1067-65-308   **Doreen Fischer*** (`fischer@mathematik.uni-siegen.de`). *Recovering a Tomographic Model of the Earth by Sparse Regularization of a Joint Inversion of Gravitational Data and Normal Mode Anomalies.*

To recover the density of the Earth we invert Newton's gravitational potential. It is a well-known fact that this problem is ill-posed. Moreover, it even becomes exponentially ill-posed if we use satellite data as input. Thus, we need to develop a regularization method.

We applied the idea of a matching pursuit to recover a solution stepwise. At step $n+1$, the basis function d_{n+1} and the weight α_{n+1} are selected to best match the data structure.

One big advantage of this method is that all kinds of different basis functions can be taken into account to improve the model stepwise and the sparsity of the solution can be controlled directly. Moreover, this new approach generates models with a resolution that is adapted to the data density and the detail density of the solution.

We applied our method to reconstruct the density distribution of the Earth and the seasonal changes in the area of the Amazon. However, from gravitational data alone it is only possible to recover the harmonic part of the density. To get information about the anharmonic part as well, we need to be able to include other data types, e.g. normal mode anomalies, and perform a joint inversion which is a main feature of the developed method.

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