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A study over direct tidal effect on the GRACE satellite observables

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Satellites not only sense the gravitational effect of the Earth but also the gravitations due to the other celestial bodies such as Moon, Sun, and other planets of the solar system, which results in systematic effects on the gravity field models derived from satellite gravimetry observations. In this contribution, direct tidal effects due to Moon and Sun on the GRACE observables, namely, (i) kinetic energy at the position of GRACE-1 and GRACE-2 satellites, i.e., summation of the gravitational potential and the unknown energy constant, (ii) gravitational acceleration at the position of the satellites, (iii) kinetic energy difference between the satellites, i.e., summation of the gravitational potential difference and energy constant difference, (iv) Line Of Sight (LOS) gravitational difference, and (v) gradiometry observations, are computed based on the tidal potential expansion into the series of Legendre's polynomials. The derived results are presented in terms of the maps of the aforementioned effects on the GRACE observables.