Development of fold hinges in a quartz arenite at subgreenschist facies conditions

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When folds of different geometries in close proximity are contained in the same lithology and formed at the same pressure/temperature conditions, then other factors must control fold formation. If such folds develop in a tight sand such as the Tuscarora Sandstone, a key issue is whether the difference in fold geometry reflects differences in the roles of deformation mechanisms during fold formation. During low-temperature deformation of a tight sand, mechanisms that are typically active include pressure solution, dislocation glide, grain-boundary sliding, brittle failure, and cataclasis. The purposes of this study are to determine whether differences in the interplay of deformation mechanisms generated the differences in fold geometry; and to determine whether the distribution of water influenced this interplay. The abundance, geometry, size, and relative age of microstructures will be used to determine the contribution of deformation mechanisms to differences in fold geometry. Fluid inclusions, solution geometry, and potentially the Fourier transform infrared spectroscopy (FTIR) will be used to determine the content and role of fluids. The target structures are two sub-hinges of the map-scale Cave Mountain anticline in the central Appalachians of West Virginia.