

LETTERS TO THE EDITOR

LUNAR TIDES IN E-REGION DRIFTS
OVER AHMEDABAD

LUNAR tides in geomagnetic components and various ionospheric parameters like the critical frequencies and heights of E and F layers, absorption, etc., for different locations have been reported in literature. However, lunar tides in ionospheric drifts have been studied at only a few stations, viz., Cambridge (Phillips¹), Ottawa (Chapman²), Waltair (Ramanna and Rao³), Thumba (Mitra⁴) and Yamagawa (Patel and Chandra⁵). One basic difficulty in obtaining lunar tidal effects is that the magnitude of the lunar tidal oscillations is very small and therefore an extensive set of data is required for obtaining significant results. Daytime drift observations in the E-region over Ahmedabad (dip lat. 18.6° N) were conducted during the period 1970-75, employing spaced receiver technique (Mitra)⁶ and this long series of data has been used to separate out lunar variations in the magnitude of drift speed.

Midday (1100-1300 hr LT) values of the apparent drift speed over the entire period have been grouped into three seasons of winter (November to February), equinoxes (March, April, September and October) and summer (May to August). Data on magnetically disturbed days have been excluded. The drift speeds in each season are grouped according to the lunar age ν at local noon and mean drift speeds at each lunar age computed. Plots of the mean drift speeds with lunar age ν at local noon for different seasons are shown in Fig. 1 where the curves for the lunar age of 0 to 11 have been averaged with the curves for the lunar age of 12 to 23 for depicting the lunar semimonthly tides. The lines drawn are the first harmonic values.

Amplitudes of about 3 m/s are noted during each of the season, the maximum occurring at about 05 lunar age for winter and equinoxes and at about 07 lunar age for summer. Misra⁴ had earlier noted semimonthly oscillations in the E-region drifts at Thumba with amplitudes ranging from 6 m/s to 9 m/s during different seasons and maximum occurring at about 05 lunar age. At Yamagawa (Patel and Chandra⁵) semimonthly oscillation of 9 m/s with maximum around 04 lunar age has been reported. Lunar tidal studies in the geomagnetic H component at equatorial latitudes show similar maximum around 0300-0400 hr lunar age (Rastogi^{7,8}). The phases of the lunar semi monthly oscillations at Thumba, Ahmedabad and Yamagawa occur at nearly same lunar age. Lunar barometric pressure oscillations at ground reported (Chapman and Westfold⁹) also

show nearly similar phase values for latitudes from Trivandrum to Tokyo.

