

SHRIMP U-Pb zircon age determination of Pan-African orogeny from a single outcrop in South Sudan

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We collected granitic gneiss (SSD-1) and intruding leucocratic gneiss (SSD-2) samples from a single outcrop (N4.840556, E31.552778) exposed in Jebel Mountain of the Juba Area, South Sudan. SSD-1 and SSD-2 are plotted within the granodiorite and trondhjemite field of the An-Ab-Or diagram, respectively. We determined SHRIMP U-Pb zircon ages of the gneisses and the results are quite distinct from each other. The granitic gneiss sample has two age populations. The older population of SSD-1 shows scattered $^{207}\text{Pb}/^{206}\text{Pb}$ age distribution near the Archean-Paleoproterozoic boundary (ca. 2500 Ma), and most of analyzed ages are more or less discordant. The younger population displays much younger and more concordant ages, yielding weighted mean $^{238}\text{U}/^{206}\text{Pb}$ age of 993.8 ± 7.1 Ma (n=34), close to the boundary between Mesoproterozoic and Neoproterozoic. Because Th/U ratios of the zircons from SSD-1 are greater than 1 in general, ca. 995 Ma is interpreted as an emplacement age of the granitic gneiss, probably indicate early Neoproterozoic magmatism within the Mozambique Belt. The leucocratic gneiss (SSD-2) intruding the granitic gneiss displays rather scattered age distribution. Except one Archean age of ca. 2580 Ma, most of the near concordant ages are concentrated in late Neoproterozoic, yielding weighted mean $^{238}\text{U}/^{206}\text{Pb}$ age of 593 ± 20 Ma (n=20). Because Th/U ratios of the zircons from SSD-2 are typically lower than 1, such an age of ca. 600 Ma seems to indicate partial melting event accompanied to Pan-African Orogeny.

Keywords: South Sudan, SHRIMP U-Pb ages, Pan-African orogeny