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Deformation History in the Ar-Ruwaydah Area, Eastern Arabian Shield, Saudi Arabia

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The Ar-Ruwaydah area locates between Al Amar-Idsas fault and Halaban belt in the eastern part of the Arabian shield in Saudi Arabia. Ar-Ruwaydah area consists of varies rocks units (such as Abt Schist, deformed granite, granodiorite and volcano-sedimentry rocks. Our Goals are accomplished through field reconnaissance and microstructural investigation to estimate the deformation history in the Ar-Ruwaydah area. The main lithologies of the Ar-Ruwaydah area are schist and metagreywacke of the Abt Formation and characterized by weakly to moderate deformation. The direction of finite strain for the long axes displays clustering along the NW–SE trend (occasionally N) with slight plunging. The Z axes are subvertical and associated with a subhorizontal foliation. The data reveal oblate strain symmetry (flattening) with minor prolate strain (constriction) and the strain magnitudes show no considerable increase towards the tectonic contacts. It is concluded that nappe stacking occurred early during an earlier thrusting event, probably by brittle imbrications. Ductile strain was superimposed on the nappe structure at high-pressure as revealed by a penetrative subhorizontal foliation that is developed subparallel to tectonic contacts versus the underlying and overlying nappes. Accumulation of ductile strain during underplating was not by simple shear but involved a component of vertical shortening, which caused the subhorizontal foliation in the Ar-Ruwaydah area. In most cases, this foliation was formed concurrently with thrust sheets imbrications, indicating that nappe stacking was associated with vertical shortening.