



What is the origin of megacracks found in the Cretaceous Hasandong Formation, Gyeongsang Supergroup, South Korea?

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Recently, unusually long megacracks (up to 1.54 m-long) have been reported in the Hasandong Formation, Gyeongsang Supergroup. The Cretaceous Gyeongsang Basin is the largest nonmarine basin in South Korea, and the Hasandong Formation is known to have been deposited in floodplain environment. These cracks were found in purple siltstone beds, and filled with coarse or medium sands probably supplied from the overlying sandstone beds. The cracks have the vertical plane structure with ca. 10 cm width, and some cracks are branched. So far, the formation mechanism of these cracks is still in debate, and there are three different opinions: (1) soil-wedge (or ice-wedge), (2) neptunian clastic dyke, and (3) mudcrack. Among three possible mechanisms, the possibility of soil-wedge (or ice-wedge) can be ruled out since soil-wedge structures are generally formed under the cold climate, and are usually filled with eolian fine-grained sediments. During the Cretaceous, Korean peninsula was located at a latitude similar to what it is today, and was a subtropical climate. Therefore, the possible mechanisms of megacracks can be narrowed down to Neptunian dykes or mudcracks. In this study, AMS (anisotropy of magnetic susceptibility) analysis was performed to provide clear evidence for the formation mechanism. Based on AMS analysis, the megacracks exhibit a sedimentary fabric with sub-vertical k_3 axes and sub-horizontally streaked k_1 - k_2 axes. These fabrics suggest the passive downward infilling process of clastic materials into cracks, and the subsequent compaction. Furthermore, the rose diagram of the crack planes shows that the plane patterns represent hexagonal shape in plan view. Based on the results in this study, therefore, the megacracks found in the Hasandong Formation can be regarded as mudcracks. However, further research is needed to explain the large scale of the cracks.