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BIG FLARE-UPS SEEN IN SUN'S RADIATION

Cosmic 'Firecrackers' Bursting in the High Solar Atmosphere Are Inexplicable to Science

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WASHINGTON — Cosmic "firecrackers" burst now and then in the sun's high atmosphere, causing flares of radiation that can be detected as far away as the earth.

This phenomenon, hitherto unknown to science, has been observed by United States Bureau of Standards scientists.

The sun, like the earth, is surrounded by a thick blanket of atmosphere. Although 1,000,000 miles thick, the blanket is invisible to the naked eye except in brief moments of total solar eclipse when the weird pearl-colored corona appears. Now it can be "seen," after a fashion, by the radio waves emitted by the sun.

The sun's radiation covers the entire spectrum from short X-rays through the invisible ultraviolet, the short range of visible light, the longer invisible infrared and short and long radio waves. Ordinarily, all this radiation remains about the same, day after day. Variations in heat, or infrared radiation, for example, amount to only a few per cent through the year. Even so, they may have a very important effect on the earth's weather.

Flare-Ups of Varying Duration

The visible light from the sun hardly varies at all and day after day there will be hardly any change in the ultraviolet and radio-wave radiation.

However, the bureau scientists at the Sterling, Va., laboratory have found that there are sudden flare-ups in some narrow wave bands of radio-wave radiation that last from a fraction of a second to a few seconds, during which the intensity of these bands increases as much as a thousandfold.

From the length of these waves and various other considerations it is possible to deduce from what region they originate.

The longer radiations, showing the enormous flare-ups, come from altitudes in the sun's atmosphere where it is close to a complete vacuum—closer than is achieved in any vacuum tube. The longer the waves, in general, the thinner the atmosphere where they originate and the longer the flare-ups last. Six-meter wave flares, for example, last from two to eight seconds. Half-meter wave flares last from three-tenths of a second to a whole second.

Flare-ups of different wave lengths do not appear simultaneously. There seems to be no time relationship between one and another.

Phenomenon Inexplicable

Thus it seems highly improbable that they are due to exceptional conditions on the surface of the sun itself, such as explain other changes in solar radiation.

One explanation that occurred to Dr. Grote Reber and his associates was that the flares were attributable to meteors, or shooting stars, from outer space that fell into the sun's atmosphere while burning from friction with the thin atmosphere. The heat might be sufficient to cause such momentary outbursts of radio energy. However, during meteor showers there is no increase in the number of outbursts, so this explanation now seems highly improbable.

Another possibility is that exploding bombs of some sort are fired hundreds of thousands of miles into the atmosphere from the surface of the sun itself. If such is the case the phenomenon must be very rare and not associated with other solar disturbances.

For the present, Dr. Reber says, there simply is no explanation except that "firecrackers" of some sort are exploding now and then in the sun's high atmosphere.

Wave 'Bulbs' Over Sunspots

There are short periods when the whole surface of the sun seems to be highly disturbed and there are simultaneous flare-ups of all sorts of radiation. This, however, is a quite different phenomenon, Dr. Reber says.

Different also is the radiation from sunspots — enormous black areas on the sun's surface which are believed to be titanic whirlwinds in the low, thick atmosphere. From these darkened areas, the radiation of visible light, ultra-violet and infra-red, is less than from the surrounding bright region. Enormously increased, however, is the output of ultrashort waves of the radio spectrum, especially those about ten centimeters in length.

Below this, the increase is so small as to be hardly detectable. There apparently is a considerable increase in longer wave lengths, but it is so diffuse that it is difficult to detect.

It is as if there were an invisible bulb of ten-centimeter waves covering sunspots, the bureau scientists explain. If the human eye were sensitive to wave lengths in this region, the bulbs could be seen. This phenomenon has been investigated especially by Dr. J. F. Dinesse, French physicist, who has been a guest worker at the Bureau of Standards station.