

## AZIMUTHS FROM SOUTH

Quite often inquiries are made concerning the reckoning of azimuth from the south in geodesy in this country. The origin of this practice is somewhat obscure and any answer to such inquiries necessarily involves a good deal of speculation.

Established facts are:

1. Astronomers now reckon azimuth from the south. This seems to be a long-established practice but I can not say how far back it goes. For a possible explanation see below.

2. In the Coast Survey Report for 1851 is a list of geographic positions given in substantially the same form as we now use. It is there stated

- a) that this list represents all the geographic positions established by the Coast Survey available to that time.
- b) that the azimuth is reckoned from the south through the west up to  $360^{\circ}$ .

3. Mr. C. A. Schott was then working for the Coast Survey and the report for 1851 makes favorable mention of his abilities.

4. Helmert in his Higher Geodesy (1880-1884) reckons azimuths from the south without giving any reason for the practice.

The following considerations contain speculative elements.

Mr. Schott was German-born and German-trained and in 1851 had not been many years in this country. It seems likely that he would have followed one of the great men of his day in geodesy, Karl Friedrich Gauss (1777-1855) who was then still alive and prominent in astronomy and

pure mathematics also. Schott studied at Karlsruhe, not under Gauss, but in the same general part of Germany. In at least one case (in his posthumous papers) Gauss by implication reckoned azimuth from the north but a hasty examination of geodetic work seems to indicate that this was contrary to his general practice. At any rate, in his tabulation of the results of the Hanoverian triangulation, of which he had charge, he reckoned azimuths from the south through west up to  $360^\circ$ , just as we do now.

The practice of reckoning azimuth from the south may have arisen among the astronomers at fixed observatories in the northern hemisphere. They were ordinarily not interested in an accurate determination of azimuth as a field operation. In general, they wanted merely an approximate value so as to know where to look or to direct their instruments. They were, for the most part, interested in the sun, moon and planets and the stars near the equator and the ecliptic. These celestial objects crossed the meridian to the south and it was a convenience to have hour-angle and azimuth become zero together and increase together.

If we reckon azimuth from the south a minus sign is avoided in certain fundamental trigonometric equations. I think that a consideration of this sort would have appealed to Gauss, who had an unusual knack and liking for neatness and symmetry in his mathematical expositions and who developed the theory of the general spherical triangle (sides and angles not restricted to being less than  $180^\circ$ ).

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