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### **SLR parameter estimation under the influence of mass redistributions**

Mass redistributions in the atmosphere, oceans and the continental hydrology cause elastic loading deformations of the Earth's crust and thus systematically influence Earth-bound observation systems such as VLBI, GNSS or SLR. These non-linear station variations have a direct impact on the estimated station coordinates and an indirect impact on other parameters of global space-geodetic solutions, e.g. Earth orientation parameters, geocenter coordinates, satellite orbits or troposphere parameters. The influence can be mitigated by either co-estimating model parameters or by reducing the induced signal using geophysical background models at the observation level. Various groups provide a number of data sets modelling the (non-tidal) loading deformations which show regionally significant differences. Consequently, the impact on the space-geodetic solutions heavily depends on the available network geometry and the choice of the loading model. We present and discuss the differences between models and quantify their influence on the estimated station coordinates, Earth orientation parameters and the geocenter motion using SLR observations over 14 years. We show that the majority of station coordinates benefit from the usage of loading models e.g. in terms of a significantly reduced RMS but also analyse and present reasons where the RMS of station coordinates increases due to the applied models. The analysis also reveals that all models are well suited to reduce the annual signal component but differences occur at other frequencies.