KINEMATICALLY-CONTROLLED DEVELOPMENT OF FOLD INTERFERENCE PATTERNS: AN EXAMPLE FROM THE BORBOREMA PROVINCE (NE BRAZIL)

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ABSTRACT: Folds are commonly found in association with ductile shear zones. However, superposed folding contemporaneous with shearing is rarely reported. Here, we describe a macroscopic fold interference pattern with geometry intermediate between types 1 and 2 whose development was controlled by movement on adjacent transcurrent shear zones. The study area is located in the Alto Moxotó Domain of the Borborema Province (NE Brazil) and the interference fold pattern occurs in a compartment bounded, on the eastern side, by the Congo (CSZ) and Cruzeiro do Nordeste (CNSZ) shear zones and, on the western side, by the Caiçara shear zone (CaSZ). Two generations of outcrop-scale, pre-strike slip shearing fabrics are recognized. An early deformation phase is only documented by the presence of intrafolial, tight to isoclinal folds that deform a previous metamorphic foliation. The dominant foliation (S_2) is thus attributed to a second phase of deformation (D_2). In places where S_2 is preserved from subsequent folding events, it has shallow to moderate dip and the associated stretching lineation trends W to WNW, with shear sense criteria indicating westward tectonic transport direction. The CSZ and CNSZ constitute a conjugate pair of transcurrent shear zones with sinistral and dextral kinematics, respectively, and the CaSZ is sinistral. Lack of relative displacements at the junction of the CSZ and CNSZ attests their contemporaneous development. The ENE- and NE-trending of, respectively, the CNSZ and CSZ implies that they resulted from NW-SE regional contraction since, in the ductile field, the obtuse angle bisector between the zones lies in the direction of bulk shortening. A local contractional strain field induced by the growth of the conjugate zones produced NW-trending, SW-verging inclined folds. One macro-scale, NW-trending fold was subsequently refolded by upright, NE-trending folds induced by the regional strain field. These latter were coeval with development of the CaSZ, producing the macroscopic fold interference pattern and a sigmoidal curvature of both S_2 and of the axial trace of the NW-trending fold. Formation of the fold interference pattern was thus controlled by nearby shear zones, requiring no rotation of the regional stress axes, with the maximum compressive stress remaining in an approximate NW-SE direction throughout the time of its development.

KEYWORDS: KINEMATIC ANALYSIS, SHEAR ZONES, SUPERPOSED FOLDS.