

Lüst, R.: How many Flares had to be excluded since they followed each other within 6 hours? This class of Flares might be important.

Wilson: About 20%. The emission appears necessary in order that the preonset level in the Chree analysis is not raised by overlapping of flare effects.

Sandström, A. E.: (1) How did you account for the diurnal variation?

(2) The diurnal variation shifts considerably when single days are considered.

(3) The amplitude sometimes shifts by a factor of 2 or 3.

Wilson, : The diurnal variation was computed for three month periods throughout the period of analysis using days free from large fluctuations in intensity. It is recognized that the corrections are inexact but this will be true for any method of correction or for no correction.

Biermann, L.: One significant difference of the Sulphur Mt. observations as compared to those reported in the preceding papers appears to the low cut-off energy of the former, of only 400 Mev.

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INTERNATIONAL CONFERENCE ON COSMIC RAYS AND THE EARTH STORM Part II

II-3B-4. On a Maximum of Cosmic-Ray Intensity Prior to a Prébaissé-Effect

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From an analysis of the neutron monitor data of the Nov. 1960 events it was found that the cosmic ray intensity increased by about 3% on Nov. 5th. At that date the center of activity in which the series of three cosmic ray flares was produced, turned onto the visible hemisphere of the sun. One might think that this coincidence occurred not just accidentally, and that a connection exists between cosmic-ray intensity and the position of some important activity centers on the solar disc.

Such a connection appears also from an analysis of the prébaissé-effects, as introduced by the second author²⁾. It turned out that on the average 2 days before the occurrence of a prébaissé a representative number of stations recorded a maximum of the

cosmic-ray intensity (cf. Fig.). The phenomenon seems to be of a general nature so that a further discussion of its significance is needed.

In deciding whether there is a real connection between these cosmic-ray events and certain solar phenomena, the superposed epoch method appeared to be not very appropriate. So instead of combining for one station the observations of a number of events, which is done when using the superposed epoch analysis, the observations of one and the same event, made by a number of stations were combined in order to increase the statistical reliability. The results of this analysis are presented in this paper.

The events taken in consideration were chosen to be the prébaissé-effects. The dates

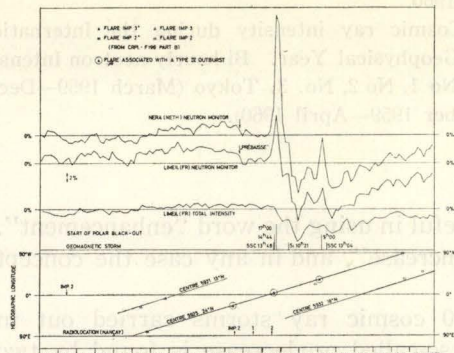


Fig. 1. Survey of the general activity for the period of 1-20 Nov., 1960.

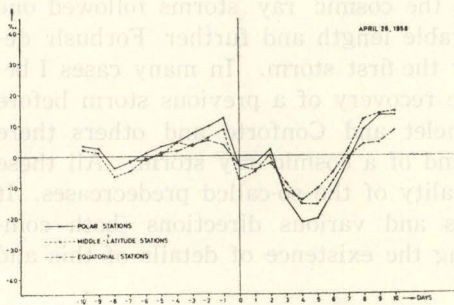


Fig. 2.

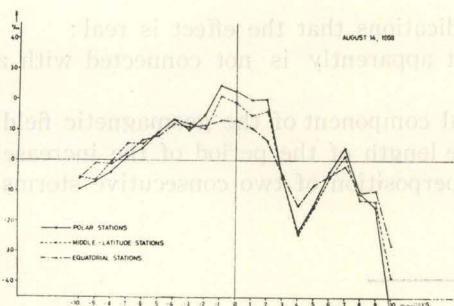


Fig. 3.

Table I.

1957		1958		1959	
July	29	February	7	June	28
August	26	February	27	August	14
September	19	March	22	August	22
October	21	April	26	October	21
November	23	May	7	December	9
December	15	May	29		

of these effects during the period of the IGY are entered in table I.

