



Shocked cobbles in Lower Cretaceous Duwon Formation, South Korea: their classification and possible formation mechanisms

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Shocked cobbles are the cobbles having shock-induced deformation structures on the surfaces. The most distinctive macroscopic features are the subparallel fractures and the pervasive surface craters, with or without radial fractures. Until now, these shocked cobbles have been reported mainly in Europe, America, and Africa, but never been found or reported in Korea. Shocked cobbles have recently found in the Lower Cretaceous Duwon Formation in South Korea, which was the second report in Asia. The Duwon Formation consists mainly of conglomerates, gravelly sandstones and intercalated mudstone and shale layers. The shocked cobbles are commonly found in the lowermost clast-supported conglomerate layers, and they show various deformation features, such as pockmarked (circular or elliptical) cobbles, cratered (Hertzian or bowl-shaped) cobbles with or without radial fractures, cobbles showing subparallel fractures, and strongly squashed or heavily dissected cobbles. In general, these deformation structures are considered to have resulted from pressure dissolution by overburden, tectonic compression, and seismic or meteorite impacts. However, the exact formation mechanism is not clearly understood, and still in debate. The shocked cobbles found in the Duwon Formation have similar features to those of previously reported shocked cobbles, especially to Triassic Buntsandstein conglomerates in northeastern Spain. Based on the degree of deformation, the Duwon shocked cobbles can be divided into four types, which are (1) faint contact marks, (2) pitted marks without any fractures, (3) pitted marks with radial or sub-parallel fractures affected by pits, and (4) intensive fractures and heavily dissected fragments. The possible mechanisms for the Duwon shocked cobbles are thought to be crushing process by shear stress and pressure solution.