1077-41-1310   **Doreen Fischer***, Geomathematics Group, University of Siegen, Walter-Flex-Str. 3, 57068 Siegen, Germany. *The Regularized Functional Matching Pursuit and its Application to Inverse Ill-posed Problems in Geomathematics.*

To recover the density of the Earth we invert Newton's gravitational potential which is an ill-posed problem. Thus, we need to develop a regularization method to solve it appropriately.

We apply the idea of a Matching Pursuit to recover a solution stepwise. At step $n + 1$, the next expansion function and the weight are selected to best match the data structure. However, all kinds of different functions may be taken into account to improve the solution stepwise. Moreover, this new approach generates models with a resolution that is adapted to the data density as well as the detail density of the solution.

For the area of South America, we present an extensive case study to investigate the performance and behavior of the new algorithm. Furthermore, we research the mass transport in the area of the Amazon where the proposed method shows great potential for further ecological studies, i.e. to reconstruct the mass loss of Greenland and Antarctica.

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 include other data types, e.g. normal mode anomalies. We present first results of such a joint inversion. (Received September 19, 2011)