



Contribution ID: 47

Type: **not specified**

The Cape Fold Belt – some stratigraphic and structural insights

Friday, 3 October 2014 11:00 (15 minutes)

The Cape Fold Belt (CFB) which lies along the southern margin of the African continent incorporates deformation of the Cape Supergroup, its basement rocks, as well as the lower Karoo Supergroup in the southern part of the larger Karoo Basin. The fold belt forms part of a larger tectonic picture that correlates with other remnants of Gondwana, thus confirming a late Palaeozoic-early Mesozoic timescale of deformation, when Gondwana was still one continent. Current models invoked to explain the compressional and metamorphic characteristics of the fold belt include mainly those involving collision and transpression tectonics. Extension which occurred as a result of the breakup of Gondwana, during the Mesozoic, is the last phase of tectonism associated with the fold belt.

Some stratigraphic and structural anomalies of the fold belt remain as yet unexplained, signalling a need for detailed fieldwork and analysis to resolve such anomalies. The recognition that some units of the Cape Supergroup are abnormally thickened in certain regional zones of the fold belt, coupled with the fact that shale beds are often entirely missing, is explained by the thrust stacking model, where thrust faulted zones are present in the region encompassing Port Elizabeth, Kareedouw and Uniondale areas.

A north-south section through the fold belt reveals that deformation is greatest along the southern coastal zone where highest degree of metamorphism occurs in basement rocks and greatest amount of crustal shortening has occurred. Near the coast where isoclinal folds are evident in cover rocks (Cape Supergroup) and further northwards mainly open folding is present in Cape and Karoo rocks, coupled with zones of low angle (thrust) faulting. Low angle thrust faults and gentle folds are characteristic of the frontal deformation zone of the fold belt. Some characteristics of this type of deformation in the Fort Beaufort area of the Eastern Cape show a complex interplay of fore and backthrusting where strata of the Beaufort Group have been locked up through duplexing above footwall ramps.

Recent seismic surveys through the Karoo Basin show that thrust faults disrupt strata of the Cape and Karoo Supergroups and are prevalent for some 300 km from the coast to the frontal zones of the fold belt near Beaufort West. These surveys also reveal that strata of the Karoo “foredeep” are of lesser thickness than predicted, thus requiring a different tectonic model to explain this new data than previously proposed.

In the Uniondale area a strike-slip model is invoked to explain a configuration of juxtaposed folded Cape Supergroup strata, separated by steeply dipping faults. This event probably occurred late in the deformation history of the CFB.

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Session Classification: Strain

Track Classification: Oral Presentation