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Editorial Page

Cosmic 'Firecrackers' In Sun's Atmosphere

Phenomenon Causes Flares of Radiation

By Thomas R. Henry

Cosmic firecrackers burst in the sun's high atmosphere.

They cause great flares of radiation which can be detected as far away as the earth.

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

The sun, like the earth, is surrounded by a thick blanket of atmosphere. It is about a million miles thick. It is completely invisible to the naked eye except in brief moments of total solar eclipse when the wierd pearl-colored corona appears.

Now it can be "seen," after a fashion, by the radio waves emitted by the flaming star.

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 infra-red and short and long radio waves.

Ordinarily all this radiation remains about the same day after day. Variations in heat, or infra-red, radiation, for example, amount to only a few per cent through the year. Even so, they may have very important effects on the earth's weather. 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.

But 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 which last from a fraction of a second to a few seconds in which the intensity of these bands increases as much as a thousand-fold. From the length of these waves and various other considerations it is possible to deduce the region where they originate.

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The longer radiations showing the enormous flare-ups come from altitudes in the sun's atmosphere where it is very close to a complete vacuum—closer than ever actually 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. 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 which occurred to Dr. Grote Reber and his associates was that the flares were due to meteors, or shooting stars, from outer space falling into the sun's atmosphere and burning from friction with the thin atmosphere. The heat might be sufficient to cause such momentary outbursts of radio energy. During times of meteor showers, however, 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.

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

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

Different also is the radiation from sun-spots, 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, ultraviolet and infra-red is less than from the surrounding bright region. Enormously increased, however, is the output of ultra-short 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 10 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.