DEFORMATION IN THE NORTHERN EDGE OF THE SÃO FRANCISCO CRATON (NE BRAZIL): MOUNTAIN BUILDING BY UNDERTHRUSTING

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In its northern edge adjacent to the S of the Sergipano Belt (Pan-African/Brasiliano cycle), the São Francisco Craton (NE Brazil) encloses Paleoproterozoic well-banded gneisses and a Neoproterozoic sedimentary cover comprising two basal siliciclastic and carbonate formations overlain by a coarsening-up siliciclastic megasequence. These rocks occur in the belt as well. The northern edge area is a typical cratonic domain with apparently undeformed flat-lying beds dipping 300 to northerly directions (with local variations due to some broad, km-scale folds, or to Mesozoic normal faults) and cross-cut by several, km-long, NW- to NE-trending, sub-vertical, extensional and shear fractures. However, recent detailed structural studies carried out in good-quality and statistically significant outcrops have revealed that the cratonic rocks display a systematic vertical juxtaposition of contractional and extensional structures, and also different mechanical behaviour. Within the cover, the layers of fine-grained siliciclastics {(meta) argillite/pelite} display a well-defined lamination that is commonly affected by a penetrative foliation and cm- to m-scale folds, and these structures are in some places adjacent to other evidencing ductile thinning, boudinage and brecciation, all indicative of coeval contraction / extension due to intralayer flow. The intercalated layers of relatively thicker and coarse-grained (meta) silttite/arenite may either be undeformed (in the scale of the outcrops), or are boudinaged and/or, most commonly, affected by sharp and sub-vertical, NW- to NE-trending fractures that do not cut the layer´s contacts. Basement gneisses show a similar stratification of strain, but the levels displaying ductile and brittle behaviour are thicker, and the scale of the folds varies from * 1m up to 10m, with deformation locally assisted by qz-feldspar remobilization. All the structures in the cratonic domain (including the km-long fracture zones) fit in a sub-horizontal N-S stress field similar to that in the Sergipano Belt, but the situation requires that a northwards internal flow took place along several sub-horizontal layers (detachments) in the basement and along almost all fine-grained layers of siliciclastics, driving these layers into ductile contraction (and extension), whereas the intercalated and more competent strata underwent brittle extension (and contraction). As the basement is involved in the structural evolution of the Sergipano Belt, too, the findings here reported imply that the former São Francisco plate and its continental margin were underthrust to the N, during the process of mountain building.