1086-65-1210 **Volker Michel***, www.geomathematics-siegen.de. *How Mathematics can Help to Observe Climate Change — An Example.*

The Mathematics of Planet Earth 2013 initiative focusses on mathematical methods that enable us to solve the manifold scientific problems that are somehow linked to the Earth. One out of many problems of this kind is an accurate observation of climatic effects such as droughts, floods, El Niño effects, etc. As an example, we show that a novel mathematical method, the Regularized Functional Matching Pursuit, yields a highly accurate reconstruction of water mass transports from gravity data. For instance, seasonal differences in the precipitation and droughts respectively floods can be visualized. The mathematical background is as follows: We solve an ill-posed inverse problem given by a Fredholm integral equation of the first kind, where large data sets are possible. A regularized version of a greedy algorithm is used to iteratively construct a solution. This solution is combined from global and localized trial functions, where the latter are primarily chosen by the algorithm in areas with a high detail structure. Hence, the obtained solution is sparse in the sense that essentially less trial functions than available are used.

D. Fischer, V. Michel: Inverting GRACE gravity data for local climate effects, Siegen Preprints on Geomathematics, 9, 2012. (Received September 20, 2012)