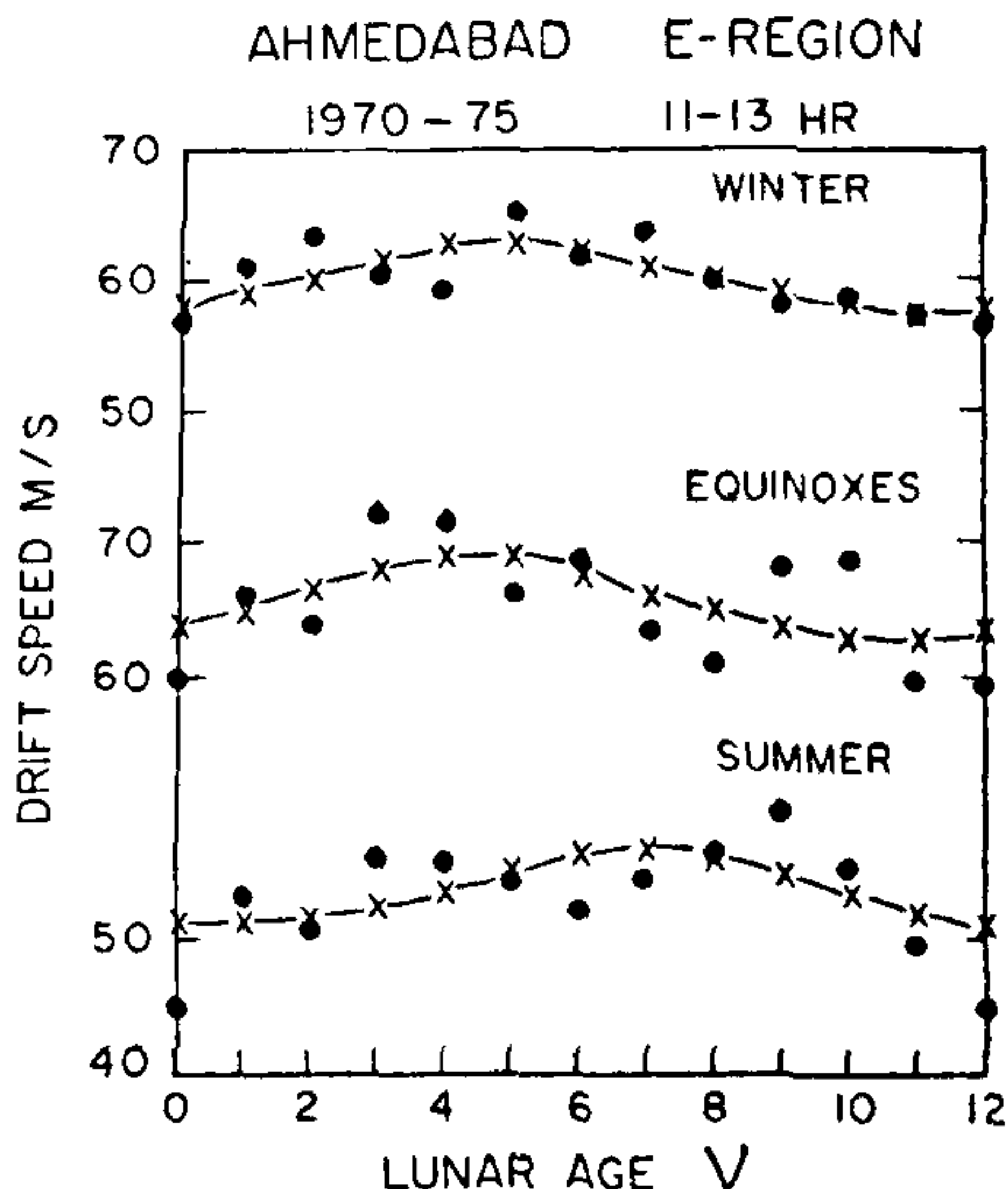


FIG. 1. Lunar tides in the midday E-region drift speed at Ahmedabad for different seasons of the period 1970-75.

Thanks are due to our colleagues, especially to K. P. Singhal, H. O. Vats and G. D. Vyas for their association in data collection at different stages of the project.

Physical Research Laboratory,
Ahmedabad 380 009, India,
May 14, 1979.

V. P. PATEL,*
H. CHANDRA,
R. G. RASTOGI.

* M. G. Science Institute, Ahmedabad 380 009.

1. Phillips, G. J., *J. Atmos. Terr. Phys.*, 1952, **2**, 141.
2. Chapman, J. H., *Can. J. Phys.*, 1953, **31**, 120.
3. Ramanna, K. V. V. and Rao, B. R., *J. Atmos. Terr. Phys.*, 1962, **24**, 220.
4. Misra, R. K., *Planet. Space Sci.*, 1973, **21**, 1109.
5. Patel, V. P. and Chandra, H., *J. Geomag. and Geoelect.*, 1979 (in press).
6. Mitra, S. N., *Proc. Instn. Elect. Engrs.*, Part III, 1949, **96**, 441.
7. Rastogi, R. G., *J. Atmos. Terr. Phys.*, 1963, **25**, 393.
8. —, *Ind. J. Met. Geophys.*, 1965, **16**, 385.
9. Chapman, S. and Westfold, K. C., *J. Atmos. Terr. Phys.*, 1956, **8**, 1.