METEOROLOGY

Noctilucent Clouds in Alaska during 1962

SINCE the first reported sightings of noctilucent clouds in 1885, there have been many subsequent observations of them from latitudes ranging between 45° and 63.3° . The majority of these observations have been made from north-western Europe and the U.S.S.R. There appear to be only three previously reported observations of noctilucent clouds from the North American continent: two of these from Canada and one from Alaska. Vestine's observation¹ of the clouds from Meanook, Alberta ($54^{\circ} 37' \text{ N.}$, $113^{\circ} 20' \text{ W.}$), on July 20–21, 1933, was the first reported sighting from North America. The second reported sighting from Canada² was made on the night of July 23–24, 1961, from Saskatoon, Saskatchewan ($52^{\circ} 08' \text{ N.}$, $106^{\circ} 38' \text{ W.}$). The one reported Alaskan sighting³ was made from Anchorage ($61^{\circ} 10' \text{ N.}$, $149^{\circ} 59' \text{ W.}$) on July 27–28, 1957. The lack of noctilucent cloud observations at latitudes higher than 63.3° (the latitude of Torsta, Sweden) was attributed by Ludlam⁴ to the lack of keen observers at these latitudes.

Following a suggestion by Prof. Sydney Chapman, a watch for noctilucent clouds was kept this summer here ($64^{\circ} 53' \text{ N.}$, $148^{\circ} 03' \text{ W.}$) to determine whether the clouds could be seen at higher latitudes than previously observed. On the night of August 13–14, 1962, a noctilucent cloud display was observed from College by four independent observers. The clouds were first seen at approximately 2330 A.S.T. (Alaskan Standard Time, $150^{\circ} \text{ W. Meridian Time}$) on August 13, and were observed until 0030 A.S.T. on August 14. The display, exhibiting the characteristic billow structure, was most intense shortly after midnight at which time the clouds extended in elevation up to 11° with the azimuthal extent of the clouds being approximately 25° west to 25° east of true north. A photograph of the display seen on that night is shown in Fig. 1. This picture was taken by Mr. Yngvar Gotaas on Kodochrome film at an exposure of 90 sec at $f 5.6$. Two subsequent noctilucent cloud displays, faintly visible through the cloud cover, were seen and photographed from College, Alaska, on the nights of August 14–15 and August 16–17. The display on August 14–15 was also observed at Ft. Yukon⁵ ($66^{\circ} 34' \text{ N.}$, $145^{\circ} 18' \text{ W.}$), and the display on August 16–17 was seen from Galena⁶ ($64^{\circ} 46' \text{ N.}$, $156^{\circ} 54' \text{ W.}$).

Noctilucent cloud displays were also observed by the Weather Bureau personnel at Anchorage on two

occasions this year⁷. Their first sighting was on May 6–7, 1962, 0005–0050 A.S.T. This display was visible up to 7° above the horizon. At the beginning of the display the azimuth extent of the clouds was 303° – 009° , and toward the end of the display the azimuthal extent of the clouds was 021° – 071° . Their second sighting was on the night of August 11–12, 1962. This display was first seen at approximately 2300 A.S.T. and lasted until 0115 A.S.T. The elevation angle of the upper border of the display was about 10° , and the clouds extended from north-north-west to north-north-east, approximately. According to Mr. John Gardey⁷ of the Anchorage Weather Bureau, the clouds are seen at least once every year from Anchorage.

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¹ Vestine, E. H., *J. Roy. Astro. Soc. Canad.*, **28**, 249 (1934).

² Baker, K. D., and Currie, B. W., *Canad. J. Phys.*, **39**, 1515 (1961).

³ Lindley, W. B., *Monthly Weather Rev.*, **85**, 272 (1957).

⁴ Ludlam, F. H., *Tellus*, **9**, 341 (1957).

⁵ Young, J. (private communication).

⁶ Private communication from the F.A.A. observer in Galena.

⁷ Gardey, J. (private communication).

PHYSICS

Bath-Tub Vortex

PERENNIAL one hears controversy regarding the direction of the vortex in the drain of the bath-tub or the kitchen sink. Some claim that the direction of swirl is always the same in the northern hemisphere, and that in the southern hemisphere it is always opposite to that for the northern hemisphere. Others claim that there is no unique direction of swirl in either hemisphere.

Both schools of thought are in some sense correct. For the everyday observations of the kitchen sink and bath-tub variety, the direction of the vortex seems to vary in an unpredictable manner with the date, the time of day, and the particular household or experimenter. But under well-controlled conditions of experimentation, the observer looking downward at a drain in the northern hemisphere will always see a counter-clockwise vortex, while one in the southern hemisphere will always see a clockwise vortex.

Fig. 1. Photograph of noctilucent clouds taken from College, Alaska, at 00 : 06 : 30 A.S.T. on August 14, 1962