Petrogenesis of A-type granite plutons of Gilkapadu and Ramreddipalem, area, Nellore Schist Belt, Eastern Dharwar Craton, India

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ABSTRACT

We present the field, petrographic and geochemical characters of two thorite bearing A-type granite plutons that occur as detached bodies around Gilkapadu and Ramreddipalem (GR) in the southern part of the Neoarchean Nellore Schist Belt (NSB) of Eastern Dharwar Craton (India). These granites are oval to sub-oval in shape, leucocratic to mesocratic in nature and deformed along the margins. Interestingly, both the granites are thorite bearing and are outcropped along NE-SW trend and exhibit discordant relationship with the host Mesoproterozoic Rapur granite exposed SE of Ramreddipalem.

Petrographically, the GR granite consists essentially of K-feldspar, quartz and plagioclase with minor biotite. Zircon, epidote, apatite, titanite, monazite and opaques, constitute the accessory minerals. Textural studies indicate the presence of quartz-alkali feldspar intergrowths and micrographic textures. Mineral chemistry by EPMA studies helped in concluding the presence of uraninite and thorite. Major oxide analysis, indicate an average high SiO_2 (70.83 wt %) and Na_2O+K_2O content (8.42 wt %) and low CaO (1.46 wt %) and MgO (0.74 wt %). Relative enrichment of Ba (430-1499 ppm), Zr (118-541 ppm) Y (25-150 ppm) and HREE is observed as compare to Sr content (19 ppm to 119 ppm). LREEs are relatively enriched when compared to HREE and has negative Eu anomaly. In Zr+Nb+Ce+Y vs major oxide and 10000 Al*Ga/Al vs trace element plots, the samples fall in A-type field, while in the trace element tectonic discrimination diagram, these granite exhibit within-plate granite (WPG) characters. In contrast to this, the granite plots in A_2-type field of Y-Nb-Ce diagram, which is an indication that it is derived by differentiation of a continental tholeiite, with variable degrees of crustal interaction, or by direct melting of a crustal source.

Keywords: Thorite bearing granite, Nellore Schist Belt, Eastern Dharwar Craton, Anorogenic magmatism

INTRODUCTION

A-type igneous suites constitute a major component of the continental crust, with roughly 30% basic rocks, 18% intermediate rocks and 6% granites and syenites. In Precambrian continental terranes, most of A-type igneous rocks are referred to as anorogenic or cratonic (Lameyre et al., 1974) and are emplaced into non-orogenic settings – both within plate and along plate margins. These granites presumably represent the most voluminous intraplate silicic magmatism and are often aligned in a linear or semi-linear manner across Precambrian cratons and are known to occur in all continents (e.g: Anderson, 1983; Anderson and Morrison, 1992; Rämö and Haapala, 1995; Subba Rao et al., 1998; Rajesh, 2000).

Anorogenic granites are characterised by their distinct mineralogy, whole rock and trace element composition, form significant constituent of the Earth's continental crust and are emplaced in extension tectonic setting (e.g: Loiselle and Wones, 1979; Collins et al., 1982; Whalen