Geochemical and Sr-Pb-Nd-Hf Isotopic study of Neoarchaean "Setouch-type" high-magnesium andesite suite from Central India

D. ASTHANA,#[1] J-I KIMURA,[2] R.SHINJO,[3]
M.KATAKUSE,[2] AND A.M.POPHARE,[1,4]

[1] DEPARTMENT OF APPLIED GEOLOGY,.ISM.,DHANBAD-826004 INDIA ; e-mail address dasthana@hotmail.com
[2] Shimane University, Matsue 690-8504,Japan jkimura@riko.shimane-u.ac.jp
[3] University of the Ryukyus ,Okinawa 903-0213, Japan, rshinjo@sci.u-ryukyu.ac.jp
[4] Department of Geology Nagpur University, India

The Mangikhuta volcanics of the Khairagarh Group, Central India are basaltic andesites and andesites with high MgO (up to 12 wt%), Ni (up to 300 ppm), and Cr (up to 841 ppm), and are classified as high-magnesium andesites (HMA). The elevated SiO_2 and MgO contents are primary features. This is corroborated by their relict clinopyroxene chemistry. The HMAs are medium-K to high-K and calc-alkaline suite. The HMAs are LREE enriched with (Ce/Ybn ~6), have high Th/Nb (~9) and Th/U (~3) and high HFSE ratios (Zr/Y ~5), typical of modern continental arcs or Ca-HMAs..

. The Rb-Sr and Pb-Pb or U-Pb ages indicate metamorphic fluid metasomatism between 1.8 and 2.0 Ga, whereas the Sm-Nd and Lu-Hf 2.5 Ga age perhaps reflecting their formation. The fluid metasomatism involved remobilisation and addition of Rb and Pb from a very enriched source, as (a) U-Pb Concordia plot indicate common Pb addition at about 2 Ga , (b) the scatter in initial Pb-Pb isotopic ratios are minimum at around 1.8 Ga indicating a relatively uniform fluid source that flushed the volcanics at around this time,and (c) the initial Sr ratios at ~2 Ga are quite uniform, The epsilon Nd and epsilon Hf plot of selected HMAs fall around Bulk Earth composition at 2.5 Ga with some scatter. This feature is also similar to those reported from the Setouchi HMAs. The isotopic characteristics, combined with the trace and major element characteristics, suggest derivation of the Central Indian HMAs from mixing between subducted slab sediment melts and a depleted mantle wedge as suggested for the Setouchi HMAs in the Cenozoic SW Japan.