

Solar Storms Affect Reception More Than Weather Elements, According to Dr. Pickard— Sun Spots Have Bad Influence on Ether

HIGH correlation between radio reception and the elements of the weather is unlikely, according to Dr. Greenleaf W. Pickard, who addressed the convention of the Institute of Radio Engineers during the past week. Dr. Pickard has studied the effects of the weather on radio since 1906 and his conclusions are that the activities of the sun and terrestrial magnetism are more to blame for poor radio reception than the weather.

"One of the outstanding problems today is the nature and cause of those atmospheric changes which produce such diversified effects as weather, magnetic storms and disturbances of radio reception," said Dr. Pickard. "The problem is meteorological. If this earth had no atmosphere there could be no weather and on an airless planet there could be no long distance radio communication.

Sun Is Important Force.

"The only known important force which acts upon the atmosphere is the complex radiation and emission from the sun. Changes in this force are caused in two ways; first by the movements of the earth with respect to the sun, and second by actual variations in solar radiation. If the sun maintained a constant radiation, we should have only to consider the earth's rotation on its axis, which gives us night and day, and its movement in an orbit around the sun, which by the changing angle of the solar rays gives us the seasons. If these movements were the only factors involved, weather, terrestrial magnetism and radio reception would follow the calendar to a far greater extent than our measurements indicate.

"But in the scheme of things as they are, we find that weather does not go according to the calendar, nor does radio reception. The visual evidence of sunspots, faculae and prominences tells us that the sun is periodically disturbed, and measurements of the light and heat received by the earth have shown that this varies in general correspondence with visible changes on the sun's disk. Definite relations have been established between solar changes and weather, which have already been usefully applied to weather forecasting.

"Less definite today is our knowledge of the short wave and corpuscular radiation from the sun, which cause ionization and electrical currents in the atmosphere, and even chemical changes. Our only direct indices of these radiations are such things as disturbances of terrestrial magnetism, atmospheric electricity and radio reception, although over long periods they are highly related to sunspots and other visible changes of the sun's surface. And as radio research has not yet become a pure science, we do not have such systematic records to study as those gathered through the years by astronomical and magnetic observatories.

"Several times in the past twenty years I have attempted systematic measurements of reception from distant stations in the hope of finding some correlation with other elements," said Dr. Pickard. "With the advent of broadcasting, I began a more systematic measurement of field intensities from distant stations, at first (in 1922) by audibility meter, and later (in 1923) by continuous photographic

recording. I again began to notice coincidences between magnetic storms and depressed reception despite the fact that the first years of broadcasting fell in a happy period of minimum solar activity and a magnetically quiescent earth.

Analysis of WBBM Waves.

"I have made a preliminary analysis of reception from WBBM, Chicago, with respect to meteorological elements, and particularly with respect to barometric gradients. So far the result has been negative. The field at Newton Centre, Mass., when solar and magnetic periods are removed, does not seem to depend in any way upon the relation of the line joining Newton and Chicago to the isobars of the weather map. But there seems to be a slight relation, which I have not yet fully investigated, between barometric activity and reception. Apparently days with great fluctuations of air pressure tend also to be days of low reception. The relation here is probably indirect; that is, barometric activity may be linked with solar disturbances, which are in turn associated with reception.

"It is perhaps unlikely that any high correlation between reception and weather elements will be found. Solar disturbances and magnetic storms are world-wide events, whereas weather is rather a local matter. Analyses of weather elements over the whole earth indicate that there are areas of positive correlation with sunspots, and also areas of negative correlation. Although I have not yet collected and analyzed reception data from any such collection of receiving points as would fairly represent the earth as a whole, I have found that a bad night for reception in Newton Centre is in general a bad night anywhere in the United States. And I have also found that European reception of distant broadcast stations agrees remarkably well with my measurements of WBBM," said Dr. Pickard.

"But the secrets of this universe yield rather to observation than to pure speculation. When we have a sufficiency of the right kind of data we can frame stable explanations; until then we are groping in the dark. The relation of earth and sun is a dominant one to mankind, and the study of radio transmission phenomena may well throw new light upon this little-understood subject."