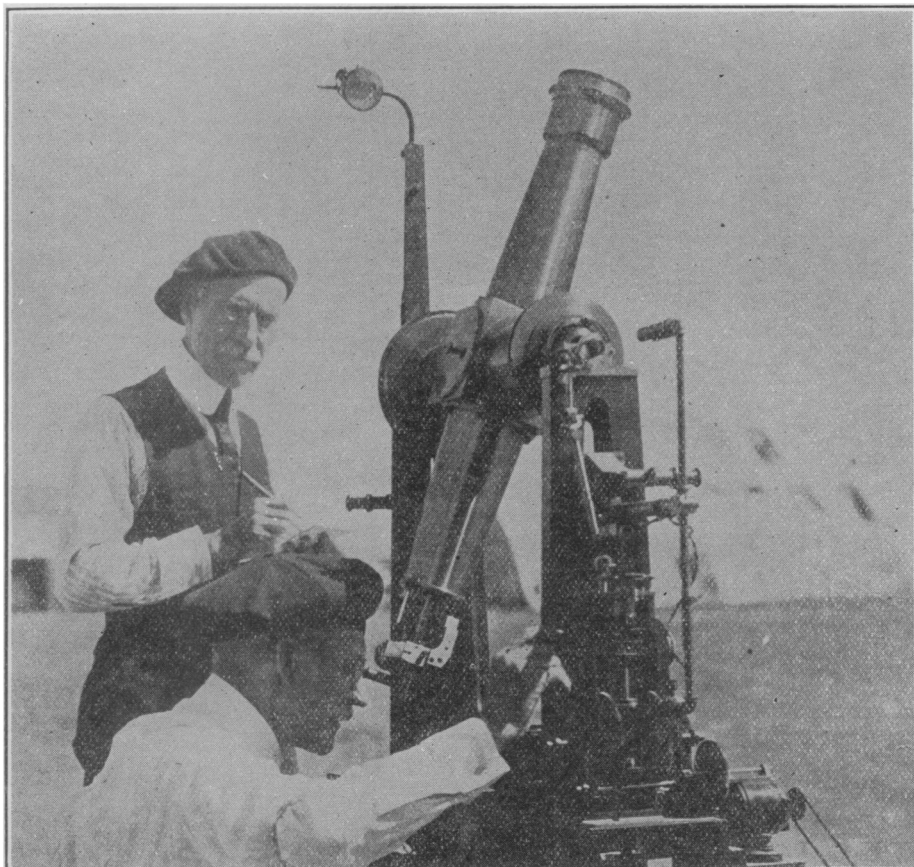


Observing the Stars to See if America Drifts



Capt. F. B. Littell, of the U. S. Naval Observatory at Washington, observing through the Prin transit at San Diego to test whether there is any change in longitude occurring. Col. Charles Mailles, of France, stands in the background recording the observations.

By ANDREW R. BOONE

Is the American continent drifting away from Europe and Africa? According to a hypothesis put forward a few years ago by the German geologist, Prof. Alfred Wegener, this is actually happening, and billions of years ago the western coast of Africa fitted into what is now the shore of the Gulf of Mexico and the east coast of South America. Look at a map of the world and you can see how similar the shape of these shore lines are.

Though so far it is only a hypothesis, which may or may not be true, scientists scattered at some 70 radio stations in all parts of the world and at three main observatories at San Diego, California; Shanghai, China; and Algiers, Africa, are now busy observing the sun and stars and exchanging radio time signals in an effort to check the present longitude lines. For if the longitude of a place in America is found to be on the increase, compared with other parts of the world, it would indicate that

the continental drift is actually taking place.

In past years the subject of continental drift has been considered one for geologists, but the development of radio, giving practically instantaneous communication between stations located a third of the world's circumference apart, has made it feasible for astronomers and mathematicians to make an effort to check the longitude lines, and the present world-wide experiment has resulted.

French and American astronomers occupy the three chief stations. The San Diego station, together with those at Algiers and Shanghai, was selected by Gen. Gustave Ferrie, chief of the French communications service and chairman of the International Astronomical Union's commission on determination of longitude by radio telegraphy. Its location was decided upon because of the usually clear weather at that point, and its position about midway between Shanghai and Algiers.

Captain Frank B. Littell, professor of mathematics at the U. S. Naval

Observatory at Washington, D. C.; J. C. Hammond, astronomer and Paul Sollenberger, associate astronomer; and Col. Charles Mailles, representing the French Government, receive their wireless signals and make their calculations in a little shack, windbeaten for several years.

At Shanghai only a small station is located, but its wireless is strong enough to carry to San Diego, while San Diego in turn hears Algiers, a French observatory.

Colonel Mailles is the only foreign observer in the United States for the tests and, while he works independently of the Americans, their results are mutually available. Representatives of the U. S. Coast Guard have been sent to Manila and Honolulu to check the exact longitude differences between those places and United States points.

With their delicate and precise instruments, the scientists follow a simple procedure in their effort to determine whether the world is becoming "lop-sided;" whether North and South America gradually are nearing Asiatic shores. Algiers and San Diego receive signals three times a day from Annapolis at 10:10 p.m., 5:10 a.m. and 3:10 p.m., Eastern Standard Time. Simultaneously, the observers determine the local astronomical time at Algiers and San Diego, then determine the exact difference in time, which thus enables them to determine the longitude difference. For, since one hour's difference in time represents one twenty-fourth of the world's circumference, a time difference may be expressed easily in a longitude difference.

