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Sequence Stratigraphy and Evolution of the Taebaeksan Basin (Cambrian-Ordovician), Mideast Korea

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This study focuses on the sequence stratigraphic implications and evolution history of the Taebaek Group(Cambro-Ordovician), a mixed carbonate-siliciclastic sequence(ca.1200 m thick), in the mideastern part of the Korean peninsula. The Taebaeksan Basin consists of mixed carbonate-siliciclastic rocks, Joseon Supergroup(Cambro-Ordovician), and the unconformably overlying siliciclastic rocks, Pyeongan Supergroup (Carboniferous-Permian). The Joseon Supergroup comprises mixed sequence of sandstone, shale, and shallow-marine carbonates(e.g., Choi et al., 2004). The supergroup can be divided into five lithologic units: Taebaek, Yeongwol, Yongtan, Pyeongchang, and Mungyeong groups(Choi, 1998). The Taebaek Group consists of 11 formations(about 1000-1400 meter thick), subdivided into the Jikdong Subgroup(Cambrian) and Sangdong Subgroup(Ordovician). The Jikdong Subgroup contains 6 formations: Jangsan/Myeonsan(Js/Ms), Myobong(Mb), Daegi(Dg), Sesong(Ss), and Hwajeol(Hj) formations, while the Sangdong Subgroup consists of Dongjeom(Dj), Dumugol(Dm), Makgol(Mg), Jigunsan (Jg), and Duwibong(Dw) formations, in ascending order. The Taebaek Group consists of conglomerate and sandstone(Js/Ms and Dj fms), marine shale(Mb, Ss, lower Dm, and Jg fms), and shallow marine carbonates(Dg, Hj, upper Dm, Mg, and Dw fms). The siliciclastics formed mainly in offshore and shoreface environments(Woo and Park, 1989; Kim and Lee, 2004), whereas shale and carbonate formed in ramp and peritidal environments(Lee and Kim, 1992; Woo, 1999; Chough et al., 2000; Choi et al., 2004). The group can be partitioned into four packages(supersequences I-IV). Each package comprises alternation of siliciclastic and carbonate successions, corresponding to the second-order sequence(supersequence) formed in a period of 10-100 m. y. Supersequence I(Jangsan/Myeonsan, Myobong, and Daegi fms) represents initial inundation and subsequent drowning during the late Early to middle Middle Cambrian. It experienced the drowning between the middle and late Middle Cambrian, forming type-3 sequence boundary. Supersequence II(Sesong and Hwajeol fms) formed by prolonged marine flooding during the late Middle and Late Cambrian. It was terminated by large supply of siliciclastics due to rejuvenation of the drainage basin, and the subsequent shallowing at the Cambrian-Ordovician boundary(type-2 sequence boundary). Supersequence III (Dongjeom, Dumugol, and Makgol fms) comprises lowstand coarse-grained siliciclastics, transgressive shale by marine flooding, and shallow platform carbonates by highstand progradation in the Early Ordovician. Following the large-scale eustatic fall of sea level in the earliest Middle Ordovician, supersequence IV(Jigunsan and Duwibong fms) formed on subaerial exposure surface(type-1 sequence boundary) by resumed marine flooding in the Middle Ordovician. This study provides basis for basin-scale correlation with the coeval sequences in northeastern China.