DEFORMATION OF UPPER CARBONIFEROUS COAL MEASURES IN THE SYDNEY BASIN, ATLANTIC CANADA: EVIDENCE OF TIMING FROM VITRINITE ANISOTROPY AND FISSION TRACKS

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Coal measures of the Sydney Basin dip gently, but are deformed locally into linear folds with reverse faults and dips of up to 50o that repesent a compressional or transpressional event of unknown timing. Analysis of vitrinite reflectance anisotropy for oriented coal samples on the limbs of the folds shows that nine of ten samples have uniaxial negative reflectance patterns, with minimum reflectance axes (Rmin) near-normal to bedding. These features imply that thte bulk of coalification took place while the strata were flat-lying and undergoing burial compaction without directed stress. The Rmin axes fan across the fold axes, indicating that folding followed coalification. Slight divergence (average 9o) between Rmin axes and poles to bedding may reflect a component of tilting before or during coalification, probably associated with differential subsidence; however, this divergence may lie within analytical error. Modelling of apatite fission-track data suggests that cooling of the coal measures to below 100+/-20oC was underway by the Upper Triassic or earlier. Because cooling implies that coalification was largely complete, the fission-track results are compatible with an early deformational event. The deformation at Sydney may represent Alleghanian compression during the later Permian, by comparison with other parts of the Appalachian belt. If so, the Sydney structures are manifestations of a little-known tectonic episode in Atlantic Canada. However, Mesozoic-Cenozoic deformation cannot be ruled out.