

# **GEOCHEMISTRY AND GEOCHRONOLOGY OF THE SEMARULE SYENITE COMPLEX (SSC) IN SE BOTSWANA**

**MS. RESEGO M RADINOGA, BSC GEOLOGY AND  
ZIBISANI BIZA BAGAI**

University of Botswana

Presenting Author: resradii@gmail.com

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R M Radinoga 1\*, Z B Bagai 1, R B M Mapeo 1

1 Department of Geology, Faculty of Science, University of Botswana, Private Bag 00704, Gaborone, Botswana

### **ABSTRACT**

The Semarule syenite is considered to be a peralkaline anorogenic intrusion within the Neoproterozoic Gaborone Granite Complex in the northern margin of the Kaapvaal Craton. The intrusion is regarded to be rift-related in origin and associated with the Bushveld LIP event. Semarule syenite intrusion is a small multi-phase complex body with five texturally different units. Recent collaborative studies between the British Geological Survey and the Geological Survey of Botswana (now Botswana Geoscience Institute) have identified elevated rare earth elements (REE) values in the Semarule syenite complex. Despite this, its formation, geological setting, crystallization histories and emplacement age are not well understood. This study aims to understand the petrogenesis of the Semarule syenite complex by generating a petrogenetic model for the complex. Henceforth, geochemical, radiogenic isotope, stable isotope and geochronological studies of the complex will be employed in this study to achieve the set objective. The outcome of the study will have impact on understanding the evolution of the syenite complex and the relationship with the high REE contents recorded by previous investigations. The understanding of relationship of high REE contents in the syenite and the evolutionary history of the complex will guide the exploration companies in formulating exploration criteria that might lead to successful discovery of the REE deposit in the study area and possibly other syenite complexes in Botswana.

### **Keywords**

Petrogenesis, Semarule syenite, anorogenic intrusion, Gaborone Granite, Kaapvaal craton, alkaline