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Gravity Effects of Solar Eclipse and Inducted Gravitational Field

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Abstract: During solar eclipses in recent decades, gravity anomalies were observed and difficult to be explained by Newton's gravitational theory. During the solar eclipse of 1995, India scientists Mishra et al. recorded a gravity valley in amplitude of 12 μGal; they interpreted that qualitatively as atmospheric effects. During the total solar eclipse of March 1997, we conducted a comprehensive geophysical observation at Mohe geophysical observatory of China (with latitude of 53.49º N and longitude of 122.34º E). From the data we recorded, we found two valleys of about 5 to 7 μGal. Unnikrishnan et al. inferred this gravity anomaly was caused by environment changes. We know that the observation had been conducting in a room inside a small building with a stable coal heating system; the temperature variation inside the experimental room was less 1ºC during the eclipse. Moreover, the measured atmospheric pressure change was less 1hPa during the eclipse. It is reasonable to believe that surrounding environment of the observatory excluded the significant gravity variations caused by temperature, pressure variation and local moving of persons and vehicles. To further study the gravity effects related to solar eclipses, our scientific team took more observations during Zambia total solar eclipse of June 2001 and Australia total solar eclipse of December 2002. After data corrections, we found respectively two gravity anomalies, with 3 to 4 μGal for Zambia eclipse and 1.5 μGal for Australia eclipse. As many scientists have pointed out that pressure-gravity factor is lower than 0.3 μGal/hPa, it means that any gravity anomaly greater than 0.5 μGal could not be inferred as the results of atmospheric pressure change. The two more gravity anomalies recorded during the solar eclipses provided us strong evidence that some gravity anomalies could not simply be inferred as atmospheric pressure change. We have tried to explain those anomalies by the induced gravitational field.