CLIMATOLOGY

Cycle Study Hints End of Drought

Sunspot Maxima and Minima Both Marked by Droughts

By DR. FREDERIC E. CLEMENTS,

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AS EARLY as the middle of last autumn, it was fairly evident that the indications for super-normal rainfall on the Pacific Coast for the season 1934-35 would be verified. On this assumption, a comparison was made of the state averages during the past sunspot cycle for these three states and the six in the tier from North Dakota to Texas, and this revealed that the departures had been in harmony for nine out of twelve years.

This relation was sufficiently close to warrant the further supposition that rainfall in the drought region generally would approximate normal during 1935. It was likewise plausible to assume that the break in the drought would occur during the latter part of April or early May as the transpiration increased with the growth of vegetation.

The basis for these anticipations (which are hardly to be dignified by the term prediction) has been laid by general studies of solar cycles and climate during the past fifty years and by specific ecological ones of drought and sunspots for the past twenty.

As an outcome of these, drought has been found to occur at each high maximum and on or near all minima. Hence, it is a pertinent question whether low maxima of sunspots may not coincide with times of high rainfall, and this is seen to be the case for all those that have occurred since 1837.

It is important to recognize that the rainfall cycle is much more irregular than the sunspot cycle, which continues to rise or fall in the respective phase but at an uneven rate. The rainfall cycle is better designated as a trend, characterized by marked deviations falling usually at sunspot maxima and minima and hence cyclic to this extent. Thus, on the basis of the indices already mentioned, the general precipitation for the next three or four years should exceed the average.

Two facts of the first importance for the program of land utilization and social rehabilitation in the West emerge from the consideration of the rainfall record. The first is that drought has occurred again and again through the course of the past hundred years and that it is certain to recur and demand a costly reckoning at similar intervals in the future. Over against this may be set the corollary that it will not persist indefinitely or permanently and that lands regularly productive in the past will again become so, if not too greatly damaged by erosion. Conversely, marginal areas of precarious agriculture will inevitably remain such, except for a transitory "good" year or two at long intervals.

For the great national projects that requires sowing and planting, such as the shelter-belt, erosion control, restoration and construction of grazing ranges, and the natural landscaping of highways and parks, the augury is auspicious for favorable rainfall up to the next sunspot maximum in about 1939. The date and intensity of this can be approximated with increasing accuracy year by year and a corresponding assumption made as to its probable effect upon rainfall and the economic and social problems that reflect this.

Science News Letter, June 8, 1935

Wet Years Indicated For Pacific Coast States

By DR. GEORGE F. McEWEN,

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STUDIES of the regional seasonal Pacific Coast precipitation indicate a long cycle of about 25 years now rising to a crest that should be reached by 1940. A five-year cycle is also clearly indicated, a low point being at 1933-34 and a high point at 1936-37. Accordingly the outlook is good for an excess of precipitation for the Pacific Coast during the next few years.

In general, however, experience with a great many series has shown that the cyclical ranges are not great enough compared to the accidental variations to permit any but the crudest advance indications for a particular season, although forecasts for a period of years may be reasonably reliable.

In studying the rainfall record to detect cycles, if any exist, a relatively simple method can be followed. First, the seasonal precipitations for a number of years are "spotted in" on a graph, so that a line connecting their ups and downs will trace a rough curve.

Just by looking at the curve, it can usually be told where it should fit on as an extension of a previously existing graphic record of the same cyclic series. Then, by appropriate mathematical methods, the rough curve is "smoothed."

This "smoothing" process tends to suppress the records of shorter cycles that might show up on the same curve, as well as the purely chance variations that it is really desired to iron out. However, a short cycle thus suppressed can be restored by noting the ups and downs in the graph of the difference between the smoothed and observed values, and deciding on the probable cycle length. Then the differences occurring in each successive interval of the cycle length should repeat approximately, and their combination by ironing out accidental variations should reveal the average cyclical change. These average cyclical values, added to the smoothed curve, afford a better representation of the actual series and its extension to be used in making forecasts.

The "reality" of a cycle thus arrived at should be tested, and the cycle used in calculating tentative forecasts only if it is strongly evident that the series of rises and drops constituting it has a factual, rather than a merely chance basis. Various methods of making such tests have been derived from the theory of probability.

Making use of the well established five-year cycle, a forecast was made dur-

ing the fall of 1933 of precipitation well below the normal for 1933 to 1934. This proved to be a very dry year not only in California but throughout the whole United States as well.

