



Mid-Cretaceous climate change in Primorye, Russian Far East

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Terrestrial biota underwent major changes through the mid-Cretaceous, including the advent of angiosperms and semi-extinction of dinosaurs. The role of climate in these events is but poorly understood. Climatic component Sedimentary basins of Primorye, a southern region of the Russian Far East, are filled with the predominantly non-marine coal-bearing deposits intercalated by the shallow-water marine tongues in the Valanginian and Albian. The coal-bearing sandstone/shale cyclothems accumulated in the late Barremian – Aptian, are followed by the tuffaceous sandstones and tuffites in the lower Albian and by the tuffaceous redbeds in the Cenomanian. The Cretaceous sequences contain rich plant macrofossil and palynomorph assemblages. This paper attempts a reconstruction of vegetation and climate changes in the mid-Cretaceous on the basis of dynamical processes in the Cretaceous plant communities that contributed to palynological assemblages. Several types of lowland to upland plant communities are inferred from repeated palynomorph associations, numerical representation, and the comparative macrofossil records. A major lowland peat-building formation was represented by fern wetland with thermophilous cyatheaceous, gleicheniaceae and matoniaceae ferns as dominant groups. Their remains are abundant in both the palynological and macrofossil assemblages. Conifers of taxodiaceae and podocarpaceae affinities constituted lowland bog forests with diverse cycadophytes in the understorey. Palynomorphs contributed by the upland communities are distinguished by their constant presence in a wide range of lithofacies. Monosulcate pollen of ginkgophytes and bisaccate pollen of pinaceous conifers belong to this category. *Laevigatosporites* morphotype represents ferns associated with upland vegetation rather than the fern wetlands. The thermophilous fern wetlands and podocarpaceae bog forests reached their maximal abundance and diversity in the late Aptian coal measures. Both types sharply declined at the Aptian – Albian boundary, whereas the upland elements consti-

tuting a uniformly minor component of palynological assemblages through the coal-bearing sequences, conspicuously increased in the tuffaceous lower Albian. Vegetation changes across the Aptian – Albian boundary are partly related to the rise of volcanic ranges, but a reduction of thermophilous components betrays a climatic impact, supposedly a sharp cooling in the early Albian followed by the advent of a relatively dry seasonal climate. Our regional data thus confirm that climate change played a role in the mid-Cretaceous restructuring of terrestrial ecosystems, including, the so called lesser Cretaceous crisis.