$\beta = 47°$

log 10300 (a)	$= 4.01284$
log sin 20° (γ)	$= 9.53405$
log sin 47° (β)	$= 9.86413$
colog sin (20°+47°)	$= .03597$
Antilog	$= 3.44699$ $d'' = 2799$

Cloud heights with all altitudes of the spot of light between and including 0° and 150° are shown by Figure 2.

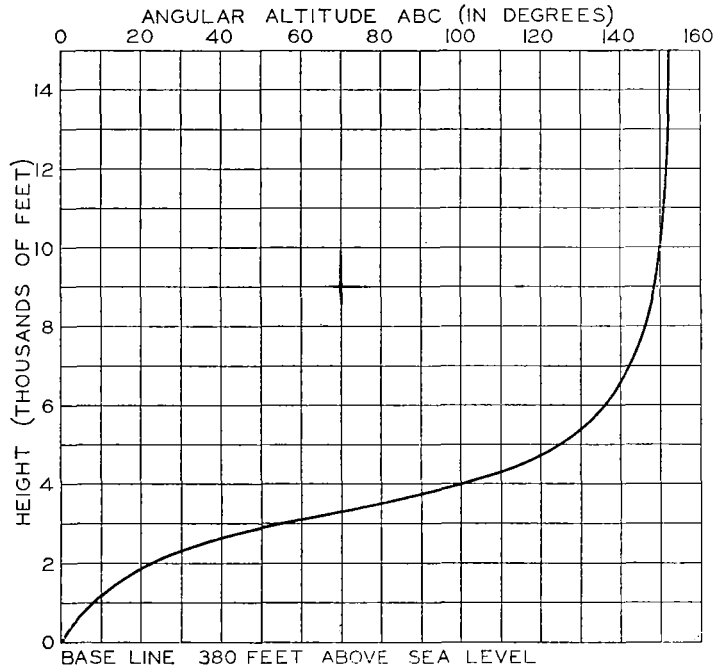

FIGURE 2.—Cloud heights corresponding to various angles of sight, β

It is interesting to note, but perfectly obvious why, that the relation between cloud heights and the distance BC is linear; that is, if the distance BC were 1,030 feet instead of 10,300 feet, all cloud heights shown in Figure 2 would be diminished to one-tenth of their indicated values. Thus, if observations are chiefly desired of cloud heights between 0 and 500 feet, as is usually the case at flying fields, it would be better to have a lesser distance between the light source and the point of observation than that given in the example herewith, but for cloud observations where no additional weight is to be given any particular height, as in the case of regular Weather Bureau cloud observations, it would be preferable to have the observing station so located that a value of 70° for ABC would indicate mean cloud heights. Inspection of Figure 2 shows why this is true, for it will be seen that this is roughly the most nearly horizontal portion of the curve. The heights on curve A rapidly approach infinity when the angle ABC begins to exceed 155°.

Table 1 gives cloud heights corresponding to distances BC of 10,300 feet, 1,000 feet, and 500 feet, respectively, for values of the angle ABC from 1° to 157°, inclusive. These values, however, represent heights above the 380-foot plane and must be added to this latter figure to obtain heights above sea level.

TABLE 1.—*Height of clouds above 380-foot plane corresponding to values of the angular altitude of the spot of light*

Angular altitude, ABC	Value of BFC in feet			Angular altitude, ABC	Value of BFC in feet		
	Height, 10,300 feet	Height, 1,000 feet	Height, 500 feet		Height, 10,300 feet	Height, 1,000 feet	Height, 500 feet
°				°			
0	0	0	0	70	3,310	321	161
1	172	17	8	80	3,523	342	171
2	328	32	16	90	3,749	364	182
5	726	70	35	100	4,006	389	195
10	1,223	119	59	110	4,322	420	210
20	1,875	182	91	120	4,746	461	230
30	2,299	223	112	130	5,397	524	262
40	2,621	254	127	140	6,621	643	321
47	2,799	272	136	150	10,380	1,007	504
50	2,872	279	139	155	17,082	1,658	829
60	3,098	301	154	157	94,985	9,222	4,618

It matters little whether the station is above, below, or on the level with the searchlight. In the first case, the base line is shortened, in the second case it is lengthened, and in the final case no adjustment for height is necessary.

