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Earth's Elastic Deformation: Reference and Site-dependent Love numbers

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Love Numbers are computed for several reference Earth models. A Love number is the proportionality coefficient between the mechanical cause and its consequence in term of elastic deformation (vertical and horizontal displacement, gravity perturbation) for a scale given in term of a spherical harmonics' degree. A practical numerical method for Love numbers computation is described. Love numbers of low degree (1 and 2) and high degree (greater than 1,000 and up to 10,000+) are computed. Their meanings are discussed depending on the effective depth of the deformation and the rheological properties of the Earth's model. Internal Love numbers of degree 10, 100, 1000, 10000 and sampling the Earth's interior every kilometer, show how the Earth's interior is deformed and which Earth's layers contribute to the global or local deformation depending on the spherical harmonics' degree. Reference Love numbers of several reference Earth's models are compared. Site-dependent Love numbers are computed taking into account the specific radial Earth's structure below a given site, under the assumption that the Earth is spherically symmetric. This approach provides an attempt to estimate the uncertainties of Love numbers relative to the site-dependent rheology and gain insights in the Earth's elastic deformation processes.