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Geochronology on rocks from Rwanda: deposition, magmatism and mineralization.

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Geological investigation in six Prospective Target Areas in Rwanda was carried out between 2012 and 2015. Rocks encountered are from the Palaeoproterozoic Rusizi and Mesoproterozoic Akanyaru Supergroup. The Rusizian belt in the SW comprises pelitic schists and granitoids all older than ~1.8Ga. The Akanyaru Supergroup comprises siliciclastic strata forming the basal Gikoro, Pindura, Cyohoha and upper Rugezi Groups. Several formations of the Gikoro, Cyohoha and Pindura groups were encountered. Due to lateral facies changes incomplete successions are present in the studied areas. Sandstones and siltstones represent fluvial to submerged depositions while siltstone, shale and mudstones represent deeper water turbidite deposits with thin to thick Bouma cycles. Interbedded gritty sandstone reflects fluctuation in the basin's elevations. Detrital zircon studies on Gikoro (2) and Cyohoha (1) gritty sandstone shows variable populations of Archaean (3.5- 2.53 Ga [18-62%]) and Paleoproterozoic (2.17-2.04 [8-14%] & 2.0-1.74 [25-68%] Ga) with a hint of ~1.45 Ga age, sources. Overgrowth and discordance show some resetting at ~1Ga. This illustrates that deposition commenced after 1.45Ga from different age composition sources regions for different sectors of the basin over time and of a subsequent tectonometamorphic activity.

Mafic dykes and sills of the Lake Victoria and Kabanga-Musongati mafic complexes intruded all the encountered Groups and probably indicate the end of deposition of the Akanyaru Supergroup. Coarse porphyritic and medium-equigranular granite mostly are found at the base of the Gikoro Group or as wedges below thrust sheets. Intrusive relationships are rarely observed. The porphyritic granite was dated at ~ 1376 with the equigranular granite at 983 to 978 Ma and represents the Kamwezi and Nyanza Suites respectively.

All strata, mafic and granite intrusions were affected by a single deformation event which caused N-S elongated granite anticlinal ridges separated by sedimentary filled synclinoria. The structures vary from low-angle imbricated thrust stacks above a basal tectonic breccia, west and east vergent, to upright irregular to regular concentric and rare overturned parallel folds. The fold axis plunges at low angles N or S–ward with subvertical axial planar fabric. Rock composition and position in the fold determine the fabric development. In shale sericite is bedding parallel, in siltstone muscovite forms the S_1 and in arenite detrital quartz is weak- to intensely flatten. Discordant idioblastic staurolite, garnet, schorl and albite are randomly aligned within the S_1 foliation. This sequence defines an early bedding-parallel (S_S) foliation, the axial planar fabric (S_1) and the late idioblastic alignment as S_{1+}.

Pegmatite dated at 944 and 939Ma affected the D_1 elements determine deformation to occurs between 980 and 944 Ma which is contradictory to the existing model from the Tervuren Museum on Africa Geology who postulated an D_1 extension since 1380Ma followed by D_2 folding prior to the Nyanza Suite. Zircon resetting and growth in Gikoro quartzite and Kamwezi granite determine the peak of metamorphism during D_1 at 960 Ma.

This study shows that mineralized quartz veins are associated with D_1 while D_2 folding is related to the subsequent pegmatite intrusions which is in accordance to available mineralization ages of 972 and 948 Ma.

References:

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