All observations have been made with the alidade of a polariscope, but an altitude finder may readily be fabricated by the use of a brass tube equipped with cross hairs, a protractor, indicating pointer, and standard, at a nominal cost.

A table similar to Table 1, but more comprehensive, should be prepared for use at all stations where regular observations are made as it would soon more than save the amount of time it takes to prepare it.

NOTES, ABSTRACTS, AND REVIEWS

Harry Crawford Frankenfield—an appreciation,[1] *by Dr. Jules Schokalsky, Leningrad, U. S. S. R.*—A post card from my friend Gen. A. W. Greely advised me that an accident had brought to a close the life of Harry Crawford Frankenfield, a man universally loved and esteemed by his many friends. I beg to be permitted to express my personal sorrow in his untimely end and to join with his colleagues of the opposite part of the hemisphere in paying tribute to his memory.

In 1912 while a member of the American Geographical Society's transcontinental excursion, I had the pleasure and opportunity of meeting Frankenfield and discussing with him the many physical problems in which we had a common interest and there was then formed a friendship that endured until the end.

His letters which continued until his death afforded me not only the joy of a kindly scientific support but also revealed in him that quality of spirit possessed only by great souls.

The life and work of Frankenfield, revealing as they did his fine character and sympathetic attitude toward his scientific colleagues assured to his memory their lasting esteem although widely separated in space and time.

Leningrad; November 22, 1929.

[1] *Cf.* Henry, A. J. Harry Crawford Frankenfield, 1862-1929, Mo. WEA. REV. 57: 254.

MAURY [1]

Two biographies, Life and Letters of Matthew Fontaine Maury, by J. A. Caskie (Richmond, Va.) (press, 1928, 191 p., $3), and Matthew Fontaine Maury: The Pathfinder of the Seas, by C. L. Lewis (the United States Naval Institute, Annapolis, 1928, $6)[2] have recently brought clearly to light the amazing accomplishments

[1] *Cf.* Roscoe Nunn's biographical note in the Bulletin, January, 1928, p. 7.
[2] *Cf.* Reviews in *The New York Times*, Mar. 18 and June 17, 1928, respectively.

of a man whose fame could not permanently be lived down by jealous naval officers and disgruntled victors of the Civil War. Maury was not only the pathfinder of the seas, the founder of the United States Naval Academy, Naval Observatory, and Hydrographic Office, but was also the prime mover in laying the first trans-Atlantic cables, and an important factor leading to the founding of our national weather service. For his monumental work on the winds and currents of all the oceans he was recognized the world over as a very great benefactor. His charts shortened voyages by 10 to 20 per cent, saving to British commerce alone many millions of dollars a year. So highly regarded was he that at the outbreak of our Civil War Russia offered him an observatory, all the facilities he wanted, and $30,000 a year. But his sense of duty to Virginia called him from his scientific work to her service in the Civil War.

On Maury's part in the founding of our national weather service, the following passages from Caskie's biography are of interest:

> Early in the following year [1858], due to interest created by Maury's lectures and writings, eight cities, including Buffalo, memorialized Congress to "establish a general system of daily telegraphic reports on the wind and weather, for discussion at a central office" (p. 90).
>
> In further substantiation of the claim that Matthew Fontaine Maury was the founder of the National Weather Bureau and Signal Service, the reader's attention is called to the speech of Mr. Vest, of Missouri, December 14, 1880, before the Forty-sixth Congress, third session. During the course of this address, Mr. Vest said:
>
> "The whole signal-service system of this country originated with the Navy, not with the Army. The man who commenced it, in whose brain it first had existence, was M. F. Maury, In 1853 he instigated and brought about, by his own individual exertions, the assembling of a convention of scientists of the world at Brussels, to take into consideration a uniform system of meteorological observations. In 1857 I well recollect that Lieutenant Maury passed through the South and West, delivering lectures at his own individual expense to the people, urging upon them that they urge their members of Congress to establish a signal-service observation system for the Southern and Western States. If that had been done then, sir, millions of dollars would have been saved to the agricultural interests of this country.
>
> "This same man, by his system of research upon the ocean, by shortening the days of transit by means of his charts of the waves and of the winds, saved to the commerce of the world from forty to sixty millions annually, and he sought earnestly, by stirring up people, by writing and lecturing in the North and West and South up to the fall of 1860, and again after the war to within three months of his death, to put the same system into existence within the landed domain of the United States" (p. 108).

