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Supercritical sheetflood deposits on the volcaniclastic alluvial fan: the Cretaceous upper Daeri Member, Wido Island, Korea

In Gul Hwang (1), Yong Sik Gihm (2), and Min Cheol Kim (3)

(1) Korea, Republic Of (ighwang@kigam.re.kr) Korea Institute of Geoscience and Mineral Resources, 124, Gwahang-no, Yuseong-gu, Daejeon 34132, (2) Korea, Republic Of (naress@kigam.re.kr) Korea Institute of Geoscience and Mineral Resources, 124, Gwahang-no, Yuseong-gu, Daejeon 34132, (3) Korea, Republic Of (mckim@pnu.ac.kr) Department of Geological Sciences, Pusan National University, Busan 46241

The upper Daeri Member is composed of subaerial primary and resedimented pyroclastic deposits. The upper Daeri Member accumulated under influence of tectonic subsidence, and the basin was divided into four blocks (Block 1 to 4) by intrabasinal normal faults (Fault A to C). Vertical separation of Fault B is estimated about 250 m and provided sufficient accommodation space on Block 3 with intrabasinal physiographic relief, resulting in conformable stacking of the upper Daeri Member on a volcaniclastic alluvial fan.
The welded pumiceous lapilli tuff (primary one) was deposited by a pyroclastic density current during an explosive volcanic eruption. After the eruption, the resedimented pyroclastic deposits were deposited by episodic sediment gravity flows and are intercalated with the reddish, homogeneous mudstones. In Block 3 the resedimented pyroclastic deposits show an abrupt decrease in ten largest lithic clasts from within 3 km away from Fault B, reflecting rapid waning of parental sediment gravity flows.
A wavy bedded lapilli tuff is one of the lithofacies of the resedimented pyroclastic deposits. The wavy bedded lapilli tuff is composed of symmetrical or nearly-symmetrical, wavy stratifications, forming undulatory bed geometry. The wavy stratifications are recognized by distinctive alternations of few cm to 10 cm thick, lapilli-rich and ash-rich layers. Beds of the wavy bedded lapilli tuff are 0.1 to 2 m thick (estimated in crests) and range in wavelength 1.3 m to 12 m (ave. 8 m). Both amplitude and wavelength gradually decrease away from Fault B. The wavy bedded lapilli tuff can laterally be traced over 90 m.
Based on undulatory bed geometry and wavy stratifications, the wavy bedded lapilli tuff is interpreted as antidune bedforms, formed by supercritical sheetfloods. The symmetrical or nearly symmetrical wavy stratifications are due to maintenance of stationary state of standing waves of the sheetfloods. A down current decrease in both wavelength and thickness of the beds indicate a decrease in velocity and depth of the parental sheetfloods. The distinctive wavy stratifications and preservation of the undulatory bedforms resulted from high sedimentation rates during the deposition (Cartigny et al., 2014), which can be due to highly erodible subaerial conditions after the explosive volcanic eruption.