

could be occupied in the *same* period of time. This is made clear in the next paragraphs.

Aside from the actual error of observation at the *time* of observation, in the determination of a magnetic element, declination for example, we have in addition the error introduced in reducing the observation to the epoch selected. A part of the observation error of the declination is entirely astronomical, *i. e.*, due to an error in the determination of the true meridian. Throughout the survey the meridian was determined by means of alt-azimuth observations on the sun, using the alt-azimuth attachment belonging to Magnetometer No. 18. The sun was observed, on the average, at about two hours before or after noon. Occasionally it happened, owing possibly to the sun having been obscured previously, or on account of lack of time, that the solar observations had to be made, if made at all, within an hour of noon. When possible, such times were invariably avoided. If the instrument was in good adjustment and carefully leveled, and the solar observations were made so as to eliminate, as far as possible, any outstanding defects in the adjustment of the instrument, then the error in the determination of the true meridian consisted of the error of pointing on the sun and the error due to an imperfect value of the latitude assumed in the formula of computation.¹ Now the *pointing error*, by suitably arranging the observations, can be reduced so that the error therefrom will fall within the reading error of the vertical and horizontal circles attached to the instrument used. If these circles read by opposite verniers to the nearest minute of arc, so that half-minutes can be estimated, the error of pointing can be reduced so as not to exceed one minute, which degree of accuracy must at present suffice for magnetic work. *The latitude error* is a function of the hour angle, and is of contrary sign for observations made before and after noon. In order to eliminate the latitude error it is necessary either to observe at such an hour angle that the error will fall within the limit of accuracy, or to make observations in the morning and in the afternoon at about the same hour angle.

¹ The present maps of Maryland, with the exception of certain portions, cannot be assumed as furnishing sufficiently accurate values of the geographical co-ordinates.