In his well-meant tribute to Maury's important part in the establishment of our weather service, Vest appears to have overlooked the contributions of Espy, Loomis, and Joseph Henry to the organization of a meteorological network on the land at the time Maury was so ably coordinating the data from the oceans. Cleveland Abbe, who, in 1869, actually began the forecasting service at Cincinnati that grew into the national weather service, presents the following items on the early history of our weather service:[3]

> 1847. December 8, Joseph Henry submitted his program of organization and work for the Smithsonian Institution, including first of all "a system of extended meteorological observations for solving the problem of American storms." [The Smithsonian Institution continued after this date a prominent factor in the development of meteorology in the United States.]
>
> 1847. Espy and Loomis addressed letters to Prof. Joseph Henry, as Secretary of the Smithsonian Institution, urging the importance of the establishment of meteorological stations and reports for the study of American storms (p. 89).
>
> 1854. Prof. Joseph Henry reported that the telegraph companies were furnishing the Smithsonian Institution with daily morning weather reports. He had suggested the custom, which became established, in accordance with which the first message each morning on opening any telegraph office was in answer to the salutation, "Good morning, what is the weather?" Each local operator gave to his division superintendent and the local newspapers a statement of these weather reports, viz, temperature, wind, and weather, and all of them were telegraphed to the Smithsonian Institution, where they were exhibited on a large wall map day after day during the years 1854–1861. These reports were frequently used by Professor Henry to predict or show the possibility of predicting storms and weather, a matter that he frequently urged on the attention of Congress. Espy and Henry were the prime movers in all matters of storm predictions both in this country and in Europe (p. 146).

As was indicated by Mr. Nunn in his biographical sketch of Maury, published in the January, 1928, BULLETIN, p. 7, Maury at his international conference in 1853 urged the establishment of meteorological networks over the lands particularly in the interest of the farmer. So, while Espy and Henry were talking most about storm predictions, Maury was hammering for "meteorology for the farmer" and "weather and crop reports." Their labors ultimately bore fruit, though sooner for the storm warnings than for the agricultural meteorology.—*Charles F. Brooks.*

A long wait for an adequate water supply.—Athens, Greece, celebrated on October 25, 1929, the completion of the Marathon Dam. This dam was erected on a site overlooking the immortal battlefield where in 490 B. C., the Greeks overcame the Persians. It was built to provide Athens with an adequate water supply and it was officially opened by the President of Greece, his cabinet, and other persons in Government circles. A sufficient water supply has always been a problem to the Greek capital as far back as to the time of Solon who, in 594 B. C., enacted laws governing its consumption. Three years ago Ulen & Co. of the United States signed a contract for the construction of the Marathon Dam and a new aqueduct tunnel 8½ miles through the base of Mount Pentelikon. The dam itself is the gravity-section arch type, faced up and down stream with Pentelikon marble of which the classic structures on the Acropolis were built.[1]—*A. J. H.*

Monthly Weather Review Supplement No. 32.—Climatological Data for Southern South America. Mr. Wesley W. Reed contributes under the above title his second statistical report on the climatic conditions of South America. The first report, Supplement No. 31, dealt with northern and western tropical South America. The present contribution presents the statistics with a discussion of the climates of the following countries: Uruguay, Paraguay, Argentine, and Chile, so that the two Supplements, 31 and 32, cover the continent of South America with the exception of Brazil.

The supplement can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C. It is priced at 10 cents the copy.—*A. J. H.*

A solar laboratory.—There are several solar observatories, but the only institution in the world calling itself a "solar laboratory" has just been established at the University of Kentucky. In honor of the New York banker who endowed it, the new institution is known as the Percy H. Johnston Solar Laboratory.

Though striking progress has been made in recent years in the knowledge and control of "indoor weather," it appears that one important element has been neglected. We know that certain combinations of air temperature, humidity, and wind are conducive to comfort. The American Society of Heating and Ventilating Engineers has published a number of "comfort charts" for the

[1] Condensed from Hydraulic Engineering, Los Angeles, December, 1929.

[3] Chronological outline of the history of meteorology in the United States. MO. WEA. REV., 1909, vol. 37, pp. 87–89, 146–149, 178–180, 252–253.