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Plio-Quaternary Seismic Stratigraphy and its Depositional History in the Ulleung Basin, East Sea off Korea

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Analysis of multi-channel seismic reflection data from the Ulleung basin, East Sea reveals that Plio-Quaternary deposits in the area consists of a succession of stacked sedimentary units separated by erosional unconformities. The individual unit in the southern slope is acoustically characterized by chaotic seismic facies interpreted as debris-flow deposits. Toward the basin floor, the sedimentary units are defined by well-stratified seismic facies with good continuity and strong amplitude, interpreted as turbidite/hemipelagic sediments.

Based on the distribution and its geometry, the deposition of Plio-Quaternary sequence was mainly controlled by both tectonic effect and sea-level fluctuations. During Pliocene, sedimentation was mainly influenced by tectonic movements related to the back-arc closing of the East Sea. The southern part of Ulleung Basin began to be closed since Miocene and thus compressional force led to regional uplift along the southern part until Pliocene time. Consequently, the large amounts of erosional sediments were supplied into the basin, forming the lowermost unit (Unit 1). During Quaternary time, the development of stacked sedimentary units (Unit 2-9) has resulted from alternating episodes of successive regression and transgression. Repeated falls and lowstands of sea level resulted in the formation of debris flow deposits mainly distributed on the southern slope, whereas during subsequent episodes of sea-level rise and highstands, debris flow deposits were draped by thin hemipelagic/turbidite sediments. Consequently, the Plio-Quaternary sequences in the area comprise a succession of stacked mass flow deposits including debris flow deposits and hemipelagic/turbidite sediments.