DR. MUNRO's scepticism regarding our recent suggestion[1] that certain large flares are associated with effects in the F region of the ionosphere is understandable. As he points out, a solar photon phenomenon of this type would be expected to be evident over the entire sunlit hemisphere and not only at one or two isolated stations. However, since the submission of our original communication, our work has revealed several new facts which may help to account for this apparent non-uniformity.

First, from further examination of vertical soundings data, it appears that F region flare effects sometimes do occur simultaneously at a number of sunlit hemisphere stations. The difficulty, of course, is to be able to determine with any degree of certainty whether or not an effect actually occurred in the presence of the normal variability of the F region and the flare-associated increase in D region absorption which usually is responsible for the loss of several crucial F region observations. These factors, coupled with the relative infrequency of large flares, are undoubtedly responsible for the fact that the F region flare effect phenomenon has been so infrequently recognized in the past.

The second new point concerns the height of the $F2$ layer just prior to the beginning of the flare. We have found a strong tendency for the F region solar flare effect to occur only at those locations where the height of the $F2$ maximum electron density level ($h_{max.}$) at the time of the flare is relatively low (less than about 315 km.).

The flare of November 12, 1960, has been chosen to illustrate these points. Fifteen-minute values of $F2$ layer penetration frequency ($foF2$) are shown for six sunlit sounding stations in Fig. 1. The stations are arranged in order of increasing h_{max} as determined by the manual 10-point method. The time at which the flare begins (1323 U.T.) is shown by an arrow on the time-scale. Considering pre-flare and post-flare trends, it seems clear that a flare-associated increase in penetration frequency, which is related to maximum electron density, occurred at at least four of the stations (San Salvador, Reykjavik, Belvoir and Talara). Flare-associated increases probably did not occur at Huancayo and Concepcion. Note that the magnitude of the flare effect discontinuity seems to vary inversely with h_{max}. This is what would be expected on the simple picture where the flare radiations have peak ionization-rates at a level significantly below the $F2$ layer, the rates falling off exponentially with increasing height above this level.

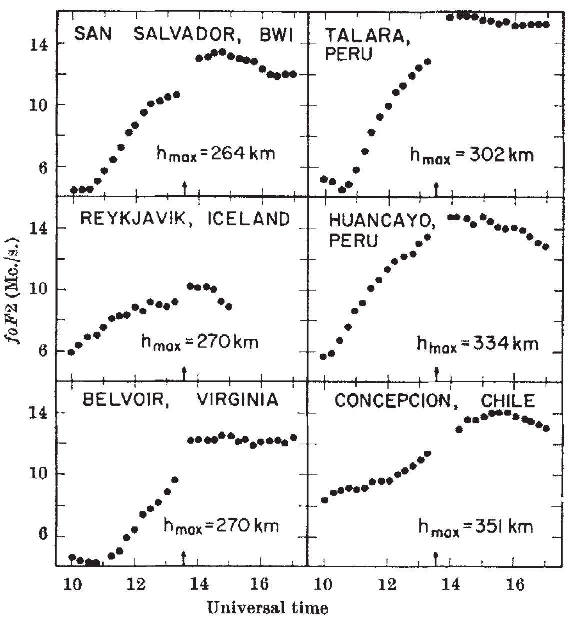

Fig. 1. Variations in $F2$ layer penetration frequency at six sunlit sounding stations during the large solar flare of November 12, 1960. Arrow marks flare beginning

Because of the simultaneity of the increases over distances of 10,000 km. or more, the possibility that the effects shown in Fig. 1 are due to travelling ionosphere disturbances is, it seems to us, extremely remote. Moreover, travelling disturbances can be rather conclusively eliminated as the cause of even some single station occurrences, like that shown in our earlier communication[1] for Adak, Alaska, during the flare of November 15, 1960, since, during the 2½-year period from July 1957 until December 1959, on only one day were occurrences of discontinuities in $foF2$ of this magnitude (1·5 Mc./s. increase in 15 min.) observed during the corresponding period (1200–1800 L.S.T.). To have one of the largest $F2$ layer travelling disturbances that occur at Adak pass over the station at almost exactly the same time as the occurrence of a large and relatively rare type of solar flare would seem fortuitous indeed. Also, according to the earlier work by Munro and Heisler[2], travelling disturbances always take the form of first a reduction in penetration frequency and then an increase whereas in the present phenomena the increase occurs first. Lastly, on the ionograms travelling disturbances are generally seen as additional cusps near the penetration frequency. Cusps of this type have not been observed on the ionograms following the solar flare events.

Miss R. E. McDuffie has contributed substantially to the work discussed in this communication.

R. W. KNECHT
K. DAVIES

National Bureau of Standards,
Boulder, Colorado.

1 Knecht, R., and Davies, K., *Nature*, **190**, 797 (1961).
2 Munro, G. H., and Heisler, L. H., *Austral. J. Phys.*, **9**, 343 (1956).

Interstellar and Interplanetary Communication by Optical Masers

IN *Nature* of April 15, 1961, p. 205, reference is made to seven stars of nearly the same luminosity and spectral characteristic as our Sun within 10 light years. Apparently this erroneous statement is derived from an earlier general statement in *Nature*, September 19, 1959, p. 844, except that 15 light years was changed to 10 light years.

Even within 15 light years, there is only one star with "nearly the same luminosity and spectral characteristic as our Sun", namely, the brighter component of the Alpha Centauri system, while possibly one other may be considered to qualify, namely Tau Ceti, with a luminosity of 36 per cent of the Sun and spectral type $G4$ (instead of $G0$ for the Sun).

PETER VAN DE KAMP

Sproul Observatory,
Swarthmore College,
Swarthmore, Pa.

WHERE the stars listed by Cocconi and Morrison are referred to in our article, 10 light years was erroneously written for 15 light years as noted by