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Venus internal structure and global deformation

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Tidal forces acting on a planet cause a deformation and mass redistribution in its interior, involving surface motions and variation in the gravity field, which may be observed in geodetic experiments. The change in the gravitational field of the planet, due to the influence of an external gravity field, described primarily by its tidal Love number k of degree 2 (denoted by k_2) can be observed from analysis of a spacecraft radio tracking. The planet's deformation is linked to its internal structure, most effectively to its density and rigidity. Hence the tidal Love number k_2 can be theoretically approximated for different planetary models, which means comparingÂ the observed and theoretical calculation of k_2 of a planet is a window to its internal structure.

The terrestrial planet Venus is reminiscent of the Earth twin planet in size and density, which leads to the assumption that the Earth and Venus have similar internal structures. In this work, with a Venus we investigate the structure and elastic parameters of the planet's major layers to calculate its frequency dependent tidal Love number k_2. The calculation of k_2 is done with ALMA, a Fortran 90 program by *Spada [2008]* for computing the tidal and load Love numbers using the Post-Widder Laplace inversion formula. We test the effect of different parameters in the Venus model (as a layer's density, rigidity, viscosity and thickness) on the tidal Love numbers k_2 and different linear and non-linear combinations of k_2 andh_2 (as the tidal Love number h_2 describes the radial displacement due to tidal effects).