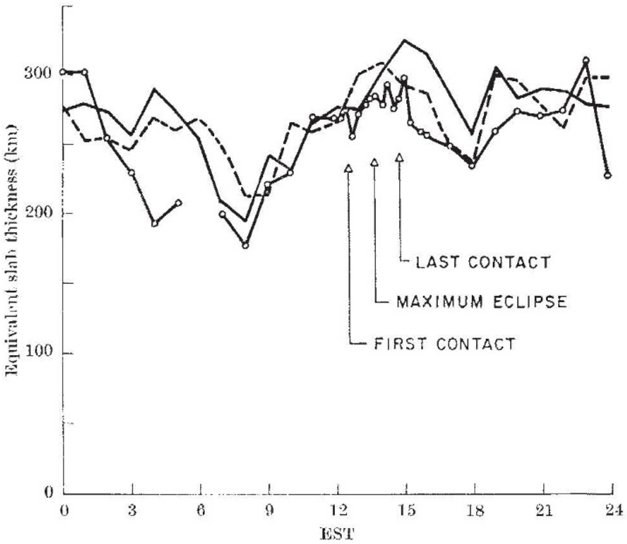

Fig. 3. Equivalent slab thickness of the F-region. — ——, March 5; - - -, March 6; ○—○, March 7.

equivalent slab thickness of the F-region, shown in Fig. 3, was not significantly changed during the eclipse, at least not when compared with the two days preceding the eclipse. All slab thickness values shown in Fig. 3 were computed using TEC values from the ATS-3 path and ionosonde data from Wallops Island.

In spite of the fact that the solar eclipse occurred during a moderately disturbed period ($\sum_{24} K_{Fr} = 33$) the eclipse effects were clearly predominant, in contrast to a report by King *et al.*[2], who observed that storm effects predominated during the June 10, 1964, eclipse near Woomera, Australia. The March 7, 1970, eclipse was also interesting in that TEC and N_{max} changed by approximately the same amount. This indicated that the expected piling up of electrons from higher heights to near the peak was more than compensated for by losses at the peak such that layer shape was maintained.

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Synoptic Preview of Ionospheric Data taken at Fort Monmouth, New Jersey, during the Eclipse

Various ionospheric observations were made at Fort Monmouth during the eclipse of March 7. These included a readout from the topside sounder satellite Alouette 1, polarization and signal strength measurements from beacons in the S-66 and ATS-3 satellites, and bottomside ionograms from various locations. This letter is a preliminary view of how data from the ATS-3 observations are related to the vertical ionogram data obtained at Wallops Island kindly provided by R. S. Gray, ESSA Ionospheric Station, Wallops Island. We selected the Wallops Island ionograms for our comparison because the sub-ionospheric point (below 350 km altitude) for our path to ATS-3 is at 37·1° N, 75·5° W, rather close to the Wallops Island station at 37·9° N, 75·5° W.

The polarization measurements of the ATS-3 beacon (137·35 MHz) represent the expected picture for a solar eclipse close to local noon. Before first contact, the polarization angle (the total electron content) increased steadily. Then a turning point (or maximum) was reached when the data decreased to a minimum related to the maximum coverage of the eclipse. After the minimum the polarization increased until a second turning point (maximum) was observed. From then on the polarization descreased as it would during the afternoon of an undisturbed day. A similar variation was observed for the plasma frequencies, for example, F_0 and E_0, read from the ionograms.

At an altitude of about 300 km, first contact at the sub-ionospheric point was at 1225 EST. The first turning point in the ATS-3 observations, that is, the moment when the effects of decreasing ionization is noticed in the total electron content, was observed at $12(38 \pm 3)$ EST, about 13 min after first contact. The ionograms from Wallops Island show the beginning of a decrease of the plasma frequencies in the F-region at $12(45 \pm 4)$ EST. This time delay is more than can be explained by the more northern position of the ionosonde in comparison with the sub-ionospheric point—we estimate a delay of about 1–2 min due to the difference between locations. Thus we conclude that the effect of the eclipse is revealed in the total content along the path of the satellite about 4 min earlier than in the F-region observations. The E-region data from Wallops Island show the first reaction at $12(15 \pm 2)$ EST, earlier than the time for first contact as seen from the ground at Wallops Island (1220 EST), and also earlier than the first contact time at 300 km altitude for the sub-ionospheric point (1225 EST). Although more detailed investigations are necessary, the early decrease of E_0 before the beginning of the decrease in total content seems to be compatible with the later reaction of the F-region.

Maximum coverage at the sub-ionospheric point (at 300 km) is estimated as 1343 EST. At this time the polarization data from ATS-3 indicated a reduction of only about 90 per cent of the total reduction observed. The minimum was reached at $14(06 \pm 3)$ EST, 23 min after maximum coverage. The F-region minimum at Wallops Island was at $14(15 \pm 8)$ EST. Again assuming a two min delay because of the distance between the two locations, there is a delay between the minimum in total content and the F_0 minimum of about 7 min. Again the E-region responds more quickly, reaching minimum at 1340 EST at Wallops Island (equivalent to 1338 EST at the sub-ionospheric point). This appears to be earlier than the time of maximum coverage at the E-region altitude.

The total content data resumed their normal decrease at $15(26 \pm 3)$ EST. The F-region data reached normal values at $15(30 \pm 8)$ EST and the E-region at 1500 EST. Last contact at the sub-ionospheric point was about 1458 EST. Again assuming the time difference of 2 min between locations, we find the E-region time coinciding with full illumination. F-region recovery is delayed by 30 min and recovery of total content by 28 min.

The data are consistent in so far as the comparison of F-region data with total electron content data is concerned, but the reaction of the E-region seems to be advanced in time relative to changes in illumination. This might have something to do with the distribution of zones of X-ray activity (Bomke *et al.* at the spring meeting of the US National Committee of URSI, 1970).

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