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The Amazon Watershed - Sparse Regularization of Inverse Gravimetry

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The Amazon watershed is one of the largest watersheds on Earth. Thus, it is very important to observe the mass transport in this area regularly.
The satellite mission GRACE was started in 2002 to gain more information about the Earth's gravitational potential which allows us to detect climate phenomena like hydrology in the gravity field. Furthermore, the GRACE mission provides us with a monthly coverage of the gravitational potential such that we are able to investigate temporal variations, too.
We apply a new regularizing method to reconstruct the mass transport in the Amazon watershed out of the gravitational potential given by satellite data. In our results, we observe the seasonal changes as well as a topographic and meteorological separation of some effects.
In general, the method, which is based on a matching pursuit and sparse regularization techniques, allows us to solve exponentially ill-posed problems stepwise. The resulting model has a resolution that is adapted to the data density as well as the detail density.

References:
P. Berkel, D. Fischer, V. Michel: Spline multiresolution and numerical results for joint gravitation and normal mode inversion with an outlook on sparse regularisation, International Journal of Geomathematics, accepted for publication, 2010.