

Saurashtra) in connection with the gravity survey for oil exploration in that region. This region falls in approximately 80% of the total eclipse and we recorded the temporal variation in the gravity field at this place continuously for approximately 12 h before and after the eclipse. The variation in the gravity field is recorded using a Lacoste-Romberg gravimeter of 0.01  $\mu\text{gal}$  accuracy. The temporal variation in the gravity field recorded at a station can be broadly classified as: (1) Very large period ( $10^2$ – $10^4$  years) variations related to the mantle processes, sea level changes, glacial rebound and ice processes. (2) Large period ( $10$ – $10^2$  years) variations due to core-mantle interaction, plate boundary deformation, etc. (3) Medium period (days to years) variations due to earthquakes, volcanoes, etc. (4) Short period (hours to days) variations caused by drift of the gravimeter, ocean tides. (5) Shorter period (hours) variations due to the sudden changes in the atmosphere such as pressure and temperature. (6) Shortest period (seconds to minutes) high frequency noises which are sharp and sudden.

As mentioned above, these variations are largely characterized by their wavelength which is used to classify them in different groups. In the 12-hour record which we made, we can neither record nor identify the variations classified under groups (1), (2) and (3). The fourth group of variations show a cycle of 24 h and is represented by smooth cyclic changes as given in Figure 1 which represents the tidal variation on 24 October 1995 at Dhoraji. It is the group (5) kind of variations which can be recorded in our gravimeter and are of present interest. The variations under group (6) are easily identifiable as they are sharp changes due to sudden jerk or some motion in the vicinity. Some experiments of recording gravitational field during solar eclipse<sup>3,4</sup> were conducted previously to find out the tidal effects during that period and gravitational shielding (Majoranna effect).

The recorded variation of the gravity field and the tidal (Figure 1) corrected field on 24 October 1995 for a period from 5.00 am to 11.00 am are shown in Figure 2. Both the graphs show a smooth variation due to short period features like tidal and the drift of the gravimeter over which a shorter period feature of

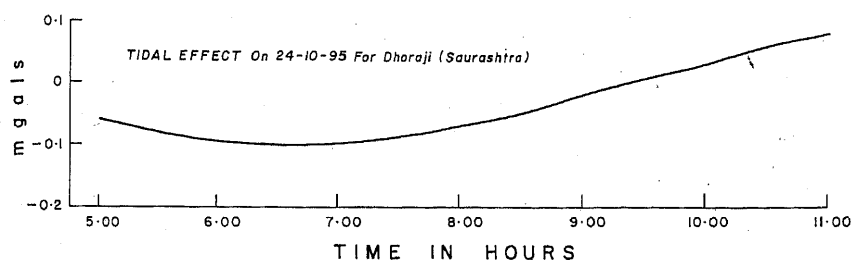


Figure 1. Tidal effect on 24 October 1995 at Dhoraji (Saurashtra).

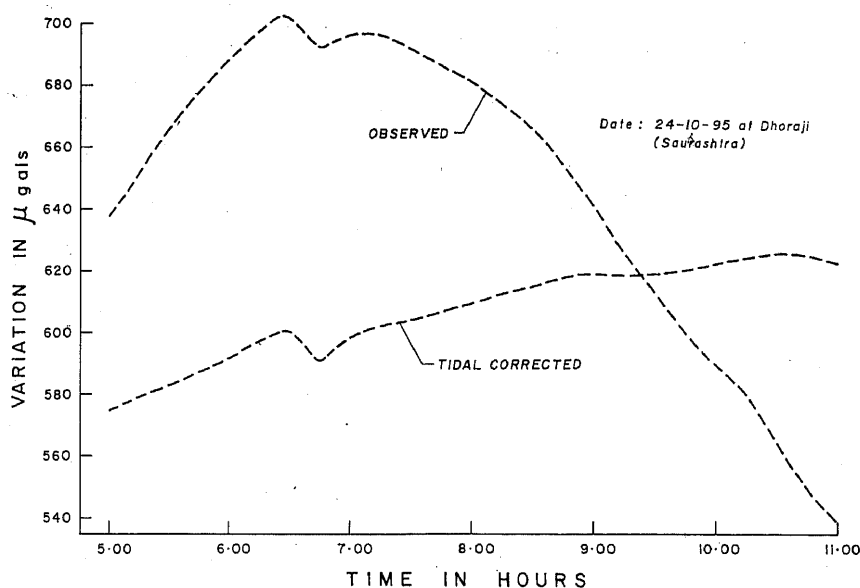


Figure 2. Observed and tidal corrected gravity field at Dhoraji on 24 October 1995.

10–12  $\mu\text{gal}$  between 6.30 and 7.30 am is superimposed. This variation can neither be classified under short period variations due to tidal effect or drift of the gravimeter nor under high frequency noise which have special patterns. Therefore, this variation is highly significant as it occurs with the onset of solar eclipse. It may represent sudden changes in the earth's atmosphere with the onset of eclipse. Exact nature of the changes in atmosphere is difficult to visualize. However, it could be due to decrease in the different kinds of radiations such as gamma rays, X-rays and radio intensity which are found to decrease with the onset of eclipse or simply due to changes in the atmospheric pressure. Therefore to understand its actual nature and mechanism, more planned experiments of this

kind should be carried out during solar eclipses throughout the world whenever such opportunities are available.

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