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Volker Michel*, Department of Mathematics, University of Siegen, Walter-Flex-Str. 3, 57068 Siegen, Germany. *Melting Glaciers and Rising Sea Level — Some Solved and Unsolved Mathematical Problems Behind a Complex Application.*

Melting glaciers on continental areas cause water mass transports into the oceans and, thus, a rising sea level. While this is a very simple principle, the quantification of the whole phenomenon is connected to a series of mathematical challenges:

1. Satellites reveal gravitational field changes due to the mass transports, but the data first have to be denoised.
2. Downward continuing the data from the orbit to the Earth's surface and computing masses out of gravitation are both ill-posed inverse problems.
3. A decreasing (ice) load on land causes a decompression and a rising of the area. This can be modeled with partial differential equations.
4. The above problems are linked: The decompression and the uplift also change the gravitational field.

Several methods are known for the described problems. However, the demand for more accurate models and the availability of huge amounts of data with a high precision motivate a revision of some of these methods. In this talk, some first results of a new joint interdisciplinary project with J Frohne (Dortmund), J Kusche and R Rietbroek (Bonn), as well as F-T Suttmeier and R Telschow (Siegen) are presented. (Received September 15, 2014)