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Sedimentation under influence of syndepositional tectonism and volcanism: Cretaceous Daeri Member, Wido Island, Korea

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The Cretaceous Daeri Member is an ancient volcanic-sedimentary succession and can be classified into lower, middle and upper members, based on vertical changes in lithologic character. The lower Daeri Member is composed of the homogeneous reddish mudstones deposited on the arid to semi-arid, floodplain environment without major volcanic activities. The middle Daeri Member is represented by thick (up to 250 m) and laterally extensive andesite as well as minor epiclastic deposits. The upper Daeri Member was formed with the onset of an explosive volcanic eruption, and large amounts of fine-grained pyroclastic sediments were deposited by pyroclastic density currents during the eruption. After the eruption, the pyroclastic sediments were resedimented by episodic sediment-gravity flows, forming conformable accumulation of the resedimented pyroclastic deposits (130 m thick). Lack of major erosional surface is interpreted be due to growing accommodation space resulted from tectonic subsidence and arid to semi-arid climatic conditions with high rates of sediment supply after the volcanic eruption.
In the Daeri Member, intrabasinal normal faults (Fault A to C) divided the basin into four blocks (Block 1 to 4), and spatial distribution of the Daeri Member is also largely controlled by the intrabasinal normal faults. The upper Daeri Member is developed only on hangingwall blocks (Block 2 and 3, whereas footwall blocks (Block 1 and4) are only composed of lower and middle Daeri members. The spatial stratigraphic relationships suggest a progressive increase in accommodation space on the hangingwall blocks during the deposition, indicating syndepositional tectonic subsidence. In addition, the resedimented pyroclastic deposits in Block 3 show northeastward (downcurrent) changes in depositional processes from debris flows to hyperconcentrated flow and sheetfloods with a decrease in maximum ten clasts away from Fault B, implying abrupt decrease in topographic gradient between Block 2 and 3. These depositional features indicate that the resedimented pyroclastic deposits were formed on a volcaniclastic alluvial fan, which can be attributed to abrupt changes in topographic gradient, resulted from the displacement of Fault B.