Science News Letter, June 8, 1935

Weather States "Match" In Widely Separated Regions

By H. H. CLAYTON, Editor, World Weather Records

WEATHER conditions in certain parts of the earth closely resemble conditions occurring simultaneously in far distant regions. These conditions may be alike or they may be opposite in character. For example, excesses of temperature in central North America are frequently coincident with excesses in central South America. An excess of rain in the central United States is frequently coincident with a deficiency of rain in Australia. An excess of pressure in central South America is usually coincident with a deficiency of pressure in India.

These coincident occurrences are generally accepted by meteorologists, but they are not so well agreed as to whether there are regular meteorological cycles. The reason of this difference of opinion is evidently due to the fact that meteorological cycles are much more complex than has been generally supposed.

The reason for this complexity, in my opinion, is due to the fact that opposing centers of oscillation in the atmosphere are subject to progressive motion; so that any particular region is first in one center of oscillation and later in an opposing center, and all traces of periodicity are lost in the opposing oscillations.

It is now becoming evident that the changes in position of these centers are brought about by changes in intensity of solar radiation. When these two facts are accepted, namely, the fact of moving centers of oscillation in the atmosphere and the influence on them of changes in solar radiation, I believe the study of weather cycles will make rapid progress.

In my opinion the great drought in the region between the Mississippi and the Rocky Mountains was closely connected with solar changes. In order to understand it, not only the sunspot changes, but longer and shorter changes of solar activity will need to be taken into account.

Science News Letter, June 8, 1935

In total bulk, the biggest whales are bigger than any dinosaur that ever lived.

MEDICINE

Artificial Fever With X-Ray Destroys Animal Cancers

FEVER treatment combined with small repeated X-ray doses give better results in treatment of a certain type of cancer in rabbits than either method alone, Dr. Stafford L. Warren with John J. Jares, and Otto Sahler of Strong Memorial Hospital, Rochester, N. Y., have found in preliminary tests of this method of attack on cancer.

This study was announced in the report of the International Cancer Research Foundation of Philadelphia which is supporting Dr. Warren's research.

Application of Dr. Warren's work to human cancers is far in the future, if it proves possible. So far he has worked with only one type of cancer and only on small numbers of animals.

Three years ago, working with funds from the Rockefeller Foundation, Dr. Warren found that high fever temperatures would kill cancer cells outside the body within a definite period of time. He found the high temperature also destroys cancer cells in the body, but only in one-fifth of the cases. Small repeated doses of X-rays, called fractional doses, destroyed the cancers in nearly half (42 per cent.) of the cases. When the fever treatment was combined with the fractional doses of X-rays, the percentage of apparent cures was doubled (84 per cent. of the cases).

Other research reports announced by the International Cancer Research Foundation include:

For the first time human cancers can be kept alive and growing for long periods of time outside the body. Dr. George O. Gey of the Johns Hopkins Medical School reported this new method which should aid greatly efforts to find better ways of destroying cancers. The mystery of why cells become malignant may be nearer solution.

The preparation of another cancer-producing substance from coal tar by Prof. J. W. Cook and associates at the London Free Cancer Hospital. Prof. Cook's latest discovery shows the importance of a certain kind of chemical architecture in cancer-producing substances from coal tar. A combination of carbon and hydrogen known to chemists as the methyl group—the same methyl group that is in deadly methyl alcohol or wood alcohol—occurs twice in the new cancer-producing compound. Apparently more important than the methyl group itself, in connection with the cancer-causing property of the new substance, is the place where it is attached to the substructure of the new substance as its molecule is built up. Even a single methyl group at "position 5" causes marked cancer-producing activity.

Calories also have an important relation to cancer. Studies on this phase of the problem have been made by Dr. Fritz Bischoff and co-workers of the Santa Barbara, Calif., Cottage Hospital. Growth of cancers in mice is notably affected by reducing by one-half the amount of calories in the diet of the mice, the California scientists found. Weight loss in itself is not a clear indication of the nutritional state, they found, as other factors enter in. Consequently they point out to fellow scientists the importance of determining caloric intake.

Science News Letter, June 8, 1935

MEDICINE

Lack of Publicity Blamed For Thriving of Quacks

LACK of publicity in the medical profession was blamed for the thriving of so-called health lecturers and psychological and medical quacks by Dr. Charles A. Rymer of Denver, Colo., speaking to the American Psychiatric Association.

The misinformation spread by these quacks, especially in the field of sex, may cause untold damage to the persons who are already unstable mentally and emotionally and to those who try to obtain free medical information in order to treat themselves, he said.

It is the public's growing and widespread interest in science that makes possible the success of these quacks, Dr. Rymer pointed out.

"People are impressed with the advances which have been gained through the scientific approach, but since they lack the proper prospective and background to determine what constitutes science, they attribute almost magical properties to anything labeled 'scientific,'" he said.

"What substitute has the profession to offer?" he demanded of his fellow physicians.