Soc. Japan*, 101(1), 70-78 (in Japanese with English abstract).
- TAKAHASHI, O. AND ISHII, A., 1995. Radiolarian assemblage-zones in the Jurassic and Cretaceous sequence in the Kanto Mountains, central Japan. *Mem. Fac. Sci., Kyushu Univ., Ser. D*, 29(1), 49-85.
- TANDON, S.K., SOOD, A., ANDREWS, J.E. AND DENNIS, P.F., 1995. Palaeoenvironments of the dinosaur-bearing Lameta Beds (Maastrichtian), Narmada Valley, central India. *PalaeoPalaeoPalaeo*, 117, 153-184.
- TOSHIMITSU, S. AND KIKAWA, E., 1997. Bio- and magnetostratigraphy of the Santonian-Campanian transition in northwestern Hokkaido, Japan. *Geol. Soc. Japan Mem.*, 48, 142-151.
- TOSHIMITSU, S., MATSUMOTO, T., NODA, M., NISHIDA, T. AND MAIYA, S., 1995. Integration of mega-, micro- and magneto-stratigraphy of the Upper Cretaceous in Japan. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 357-370.
- UTKIN, V.P., 1997. Horst-accretionary systems, rift-grabens and volcano-plutonic belts of the south of the Russian Far East. Paper 2. Volcano-plutonic belts; structural-material characteristics and regularities of formation. *Tikhookean. Geol.*, 16(6), 58-79.
- WAN, X.Q., LAMOLDA, M.A. AND WANG, C.S., 1997. Upper Cenomanian-Lower Turonian foraminiferal assemblages from southern Tibet: The responses of the biota to oceanic environmental changes. *Jour. Geol. Soc. Philippines*, 52(3-4), 183-197.
- WU, X.W., 1995. Early Cretaceous floras and phytogeographic provinces in China. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 279-291.
- YABUMOTO, Y., 1994. Early Cretaceous freshwater fish fauna in Kyushu, Japan. *Bull. Kitakyushu Mes. Nat. Hist.*, 13, 107-254.
- YAGISHITA, K., 1997. Preservation of herringbone cross-stratification in a transgressive sequence of the Santonian Taneichi Formation, northeast Japan. *Geol. Soc. Japan Mem.*, 48, 76-84.
- YANO, T. AND WU, G.Y., 1995. Middle Jurassic to Early Cretaceous arch tectonics in East Asia continental margin. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 177-192.
- YANO, T. AND WU, G.Y., 1997. Late Mesozoic geodynamics relating Circum-Pacific mobile belt and Darwin Rise. *Jour. Geol. Soc. Philippines*, 52(3-4), 235-271.
- YUMUL, G.P., JR., 1995. Transition from a marginal basin to an island arc setting: the Cretaceous-Paleogene volcanic basement complexes of the Baguio-Mankayan mining districts, Luzon, Philippines. *Proc. 15th Intern. Symp. Kyungpook Natl. Univ.*, 109-130.
- ZHANG, J.F., 1996. Entomofauna from Early Cretaceous of Laiyang, Shandong, China. *Programs and Abstracts on Cretaceous Environmental Change in East & South Asia/Tethyan and Boreal Cretaceous (IGCP Project 350 & 362)*, Peking Univ., Aug. 1996, 31.