

OPERATION ECLIPSE - 1963

Saturday, 20 July 1963 marked the third time that the Royal Canadian Air Force had made aircraft available for the viewing of a total eclipse of the sun from the air. The previous occasions were on 9 July 1945 and 30 June 1954.

In 1945, the base of operations was the RCAF Central Navigation School at Rivers, Manitoba and the aircraft used were a Mitchell, a Spitfire and two Ansons. The aircraft were operated at altitudes varying from 17,000 to 33,000 feet over the general area around Dauphin, Manitoba. The duration of totality was between 33 and 38 seconds. Only photographic observations were made and eight cameras of various types were used. From these, motion and still pictures of the stages of the eclipse and of the chromosphere and the corona were recorded, together with spectrographic data.

In 1954, the "Ice Wagon", a North Star aircraft converted for studies of icing during flight, was used. The operation was organized at RCAF Station Rockcliffe and all the practice flights originated from there. The aircraft was moved to Goose Bay, Labrador for the actual observations, which were made at an altitude of 27,500 feet to the east of this base. On this occasion the period of darkness was nearly two minutes. In addition to photographic and spectrographic observations, visual observations were made of the solar prominences during totality and the dark sky searched for a daytime display of aurora.

Initial planning for the present operation began during the summer of 1961, when the Chief of the Air Staff gave his approval to the undertaking. While the operation was fully supported by the Defence Research Board, the main interest centered on the Dominion Observatory. As a result, the Dominion Astronomer coordinated the programme of scientific observations. After examining the characteristics of the several types of transports available, it was decided that the large turboprop-driven YUKON was the only one which would be satisfactory and 412(T) Squadron, based on Station Uplands near Ottawa, was given the responsibility of carrying out the operation.

As the path of totality extended across Canada from the Alaska-Yukon border to the southern tip of Nova Scotia, there was a wide choice of areas for viewing the eclipse. In order to obtain the greatest period of darkness, the aircraft was flown along the path of the eclipse in the same direction as the movement of the moon's shadow (i.e. towards the east). An altitude of 30,000 feet was chosen to be above weather. Because of the intricacy of the scientific equipment, it was necessary to have the sun directly off the beam of the aircraft. This condition was only to be found along the Mackenzie River between Fort Simpson and Fort Providence, near the western end of Great Slave Lake. The eclipse required just over 1½ hours to progress from the Alaska-Yukon border to the southern tip of Nova Scotia and in terms of local standard time ranged from 11:10 am in the Yukon to 5:45 pm off Yarmouth, N.S. At Great Slave

Lake, the local standard time was 12:40 pm--the time past noon just compensating for the southerly component of the flight direction--and the period of totality was 99 seconds. The speed of the aircraft increased the time of darkness by about 20 percent.

The scientific programme was much more elaborate than on the previous operations. It included photometric measurements of the sun's corona and the airglow in the suddenly darkened sky. The northern sky was photographed with an auroral camera in the search for a daytime display of aurora and visual observations were made of the solar prominences during totality. This latter information was transmitted immediately following the eclipse to the Canadian Broadcasting Corporation to assist them in their television coverage of the eclipse in the region of Three Rivers, Que., approximately one hour later. Three special glass windows were used in place of the standard plastic ones for those measurements which would be impaired by optical distortion.

The scientists aboard the aircraft represented:

Defence Research Board  
Dominion Observatory  
National Research Council  
University of Saskatchewan  
Oxford University, England  
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