No. 67 OBSERVATIONS OF COMET IKEYA-SEKI (1965f) FROM MAUNA KEA, HAWAII

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ABSTRACT

Visual and photographic observations from the test site at Mauna Kea are described. A noon-time observation at perihelion is included.

The writer visited Mauna Kea, Hawaii, in October and November, 1965, to participate in the site survey then being conducted by the University of Hawaii, and was fortunate in being able to obtain a number of visual observations and photographs of comet Ikeya-Seki (1965*f*) from this location. The visual observations were made with the naked eye, using 20 × 60 binoculars, and with 6-in. and 12½-in. Newtonian reflectors. In addition to the visual observations, 80 color slides were made with a Yashica Penta J 35-mm reflex camera, having a 50-mm lens at f/2. All of the photographs were taken with Kodachrome II and Kodachrome X, since other color films having higher ASA ratings were not available.

Although low clouds and haze were often present along the eastern horizon, the comet was observed with the 20 × 60 binoculars on two mornings prior to perihelion. On October 15, 1965, at 15^h15^m UT, the head was estimated to be about magnitude 3, and two envelopes were noted. The tail length was estimated to be 3°. The comet was observed again the following morning, but haze and the proximity of the comet to the sun in the morning twilight prevented a critical study.

Since spectacular behaviour was thought possible in view of the comet's near-grazing incidence to the sun, plans were made to photograph the comet near perihelion passage on October 21 UT, at which time the comet would be east of the sun and in the evening sky for a few hours. In preparation for this event, a mount was constructed to attach the 35-mm camera to the 12½-in. reflector, and the telescope was elevated by placing blocks under the mounting to permit clear access to the western horizon over the wall of the observatory dome.

On October 20 at 21^h45^m UT — near noon local time, and only a few hours before perihelion — the comet was a spectacular object and was easily visible near the sun to the naked eye when using either the extended thumb or the edge of a building roof as an occulting medium. The position angle of the comet's head with respect to the sun, measured from the north point on the sun eastward, was estimated to be 220°. The head was estimated to be 3′ in diameter, with a magnitude of −8 or −9. In addition to the brilliant stellar nucleus, the edge of the coma nearest the sun formed a brightly illuminated arc. The tail somewhat resembled the contrail of a jet aircraft at high altitude but with a slight yellowish tinge. The length of the tail was estimated to be about 1°, and no curvature was noted. Visual observations were continued until about 23^h UT, at which time a thin haze brightened the sky near the sun and the comet was lost in the glare.

An attempt to photograph the comet that evening was unsuccessful due to the formation of a heavy cloud cap over the mountain top during the afternoon which effectively prevented observations from the dome. It was therefore necessary to set up an observing station in a clear spot on the side of the mountain at about the 11,000-ft level. The western sky was

Fig. 1 Comet Ikeya-Seki on October 27, 1965, 15^h22^m UT. Unguided exposure for 30 seconds on Kodachrome II in very strong morning twilight.

generally clear from this site, but a heavy layer of cumulus clouds lay along the horizon so that the actual sunset could not be observed; and although a vigil was maintained for several hours after sunset, the expected sweep of the tail across the sky did not occur. A further attempt to recover the comet the next morning before sunrise was also unsuccessful.

Because the elevated position of the telescope made it awkward to use for the site-survey seeing tests, it was removed from the blocks after these failures and returned to its normal position. As a result, the writer was caught unprepared when several days later the comet suddenly displayed a brilliant tail. There was then no alternative except to place the camera on a box and photograph the comet through the open shutter of the dome. Although it was possible to obtain unguided exposures of 5 to 10 minutes, they were often limited to 1 minute or less, not only to minimize streaking in the image, but also because of the location of the comet in the strong morning twilight. Figure 1, selected as representative of the period of October 25 through October 29, was photographed in this manner. After October 29, the writer borrowed a 6-in. equatorially mounted reflector. The camera was attached to this instrument and the comet was followed by manually guiding on a nearby star with a high-power eyepiece. Plate 1 and Figures 2–5, representative of the October 30 through November 3 period, were photographed in this way. No observations were made after November 3, as the observing run at Mauna Kea terminated on that date and the writer returned to Tucson.

The photographic sessions were begun each morning on Mauna Kea as soon as the first faint glimmerings of the comet tail could be detected on the eastern horizon, and were continued until clouds or the brightening of the sky prevented further photography. With exposures ranging from 15 seconds to 15 minutes, it was possible to obtain from 5 to more than 10 photographs during each session, with the number naturally increasing toward the end of the run as the comet receded westward from the sun. Clouds and haze sometimes limited the number of photographs possible. On the best photographs, made when the sky was unusually dark and transparent, stars as faint as the ninth magnitude were recorded, as determined by comparison with the BD charts. One brilliant meteor was photographed. It is somewhat alarming to note that of the 80 photographs obtained at Mauna Kea, three — or nearly 4 percent — record satellite trails.

The writer returned to Mauna Kea early in 1966 for further site testing, and was able to make two more observations of comet Ikeya-Seki with the 12½-in. reflector at 75×. Visual estimates of the brightness and size of the comet were made. On January 9 at 8^h05^m UT, the comet appeared to be a diffuse nebulosity about 2′ in diameter, with no nucleus, central condensation, or tail. The magnitude was estimated to be about 10. On January 31 at 6^h05^m UT, the comet appeared to be a diffuse nebulosity about 1′ in diameter, again with no nucleus, central condensation, or tail. The magnitude was estimated to be about 11.

The observations of the comet made from Mauna Kea, which is located at Long. 155° 29′ W, Lat. 19° 49′ N, thus provide a significant extension in time to those made in the continental United States.

Fig. 2 Black and white print of Plate 1 inserted for identification and comparison. a = γ Corvi; b = δ Crateris; c = β Crateris.

Fig. 3 Comet Ikeya-Seki and meteor on October 31, 1965, 14^h10^m–14^h20^m UT. Ten-minute guided exposure on Kodachrome X. The tail of the comet is shown rising above the horizon. The vertical streak at the bottom of the photograph is the airport beacon at Hilo, 35 mi distant and 13,600 ft lower.

Fig. 4 Comet Ikeya-Seki and satellite trail on October 31, 1965, 14^h43^m–14^h58^m UT. Fifteen-minute guided exposure on Kodachrome X. The irregularities in the trail are the result of manual guiding.

Fig. 5 Comet Ikeya-Seki on November 3, 1965, 14^h38^m–14^h48^m UT. Ten-minute guided exposure on Kodachrome X.

Plate 1 Comet Ikeya-Seki on October 30, 1965, 15^h11^m UT. Five-minute guided exposure on Kodachrome X. Note extremely transparent sky.