Geology of subsheets J, P and V of the Yabello map sheet (NB37-14)

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ABSTRACT

This report portrays the geology and structure of three subsheets which together cover 2250 sq. km area, in the west-central part of the Yabelo map sheet, southern Ethiopia. The description is based on the conventional methods of regional geological mapping, which mainly involve pre-field photogeological interpretation, field geological mapping, petrographic study and structural analysis.

More than half of the area is a plain-land covered by Recent superficial deposits constituting mainly red-sandy soil, typical of semi-arid and arid regions. This extensive plain-land is traversed or punctuated by prominent mountains, scattered ridges and hills, which expose mainly Precambrian crystalline basement and subordinate Cainozoic volcanic rocks in the southeast.

The crystalline basement in the study area is represented by five major map units, namely, Gamedu layered gneiss complex (GLGC), Fele quartzofeldspathic gneiss complex (FQFGC), Yatu granite-gneiss complex (YGGC), Somsa schist-gneiss complex (SSGC) and Molicha silicified serpentinite (MSS), showing a distinct texture, rock association and/or mineralogical composition. The first three complexes are the largest units generally arranged in three NNW trending belts. They are basically made up of a suite of quartzofeldspathic rocks constituting biotite, amphibole or pyroxene bearing felsic gneisses, concordant and discordant pegmatite veins or bodies. The Gamedu layered gneiss complex underlies the southwestern part of the area. In contrast to the other two felsic dominated complexes, it contains appreciable layers of mafic gneisses, metasedimentary schists, metacarbonates and amphibolites. Unit FQFGC is found in the central part of the area and is characterised by the variation: in the grainsize of the quartzofeldspathic lithologies and in the distribution and type of minor mafic minerals in different layers over short distances. The complex also contains very minor migmatitic mafic gneisses and amphibolites in some places. The Yatu granite-gneiss complex occupies the northern part of the area. It is distinguished by the abundant occurrence of massive to slightly foliated heterogeneous granite and late stage pegmatite. It also associates subordinate banded gneiss, migmatitic gneisses and meta-

ultramafic schists in some places. Somsa schist-gneiss complex forms a very small zone in the west-central part of the area bounded by units FQFGC and GLGC to the north and south respectively. It is represented by metasedimentary schists/gneisses, metacarbonates, amphibolite and quartzofeldspathic gneiss. The Molicha silicified serpentinite occupy a single isolated hill within the outcrop region of unit YGGC. The unit is mainly formed of altered ultramafics that is partly silicified and traversed by chalcedony and magnesite veins. Most crystalline map units (except unit MSS and meta/ultramafics in other complexes) show mineral assemblages characteristic of middle-upper amphibolite and granulite facies metamorphism.

The Precambrian structural fabric is generally NNW trending and parallels the strike of ridges and mountains. Based on the megascopic and mesoscopic structures three major phases of Precambrian deformation (Dp-1, Dp, Dp+1) are recognised. The first phase of deformation (Dp-1) is related to NNW-SSE compression and is mainly recorded in the Gamedu layered gneiss complex. It has given rise to open, normal folds with ENE-WSW trending axis. This deformation event signifies the beginning of Neoproterozoic lithospheric extension in the region. The other two deformational phases (Dp and Dp+1) are due to a progressive E-W compressional deformation at the final stages of the Neoproterozoic orogenesis. The major structure associated to the Dp deformation is a regional plunging, normal fold with N-S trending axis. Continued deformation resulted in the tightening and disruption of early formed structures by layer parallel extension and development of brittle-ductile strike-slip shear zone parallel and oblique to the regional structural trend.

The Cainozoic volcanics are found in the southeastern part of the area filling depressions and partly covering flanks and highs of the Precambrian crystalline basement. They are represented mainly by pyroclastic (lapilli and ash), volcano-sedimentary (lacustrine) deposits, scoria fall deposits and scoraceous-vesicular basalts. These rocks are the results of two stages of bimodal volcanic eruptions (from a number of cinder cones) related to the tectonics of the East African Rift System.

The area owes certain geological resources that can be useful for agriculture (local use), road construction and dimension stones. In addition to these, there are a number of kaolinite deposits associated to altered quartzofeldspathic rocks in the area. Disseminated magnetite and chalcopyrite mineralizations are recorded in some places.