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STRUCTURAL AND STRAIN ANALYSIS OF THE NOSE OF THE MYPONGA-LITTLE GORGE INLIER, FLEURIEU PENINSULA, SOUTH AUSTRALIA

by

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November, 1975.

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NOMENCLATURE

X,Y,Z - Principal axes of the triaxial strain ellipsoid. $X \geqslant Y \geqslant Z$

Rf - Final deformed ellipse axial ratio in a principal plane.

Rs - Finite strain axial ratio.

Ri - Initial undeformed particle axial ratio.

ϕ - Angle between the Rf long axis and the maximum principal strain direction in the principal plane considered.

θ - Angle between the Ri long axis and the maximum principal strain direction.

$\bar{E}s$ - An absolute measure of the magnitude of the distortional component of strain. $\bar{E}s$ is directly proportional to the natural octahedral shear ($\bar{\gamma}_o$).

V - Lodes unit. A measure of deformation symmetry.

k - Flinns k. An alternative measure of deformation symmetry.

γ - Magnitude of shear strain.

θ' - Angle of planar fabric dip in the right section to strike.

ABSTRACT

The Myponga-Little Gorge Inlier is the core of a regional reclined fold, which is delineated by the stratigraphy of the Adelaidean cover and by detailed structural analysis. The regional fold formation occurred during the F_1 phase of the Palaeozoic Delamerian Orogeny. The regional fold axis is orientated with a shallow southeast plunge which is perpendicular to the regional trend. Although the fold closure is to the southwest, brittle thrusting disrupts the nose of the inlier.

Planar zones of extensive phyllonitization and foliation development in basement lithologies adjacent to the overturned basement-cover contact, are interpreted as zones of simple shear. Formation of these zones is considered contemporaneous with the development of an elongation lineation, which is reflected by deformed pebbles and clastic grains in the basal conglomeratic sandstone.

A quantitative strain analysis of the conglomerate is discussed. Deformation paths interpreted from the variation of finite strains suggest prolate strains have developed from less significant oblate strains. This is inconsistent with the plane strains inferred by the proposed simple shear model. Two possible explanations are considered likely:
(a) As Rf/Ø diagram analysis suggests that only one deformation has been imposed on an initial sedimentary fabric, the finite strain variation may not represent a true deformation path, which is a result of two deformations. Therefore plane strain and the simple shear model may be valid.
(b) The estimates of prolate strains may be realistic, in which case, the simple shear model is invalid.

The F_2 phase of the Delamerian Orogeny is represented by a small-scale crenulation cleavage and lineation. Widespread but insignificant conjugate faulting also post-dates the regional fold formation.