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The geology of the Blouberg Formation, Waterberg and Soutpansberg Groups in the area of Blouberg mountain, Northern Province, South Africa

by

ADAM JOHN BUMBY

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ABSTRACT.

The geology of the Blouberg mountain area, Northern Province, South Africa is characterised by a number of successor basins developed over a region which is underlain by a cratonic suture (the Palala Shear Zone). The suture was formed during the Limpopo Orogeny, due to oblique convergence of the Kaapvaal Craton and the Central Zone of the Limpopo Mobile Belt at either 2.65Ga or 2.0Ga. Post-collisional brittle reactivation along the Palala Shear Zone in the Blouberg study area is accommodated on the parallel Melinda Fault.

The earliest basin developed in this area was that of the Blouberg Formation, which is preserved in an area restricted to the eastwards extension of the Palala Shear Zone. The Blouberg Formation can be divided into Lower and Upper Members. The widespread Lower Member is thought to have been deposited in a pull-apart basin, is characterised by braided fluvial sheetflood deposits, and is generally steeply-dipping or overturned, reflecting a subsequent southwards-vergent basin inversion. The Upper Member contrasts with the Lower Member in that it is preserved only rarely, is generally flat-lying, and is composed of conglomerates with sub-angular cobbles of foliated basement rocks with rare granulestone beds, reflecting deposition in debris flows and braided rivers respectively. The tectonic event responsible for the southwards-vergent basin inversion of the Lower Member probably also uplifted proximal basement sources to the north and east, leading to deposition of the Upper Member in localised basins close to the southern strand of the Melinda Fault scarp.

The syn-tectonic deposition of the Blouberg Formation was followed by a period of relative tectonic quiescence, and deposition of the Waterberg Group. The fluvial Setlaole Formation was succeeded by the predominantly aeolian Makgabeng Formation. Strata of these two formations are not preserved north of the Melinda Fault, probably due to the syn-Blouberg tectonic activity, which had led to development of high topography in this area. This palaeohigh gradually denuded throughout Waterberg sedimentation.

Ultimately, the Mogalakwena Formation, the youngest of the Waterberg units in the study area, onlapped northwards over these denuding highlands.

After the end of Mogalakwena deposition, renewed tectonic activity led to approximately north-south orientated extension. Syn-Blouberg northwards-dipping reverse faults along the southern strand of the Melinda Fault were locally reactivated as normal faults, resulting in a half-graben type environment. A depository was created above the hanging wall, which filled with the strata of the Soutpansberg Group; initially volcanics of the Sibasa Formation erupted, followed by the clastic deposition of the Wyllies Poort Formation.

Late-stage reactivation along the Palala Shear Zone is represented by the northern strand of the Melinda Fault, which is generally a dextral strike-slip fault, with up to 17km of total displacement.

SAMEVATTING.

Die geologie van die Blouberg omgewing in die Noordelike Provinsie van Suid-Afrika word gekenmerk deur die teenwoordigheid van 'n aantal opeenvolgende sedimentêre komme wat ontwikkel is oor 'n kratoniese sutuursone (die Palala skuifskeursone). Die sutuur het gevorm tydens die Limpopo Orogenese (2.65 of 2.0 Ga) en was die gevolg van skuins konvergensie van die Kaapvaalkraton en die Sentralesone van die Limpopo Mobiele Gordel. Bros heraktivering van die Palala skuifskeursone in die Blouberg studiegebied, na die botsing, het plaasgevind op Melindaverskuiwing.

Die eerste kom wat ontwikkel het in die studiegebied, is gevul deur die Blouberg Formasie, wat gepreserveer is in 'n gebied wat beperk is tot die oostelike verlenging van die Palala skuifskeursone. Die Blouberg Formasie kan onderverdeel word in 'n Onderste en Boonste Lid. Die wydverspreide Onderste Lid is klaarblyklik in 'n ooptrekkom afgesit en word gekenmerk deur gevlegde fluviale plaatvloed afsettings wat algemeen steilhellend tot oorgeplooi is deur 'n jonger, suidwaarts gerigte kominversie. Die Boonste Lid verskil van die Onderste Lid deur dat dit swak gepreserveer is, oor die algemeen horisontaal gelaagd is, en bestaan uit konglomeraat met sub-hoekige rolstene van gefolieerde vloergesteentes en korrelsteenlae. Laasgenoemde sedimente dui respektiewelik op puinvloei en gevlegde riviere. Die tektoniese gebeurtenis verantwoordelik vir die suidwaarts gerigte kominversie van die Onderste Lid het ook proksimale vloergesteente bronne in die noorde en ooste opgehef. Dit het gelei tot die afsetting van die Boonste Lid in gelokaliseerde komme naby die suidelike vertakking van die Melindaverskuiwingseskarp.

Die sintektoniese afsetting van die Blouberg Formasie is gevolg deur 'n relatief tektonies-statiese tydperk waartydens die Waterbergkom gevul is. Die fluviale Setlaole Formasie is gevolg deur die eoliese Makgabeng Formasie. Sedimente van hierdie twee formasies is nie noord van die Melindaverskuiwing gepreserveer nie, waarskynlik as gevolg van die sin-Blouberg tektoniese aktiwiteit wat hoë topografie in die gebied tot gevolg gehad het. Hierdie paleohoog is geleidelik tydens Waterberg sedimentasie vernietig. Uiteindelik het

die Mogalakwena Formasie, die jongste van die Waterberg eenhede in die studiegebied, hierdie hooglande na die noorde oordek.

Na die einde van Mogalakwena afsetting het hernude tektoniese aktiwiteit gelei tot noord-suid korsverlenging. Sin-Blouberg noordwaartshellende oorskuiwings, langs die suidelike vertakking van die Melindaverskuiwing, is plaaslik geheraktiveer as afskuiwings wat 'n halwe-graben omgewing tot gevolg gehad het. 'n Afsettingskom is gevorm op die dakkant en is gevul deur gesteentes van die Soutpansberg Groep, bestaande uit vulkaniese gesteentes van die Sibasa Formasie gevolg deur klastiese gesteentes van die Wyllies Poort Formasie.

Laat-stadium heraktivering van die Palala skuifskeursone word deur die noordelike vertakking van die Melindaverskuiwing verteenwoordig en aanduidings is dat daar sowat 17 km regs-laterale strekkingsglipverplasing is.

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