Use of the signals transmitted from Annapolis to the other stations and between stations is made possible through radio perfection and a chronograph (on which time is recorded graphically). On the same instrument astronomical observations are recorded.

The solar observations are brought to the chronograph at the American station by means of two instruments. One is called a Prin transit and is used by Capt. Littell and Mr. Hammond, alternately, while Mr. Sollenberger records the radio signals. This instrument was built in Paris ten years ago and, together with one other, sold to the United States government. It is as accurate as skilled workmen have been able to construct

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Observing the Stars

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such apparatus and on it human error has been reduced to a minimum.

Colonel Mailles, who has represented the French government on scientific ventures in the past, operates a prismatic transit less accurate than the Prin instrument yet valuable both to Colonel Mailles and the Americans in recording the Frenchman's observations and verifying the calculation made by Capt. Littell and Mr. Hammond.

The French scientist sits alone early in the evening of clear nights and early in the morning, in a small boxed square, from which his only view is skyward. The door closed to worldly interference, his vision encompasses only the starry spaces above, where he endeavors to record from eight to 20 standard stars every night, while his American companions try for the same approximate number, though not necessarily the same stars.

Signals reach the observers, whose procedure is typical of that followed at Shanghai, Algiers and the other stations in the net, from Annapolis and Honolulu three times a day in competition with commercial messages flowing along the same short and long wave lengths upon which the set operates: from Saigon, China, once a day, and from Bordeaux, France, when conditions permit.

"The present world cooperation has resulted," said Capt. Littell, "from endeavors started by General Ferrie, who long has been interested in the checking of longitude lines by radio telegraphy. The lack of radio facilities and financial difficulties have made the progress slow, however, and only now have the scientists been able to cooperate and coordinate their activities. Whereas we had intended to have six sets of observers at the three present stations—three French and three Americans—and have each pair move on to a second station after two months, there to remain two months until the entire world circuit had been traveled, we have only three scientific groups. The larger plan would have minimized the chance of error and we could have compared results of radio and solar observations.

"However, with such excellent equipment as the observatories have, we proceed with some assurance of satisfactory results. At each station has been installed high-powered radio apparatus on which to receive the signals. They are connected with the chronographs by wire, so the chronograph receives the same electrical sig-

nal as is transmitted through the wireless apparatus.

"On North Island we Americans come to the plant before sundown to prepare for the night's observations, which commence with the setting of the sun and continue as long as fog and dew permit. Usually we get in four or five hours' good observation before quitting, and start up again in early morning. At sun up, of course, our observations cease.

"When observations are made impossible by local conditions, we rely upon a very accurate clock, which varies less than three one-hundredths of a second in three days. This we consider sufficiently accurate to be considered local astronomical time. The clock has been installed below ground on a concrete base detached from the building and anything else which might impart man-made shocks to it. It is enclosed in an airtight glass case, in a concrete room kept at an even temperature of 87 degrees Fahrenheit, assured of constancy by electric heaters controlled by a sensitive thermostat.

"Under weather conditions usually equable, Colonel Mailles and our group have proceeded with plans which we hope will, in a period of years, indicate whether the Americas are drifting westward as Professor Wegener thought. Of course we will learn nothing immediately, but if a second series of observations can be arranged a few years from now—say a decade—astronomers and mathematicians can, by comparing the two sets of observations, determine to what extent the land bodies have shifted. It will be very, very, little in ten years, of course, providing there is any, for the movement of North and South America from any point farther east has taken billions of years. If, at one time, their Atlantic shore lines approached or coincided with those of Europe and Africa, their movement in a decade could be measured only by very fine and accurate observations."

The results of the present observations will be compiled individually by the various astronomical groups, except those under supervision of the French society. No plan has been perfected whereby all the reports and related data will be taken to one "clearing house" for centralized study, though this is expected to be brought about in some manner.

The whole scheme is a world movement, a giant cooperative enterprise, without an official head. Like Topsy,

it "just grew." Unofficially, General Ferrie may be termed the head of the experiment, for he fostered the plans which finally resulted in the present work.

Whether the North American continent is drifting away from the South American continent is not considered by the scientists to be a "scientific problem" worthy of special study. They are confining their investigation largely to the potential drift westward of the Americas, though any evidence of the northerly drift of North America will cause a re-vamping of their investigation plans and further investigation later.

If one or more continents is found to be shifting, the finding will bear out the principle of isostasy, or "compensation" of the earth's crust; that is, that the upper crust rests on a more or less plastic substance which permits a too-heavy spot to sink and a lighter one elsewhere to rise up. Thus, the continents would be said to rest on and "slide" on this plastic substance, whatever it may be.

Ordinarily scientific men are interested in principles. The case of possible continental drift presents a problem wherein the astronomers are more concerned in the fact. How a continent would drift would follow a principle already accepted by the scientific world, but the fact of drift has not yet been generally accepted. Professor Wegener and one or two American geologists have believed the Americas are drifting, but the majority await the results of the solar and radio observations and tests.

While the actual facts of the extent of the observations remain somewhat obscure—the American observers do not know definitely how many countries or radio stations are included in the network—the final compilation of data is, in a general way, assured. Captain Littell expects to return to Washington at the close of his two-months' session at San Diego, sometime late in November, and there commence the task of studying and interpreting his figures. Colonel Mailles plans to go on to Japan for similar studies, later to return to Paris where he will compile his statistics of the stars.

Thus, in a way both haphazard and orderly, men of the scientific world will continue to go forward with their measurement of longitude lines which eventually will tell the lay world whether their feet are planted on spots stationary or in motion.

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