

REPORT OF THE SUPERINTENDENT

OF THE

UNITED STATES COAST SURVEY,

SHOWING THE

FREDERICK W. HAZEN  
PROFESSOR OF GEOLOGY

PROGRESS OF THE SURVEY

DURING

THE YEAR 1867.

TEXAS TECHNOLOGICAL

MAR 31 1954

COLLEGE

WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
1869.

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each night at the several stations, and as soon as the telegraph line was available for the use of the observers, which was generally at 9 p. m., the clock at Harvard Observatory was connected in the main telegraph circuit, and clock signals were sent to the Observatories at Albany and Washington for five minutes. Meanwhile the clocks at those places were adjusted in their respective local telegraph circuits, for the purpose of recording their clock signals upon the chronograph while receiving clock signals from Harvard Observatory.

At the expiration of five minutes, the Harvard clock was disconnected from the main telegraph circuit, and adjusted in its local circuit; the Dudley Observatory clock being meanwhile placed in the main circuit, and its signals recorded at Cambridge and Washington for five minutes. In a similar manner the clocks at coast survey station Seaton, and at the Naval Observatory at Washington, were compared by telegraph with the clocks at Cambridge and Albany.

Immediately after the first set of clock comparisons were completed between the several observatories, each night, a second series of observations were made for determining the clock corrections. This usually required about an hour and a half, after which a second set of clock comparisons followed, thus furnishing the data for ascertaining the rate of each clock from the observatories, and also from the clock comparisons.

The requisite observations at Harvard Observatory were made by Professor Winlock and his assistant, Mr. George M. Searle. The instrument used for determining the clock corrections was a forty-eight-inch Troughton & Simms transit, (Coast Survey, No. 8,) having an aperture of two and three-quarter inches.

While the longitude experiments were in progress, Mr. Searle visited Washington and made several series of observations for determining the personal equation between himself and Assistants Dean and Goodfellow, and Professor Newcomb of the Naval Observatory. On his return northward, Mr. Searle passed several days at Albany, but the weather proving unfavorable only a few observations were made for personal equation between himself and Professor Hough.

Near the close of August, Assistant Dean, with Professors Hough and Newcomb, joined Professor Winlock, at Cambridge, and made the final observations for personal equation.

The operations here noticed will be again alluded to under the heads of Section II and Section III.

*Latitude observations at Manomet, near Plymouth, Massachusetts.*—These observations were commenced by Assistant C. O. Boutelle, on the 27th of June, his party having been previously employed at another station in this section. Sixty-seven pairs of stars were observed for latitude, on thirty nights, with an average of six observations to each pair. In connection with these, observations were made on twenty-seven nights in July and August, for local time. The value of the scale divisions of the level of transit No. 10 was carefully determined, and observations were made to find the correction for irregularity in the form of the pivots. To find the value of the micrometer of zenith telescope No. V, five western elongations of Polaris were observed by one hundred and sixty-three readings, and the value of level A was determined in terms of the micrometer by two hundred and forty observations on six days. Assistant Boutelle was aided in the latitude and other geodetic observations at Manomet by Messrs. F. H. Agnew and C. S. Peirce. Sub-Assistant J. W. Donn also joined the party in July, and rendered good service by making the first reduction of apparent places for all the stars used for latitude. My first visit of inspection was made to this party, and I was highly gratified at the vigor and ability manifest in its conduct.

*Magnetic observations at Manomet and at Nantucket, Massachusetts.*—At Manomet station ten determinations of magnetic dip were made by the party of Assistant Boutelle, on four days in August, by two hundred and eight observations. Half-hourly readings of maxima and minima were taken on six days, for variation of the needle, and observations of deflection and vibration were made on three days, to determine the horizontal intensity.

The magnetic elements were determined by Mr. Boutelle also at Nantucket, in June, using, as in the observations just alluded to, declinometer No. 3, and dip circle No. 8. At Nantucket, (Cliff station,) ninety half-hourly readings were taken on four days, for variation. Six determinations of the magnetic dip were made, on two days, by ninety-six observations, and two days were employed in determining the horizontal intensity.

Assistant Boutelle was very efficiently aided in these and in the other operations here reported