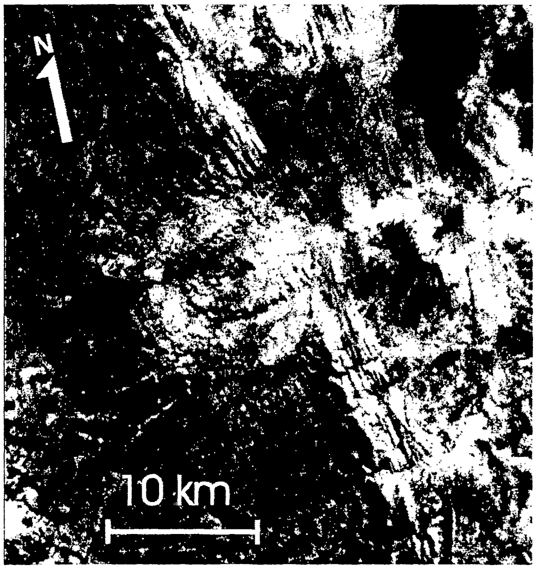

Fig. 1. Detail from Landsat TM image (174-67), showing the 12.6 km diameter Luizi Structure on the Kundelungu Plateau. The structure is superposed in the east on Cenozoic normal faults of the Lake Mweru graben.

these redbeds [5] indicate a late Neoproterozoic (570 ± 5 Ma) maximum age for the sediments of the Kundelungu Plateau, at the top of the Upper Kundelungu Supergroup of the Katangan Sequence [6]. Landsat imagery (Fig. 1) shows that the Luizi structure is superimposed on NNW-SSE trending faults of the Lake Mweru-Luapula graben, which is part of the Cenozoic East African Rift System. Although the Mweru graben contains Permo-Carboniferous (Karoo) sediments [6], rift development in the Lake Mweru region started in the late Tertiary [7,8]. Two kimberlite pipes of probable Cretaceous age [9] are found within the Luizi Structure [1], but their relation to the structure is unclear. The geological and geochronological data currently available indicate that the formation of the Luizi Structure postdates late Neogene rift faulting.

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AN ALTERNATIVE ORIGIN FOR COESITE FROM THE RICHAT STRUCTURE, MAURITANIA. S. Master[1] and J. Karfunkel[2], [1]Impact Cratering Research Group, Dept. of Geology, Univ. Witwatersrand, Wits 2050, Johannesburg, South Africa (sharadmaster@hotmail.com), [2]Universidade Federale de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil (jokarfun@igc.ufmg.br).

The Richat structure is a 38-km diameter circular concentric domal feature in the Adrar region of Mauritania, (western Sahara Desert) [1–4]. Although the early workers regarded it as of endogenic origin [1–5], others have considered it as a possible impact structure [6–8]. In 1969, the Richat structure was investigated in the field by Dietz [9], who found no evidence of shock metamorphism, and concluded that the structure was definitely not of impact origin. Richat has since then been regarded as a discredited impact structure, probably of endogenic origin [10–12].

Aside from the remarkable circularity of the concentric ridges of quartzite, which have a relief of up to 100 m, and the presence of some chert and quartzite breccias, the strongest evidence put forward by proponents of the impact origin of the Richat structure was the discovery of the high-pressure silica polymorph coesite in some of the quartzite breccias [6]. This was taken to indicate high shock pressures (>2 GPa), related to the formation of the structure by impact processes. Dietz et al. (1969) [9] rejected a shock wave origin for the coesite, citing the complete absence of even minor grain fracturing in the quartzite breccias. They suggested instead that local intergrain stress concentrations may have exceeded 2 GPa pressures in certain tectonic environments; or that pressures <2 GPa may produce coesite under conditions of high stress and strain-rates [9,13].

In the Diamantina region of Minas Gerais, Brazil, shattered quartzite outcrops have been found which contain coesite. The origin of these shattered outcrops has been attributed to the effects of lightning strikes [14]. Microfractures in these quartzites are saturated with water during the rainy season. When struck by lightning, the water temperature in these confined systems rises to over 1500 °C, resulting in an explosive expansion, which can blow rocks apart, and produce estimated pressures >3.5 GPa, indicated by the presence of coesite (identified by RMP analyses). Thus we propose an alternative origin for the coesite from Richat, which would be consistent with the lack of shock metamorphic features in the structure. We suggest that the coesite-bearing quartzite breccias of the Richat structure were produced by lightning strikes, during a wetter pluvial period [15] in the history of the Sahara Desert, attested to by the presence of Paleolithic sites in the Mauritanian Adrar [16]. The presence of coesite in the Richat structure [6] would then no longer be enigmatic, and the endogenic origin of the structure is supported.

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A STRIKING ^{126}Xe ANOMALY IN LUNAR AND PESYANOE REGOLITH SAMPLES. K. J. Mathew and K. Marti, Department of Chemistry and Biochemistry, University of California, San Diego, La Jolla CA 92093-0317, USA (mkattath@ucsd.edu).

An analyses of the solar-type xenon in Pesyanoe and in regolith samples led Pepin et al [1] to suggest an unrecognized irradiation effect which generated variable and often large excesses of ^{126}Xe. Podosek et al [2] first noted this excess in the spallation-free early release (1000 °C step) of Pesyanoe [Marti, 3] compared to the surface correlated Xe in lunar samples. There is no satisfactory explanation of this anomaly even though, as mentioned, its presence in regolith samples had long been recognized.

Figure 1 shows that ^{126}Xe excesses are often large and apparently not correlated with the small excesses at other isotopes. Pepin et al [1] discussed possible origins by proton- and neutron-induced reactions on ^{127}I and argued that these excesses are due to a regolith process. However, estimated production rates from measured ^{127}I fall short by one to two orders of magnitude to account for these excesses. Begemann and Mathew [6] suggested another alternative, proton-induced reactions on Te. Thick-target cross-section measurements on natural tellurium with low-energy protons showed that production from Te had the advantage of not perturbing other isotopic ratios ($^{128}Xe \leq 7\%$ and $^{130}Xe \leq 1\%$) [6]. However, the abundances of Te in regolith samples are equally too low to account for these excesses.