**Abstract:**

**Investigating load-induced elastic Earth deformation using a homogeneous, non-gravitating half-space method and a homogeneous, gravitating, spherical method**

Planetary bodies, including the Earth, deform when there is a re-distribution of surface load. This project aims to compare two methods for modeling the elastic loading response of the Earth: a homogeneous, non-gravitating, half-space method and a homogeneous, gravitating, spherical method. Many studies have focused on computing vertical displacement due to uniform pressure applied over a region using a homogeneous linearly elastic half-space Earth. However, although homogeneous half-space models are simple to implement, they are less accurate than the more realistic gravitating, spherical models. As remote sensing data improve in quality, we require more accurate models to interpret the observations. Here, we quantify empirical differences between homogeneous, non-gravitating, half-space models and homogeneous, gravitating, spherical models at a variety of load scales. We also consider the mathematical derivation of the homogeneous half-space model, compare implementations of the Boussinesq (1885) problem by different research groups, and contrast with the gravitating, spherical formulation.

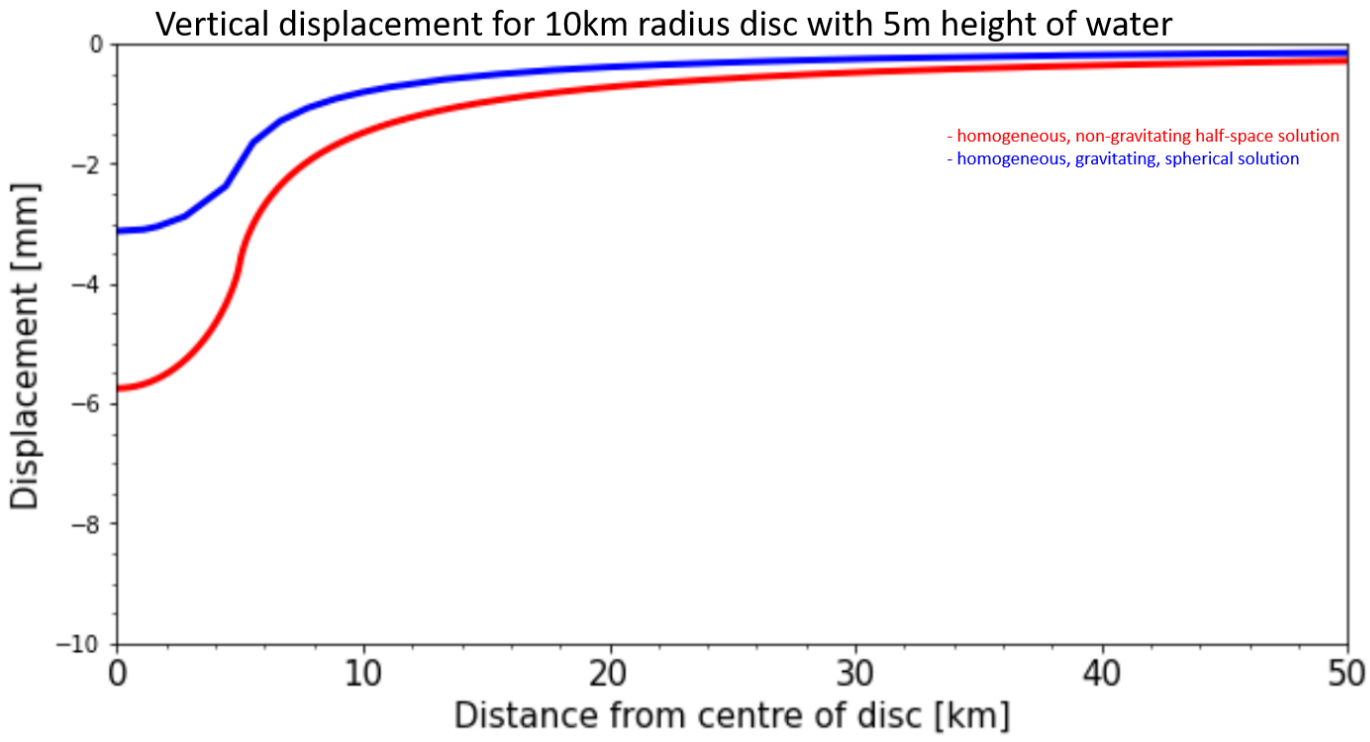


*Figure 1: Vertical displacement by load distribution of 10 km radius disc with 5m height of water. Blue line is the solution given by the spherical, gravitating homogeneous Earth model and the red line is the solution given by the half-space elastic Earth model.*