Northwest Africa 3163: A window into the deep lunar crust?

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Northwest Africa (NWA) 3163 is a feldspathic lunar meteorite (FLM). However, it is unique amongst FLMs by virtue of being relatively ferroan (~5.8 wt.% FeO [1, 2]) and having low abundances of incompatible trace elements and siderophile elements [1, 2]. This sample has been previously interpreted to represent burial metamorphism of anorthositic and olivine gabbroic to diabase rocks [2]. NWA 3163 is brecciated with distinct relict anorthorsitic clasts and zones of more mafic diabasic clasts and has been largely recrystallized during burial metamorphism.

An approximately 1cm x 1cm x 3 mm fragment of NWA 3163 was polished and analyzed for *in situ* major element and trace element contents of the consituent phases by electron microprobe (EMP) and by laser ablation ICP-MS (LA-ICP-MS). Major element compositions of the mineral phases are in close agreement to previously published values [2]. Plagioclase (now converted to maskelynite) shows a narrow compositional range ($An_{96.5\pm0.6}$) as does olivine ($Fo_{57.7\pm1}$). Pyroxene compositions are more variable, although the majority are pigeonite with occasional discrete augite grains.

Rare earth element compositions of maskelynite grains range from strongly HREE depleted (La/Yb_{CI} = 7.6) to HREE enriched (La/Yb_{CI} = 0.6). Mass balance relationships show that the HREE enriched compositions are likely the result of either trace element diffusion between maskelynite and augite during the granulite facies metamorphism or due to the laser penetrating the maskelynite grain into underlying pyroxene. Augite trace element compositions are highly HREE enriched (La/Yb_{CI} = 0.06) with strong negative Eu anomalies (Eu/Eu* = 0.034) indicating crystallization after substantial plagioclase formation. Pigeonite, on the other hand, has lower overall incompatible trace element abundances and positive Eu anomalies.

Diverse Sm/Nd ratios amongst the constituent phases and relatively abundant oxide phases with high Hf contents make this rock potentially suitable for Sm/Nd and Lu/Hf age dating of the burial metamorphism, which may provide further constraints for timing of burial of ancient lunar crust during the late heavy bombardment.

[1] Korotev (2006) *LPSC* **XXXVII**, #1404. [2] Irving *et al.* (2006) *LPSC* **XXXVII**, #1365.

Evaluation of natural background radiation hazard in Southern Tamil Nadu, India and its effect on habitat and environment

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Detection and quantification of radioactivity has become significant in recent years with the recognition of the importance and urgency of environmental/climatic problems around the world. The radioactivity even in minor quantities will build up in human body and subsequently, lead to unknown and unpredictable health complications in particular those related to sustainable development, agricultural production, habitat, ecosystem and forest. This paper presents the detailed radiation exposure rates at closely spaced intervals have been obtained along the beach sectors from Thengapattanam to Kanyakumari and the surrounding hinterlands. High intrinsic radioagenic source, with radiation exposure rate ranging from 500 to 2600 μR/h, have been identified in the weathered hillocks around Inayam and Midalam localities. In addition, a very high radiation exposure rate ranging from 1000 to 6000 μR/h were found within the rock population of syenite body and in the boulders around Puttetti. Further, the radiation exposure rate along the connected beaches around Midalam, Kurumpanai and Manavalakurichi is observed to be lower than that of hinterlands ranging from 200 to 1600 μR/h. Public concerns of radiation exposure of safety in high background areas are of great social relevance. The construction materials used for dwelling purposes from these areas should be avoided from health hazard point of vies. Significant radiation doses will certainly enter the human body as most of the people have the habit of sitting and sleeping on the floor. People living in the region are expected to receive significant radiation, which may get accumulated in the human body causing long-term health problem.