References and Notes

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Meteors: An Unexpected Increase in 1963

Abstract. *Counts of meteors observed by radar from Christchurch, New Zealand, rose unexpectedly by over 100 percent during mid-1963. A similar but smaller increase was also observed in Canada. Diminishing peaks have subsequently appeared at 6-month intervals in the Christchurch meteor counts.*

During 1960–61 an extensive survey of meteor rates was carried out near Christchurch, New Zealand (lat. 43.5°S). The equipment operated at 69.5 Mcy/sec, and an antenna was used with omnidirectional characteristics such that meteors arriving from all directions were detected, down to magnitude +8. Stringent precautions were taken throughout the survey to ensure that the sensitivity of the equipment remained constant (*1*, *2*).

A second survey was commenced in February 1963 and is still continuing. In mid-1963, as the records were processed, it became apparent that the rates from April onward had risen well above those obtained in 1960. This trend continued until July, after which the high rates subsided; they returned to the 1960 values by October (Fig. 1).

At the end of 1963 and beginning of 1964 the meteor rates again rose, but by a smaller amount, and a preliminary analysis of subsequent data indicates that the rates once again returned to the 1960 values by March 1964. This preliminary analysis of the data now being processed also gives evidence of yet another, but even smaller, increase during mid-1964. It rather suggests a decaying series of peaks at 6-month intervals.

The first unexpected increase in meteor rate led to a thorough re-examination of the equipment performance, but we could not account for the high 1963 rates. The only similar survey known to us was that being conducted by the National Research Council in Canada, and an enquiry was therefore made to ascertain whether they had obtained any unusual results. When the Canadian data revealed a broad agreement with that from the Christchurch survey as far as the major peak was concerned, it became apparent that the phenomenon was world-wide (*3*).

The extent of the collecting area of the Christchurch equipment amounts very closely to 10^{-3} of the total area of the earth at the 95-km level. From Fig. 1 we see that the excess number of meteors observed during the period of the increase was close to 300,000. This is therefore equivalent to an influx of some 3×10^8 particles over the whole of the earth. Furthermore, the increased influx did not appreciably alter the form of the diurnal variation in meteor rate. The monthly mean curves for the diurnal variation were magnified replicas of those obtained during the 1960 survey (*2*).

There are three possible agencies which may have caused this phenomenon: extraterrestrial, terrestrial, or man-made. It is difficult to imagine any extraterrestrial factor which could give rise to a marked increase in the amount of interplanetary matter encountered by the earth over a period of half a year. Likewise, it is difficult to conceive a terrestrial influence (such as varying ionospheric conditions) which would produce a proportionately greater effect at higher frequencies. This would be required to explain an increase of over 100 percent in the Christchurch rates obtained at 69.5 Mcy/sec compared with a 50 percent increase at 32.7 Mcy/sec observed in Canada. There remains the possibility of a man-made effect produced by some kind of high altitude or space experiment. The reentry of orbiting dipoles (or needles) is the most obvious thought, but such a cause would appear to be ruled out by the data already published (*4*).

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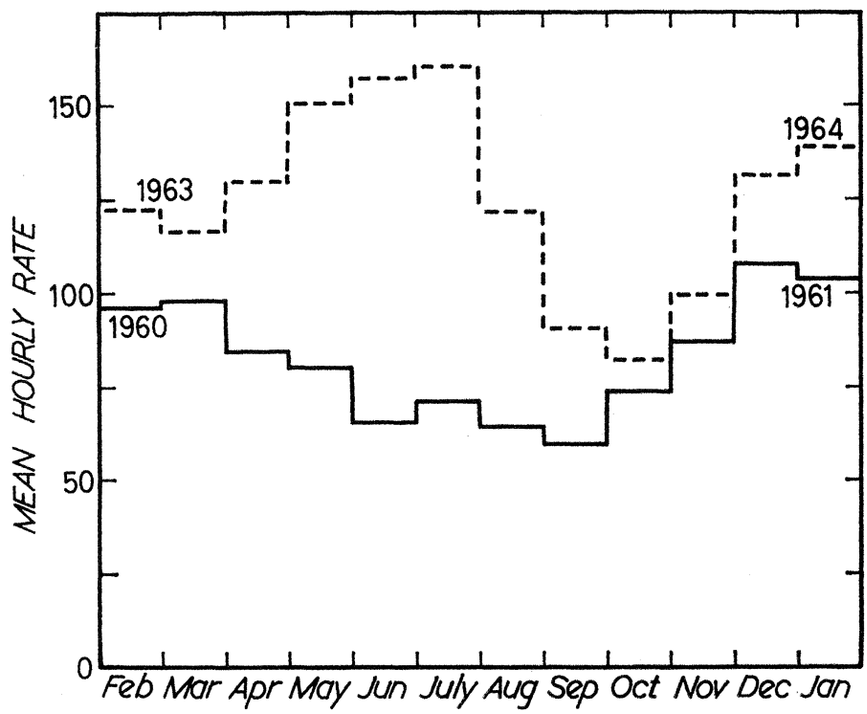

Fig. 1. Mean hourly rates of meteor echoes observed by radar from Christchurch, New Zealand.

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