the afternoon control period is maintained but the decreasing trend is reversed at altitudes above 700 km. These topside regions must, however, be thermally stable because they have been illuminated during the long summer day. Thus any expansion of the ionosphere caused by heating in the vicinity of $h_{\max}$ and the ensuing upward drifts of electrons had already taken place. The observations suggest that denser upper regions must exist in the northern latitudes during this period. Apparently, the daytime expansion offsets the usually observed decrease (as in the control situation) at the higher altitudes. The electron density structure at altitudes below 700 km, however, is similar in trend to that during the control period. Because the trend of the contours in Fig. 1 changes at rather low latitudes where particle-produced ionization is very small, especially during the magnetically quiet period of the observations, we can rule out the possibility of direct ionization from particles as a cause for the contour change.

In summary, the observed phenomenon can be described as the interaction of two effects: (1) the normal decrease of density (at equal heights) at northern latitudes and (2) the expansion effects around $h_{\max}$ produced by long time solar illumination.

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Uranium Content of Some Stone Meteorites and their Pu–Xe Decay Interval

Kuroda and Reynolds have recently discussed whether or not the Pu–Xe and I–Xe decay intervals of stone meteorites are concordant, and the implications of this question to models of galactic nucleosynthesis. Kuroda states[1,2] that they are concordant, while Reynolds[3,4] believes the question is still open. Kuroda notes that the ^{136f}Xe/U ratios are excessively high in two eucrites, Petersburg and Moore County, indicating Pu–Xe decay intervals for these two meteorites which are not concordant with their I–Xe decay intervals beyond his acceptable limits of error (±30 per cent). Using his average eucrite uranium abundance of 130 p.p.b. for these two meteorites, instead of their measured abundances of 100 and 40 p.p.b. respectively, he brings the decay intervals to near concordancy, arguing that the measured uranium abundances may well be wrong because of tellurium interferences with the neutron activation analysis. It therefore becomes a critical test of Kuroda's model to measure the uranium in either of these meteorites by a different technique. In particular, the difference between the measured and predicted U abundances in Moore County is significant.

Another meteorite, the aubrite Pena Blanca Springs, would show concordancy with a U abundance of about 20 p.p.b. The measured values are close enough to this, 14·3 and 16·4 p.p.b. (ref. 6), but because of the doubt cast by Kuroda on the validity of these measurements and because of the high U content (47 and 62 p.p.b.) measured by the same technique on the aubrite Shallowater, it seemed important to check the Pena Blanca Springs data.

Here I report measurements of the uranium abundances in Moore County, in Pena Blanca Springs, and in several "normal" eucrites, by the fission track method[5]. Thin sections of the meteorites mounted in plastic disks were covered with lexan plastic and irradiated in a nuclear reactor for 4 h at a flux of $\sim 5\times 10^{11}$ n/cm^2 s, together with a glass standard similarly mounted and covered. Tracks in the covering plastic were the result of neutron induced fission of uranium in the samples. A background effect caused by uranium in the plastic itself was negligible except for the very lowest uranium contents ($\lesssim 10$ per cent for Moore County and Pena Blanca Springs). Comparison of track densities found in the plastic adjacent to the meteorite samples with that found in the plastic adjacent to the standard glass sample gives directly the uranium content of the meteorites. The meteoritic areas scanned were large enough to smooth out heterogeneities in the uranium distributions (Table 1). Error limits are ±10 per cent except where noted.

Table 1. URANIUM ABUNDANCES IN SOME STONE METEORITES

Meteorite	Fission track density (cm^{-2})	Area (cm^2)	U (p.p.b.)	Previous results	Average
Pena Blanca Springs	250 ± 100	0·06	8 ± 2	16·4, 14·3 (ref. 6)	13
Pasamonte	4,000	0·031	120	54·2 (ref. 7); 132 (ref. 8); 107, 58, 67, 97 (ref. 6)	91
Moore County	850	0·044	25	19·6 (ref. 9); 50, 39 (ref. 6)	44
Sioux County	1,380	0·057	40	63 (ref. 7); 142, 106 (ref. 6)	88
Stannern	5,600	0·08	165	190, 160 (ref. 6)	175

The Moore County datum of 25 p.p.b. U is in good agreement with the previous data, and is far from the value of 130 p.p.b. predicted by Kuroda's calculations. The Moore County decay intervals, therefore, remain discordant and it is clear that the whole question of concordancy of meteoritic decay intervals is still open.

The Pena Blanca Springs datum of 8 p.p.b. U is in reasonable agreement with the previous data, considering the range in U abundances within individual meteorites found by previous investigators[6–9], but is far from the 20 p.p.b. necessary for concordancy. The average U abundances calculated for this meteorite from my own and previous data do give a Pu–Xe decay interval concordant with the I–Xe interval, within Kuroda's stated limits of error; this emphasizes the question of sampling difficulties in the interpretation of the Xe and U data. The uranium abundances within most of these meteorites show variations of about a factor of two. It will therefore be necessary to perform U and Xe measurements on thoroughly crushed and mixed aliquots if the question of the Pu–Xe decay interval is to be settled. A eucrite average of about 100–120 p.p.b. can be calculated from my own and earlier data, depending on how one weights multiple determinations on individual meteorites. But about half the eucrites show average values differing from this total average by ±75 per cent, so that Pu–Xe decay intervals based on such an average uranium content can only be a gross estimate.

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