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Shortening Ratio Calculations on Folded Sequences: A Comparison Study of Anisotropy of Magnetic Susceptibility (AMS) and Balanced Cross-Sections from the Haymana Basin, Central Anatolia, Turkey

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The AMS signals are observed on almost all types of rocks and easily give information about the orientations of petro-fabrics/cyrstals/grains in a volume of rock. Maximum anisotropy directions of such elements are supposed to be associated with the strain caused by the combination of the regional tectonic load and overburden, therefore the anisotropy directions mainly allow us to make interpretation about the prevailed deformation styles of a region and resultant structural products such as folds and faults. The main aim of this study is to calculate shorthening ratios along various traverses of a fold, the Haymana Anticline, by AMS shape parameter (T), which is basically described as AMS-Strain correlation and is based upon finite strain calculations of magnetofabric structures, by figuring out the degree of clustering of the different anisotropy principle axes. In this respect, over 650 oriented core samples from 6 individual sites locating on the different traverses of the Haymana Anticline were collected and their AMS properties were determined. As a result, shorthening ratios were determined between 20% to 27% by AMS-Strain correlaions. Additionally, these results were checked by balanced cross-sections (created based on ∼500 bedding attitudes and formation boundaries) passing over the sampling sites. Consequently, the inconsistent shorthening ratios were interpreted to be the results of geometrical/internal kinematic features of the fold. In addition, AMS-based shorthening calculations were determined as consistent with the results of balanced cross-sections. The results alsoindicate that the Haymana anticline, contrary to expectations, was shorthened in lesser ratios during (1) the closure of the Neotethys Ocean and (2) subseguent continental collision events which are considered as the main driving mechanisms behind the shorthenings in the region.