The cosmic-ray intensity figures were borrowed from the publications by WDC C2³). For each station and each event we determined the differences between the observed daily mean intensity and the averaged value of this intensity during a period from 10 days ahead to 10 days after the zero date (prébaïsse). These values were combined for a number of stations, all situated at or near sea-level. In order not to lose information on the latitude-effect these stations were divided into three groups, as mentioned in table II.

Table II.

Group	Cutoff-rigidity	
A	0-2 GV	Uppsala, Churchill, Lesis, Mawson, Murchison, Ottawa, Resolute, Thule
B	2-5 GV	Berkeley, Chicago, College, London, Herstmonceux, Rome, Ushuaia
C	≥5 GV	Ahmedabad, Buenos Aires, Hermanus, Lae Makapuu Pt., Rio de Janeiro.

For every event, we plotted the mean daily intensities, averaged over the stations within each group. For the events of 1958, April 26 and August 14, the curves are reproduced in the figure.

Out of 17 cases at least 12 show a remarkable increase prior to the prébaïsse, in 3 cases the increase is less typical and only 2 cases displayed a rather flat intensity-curve. In all cases a significant latitude effect is present. Out of the 12 cases with a definite maximum prior to the prébaïsse, 11 could be related to an *F*- or *E*-type sunspot, which passed the central meridian within 2 days around the time of maximum.

Our results indicate a possible relation between cosmic-ray maxima and the C.M.P. of an active region on the sun. A more profound analysis will be necessary before theoretical speculations can be given.

Reference

1. L. D. de Freiter, A. Fréon and J. P. Legrand: Proc. Roy. Netherl. Ac. Sciences, Series B, **64**, (1961) 325.
2. J. P. Legrand: Acad. Sci. Fv. T 247 Séance

du 7-7-1958 p: 70

J. P. Legrand: Ann. Geophys. T 16 No 1-1960 p: 140.

J. P. Legrand et A. Fréon: Communication to the XIIth General Assembly of U.G.G.I. Helsinki

1960.

3. Cosmic ray intensity during the International Geophysical Year. Bi-hourly neutron Intensity: No 1, No 2, No. 3. Tokyo (March 1959—December 1959—April 1960).

Discussion

Sarabhai, V. A.: I believe we have to be careful in using the word "enhancement". It is not clear that we have a recovery or an "increase", and in any case the concept of the normal intensity requires definition.

Sandström, A. E.: From studies of about 50 cosmic ray storms carried out in Uppsala, it has turned out that very often the so-called predecrease is found by two Forbush decreases following closely one upon the other. Often it is also possible to find two associated sudden commencements with approximately the same time difference. Further it is also sometimes possible to identify two successive flares in the same active region on the sun, also with approximately the same time difference. During the IGY and also for a time afterwards the cosmic ray storms followed one another very closely. Many were of a considerable length and further Forbush decreases appeared before the final recovery after the first storm. In many cases I believe the predecrease is only the end part of the recovery of a previous storm before the new one sets in. As pointed out by Bachelet and Conforto and others there sometimes appear sudden recoveries at the end of a cosmic ray storm. All these facts have made me rather suspicious of the reality of the so-called predecreases. It is my opinion that records from many stations and various directions (both components) should be employed when ascertaining the existence of details of this and similar kinds.

Roederer, J. G.: We analysed some of these prestorm increases and decreases, and found that the variation spectrum was the same as that of Forbush decreases. Therefore we believe that they belong to the same modulation mechanism in interplanetary space.

de Feiter, L. D.: There seem to be some indications that the effect is real:

- (a) There are some occasions when the effect apparently is not connected with a previous storm (see Fig. 1)
- (b) The effect is also present in the horizontal component of the geomagnetic field.
- (c) There seems to be some regularity in the length of the period of the increase, which is hardly explainable on the basis of a superposition of two consecutive storms.

Table I.

1957	1958	1959
July 30	February 7	June 28
August 30	February 27	August 14
September 19	March 23	August 22
October 21	April 26	October 21
November 23	May 7	December 9
December 15	May 29	

References

1. L. D. de Feiter, A. Fréon and J. P. Legrand: Proc. Roy. Nederl. Acad. Sciences, Series B, 64, (1961) 325.
2. J. P. Legrand: Acad. Sci. T 217 Stance