Improve mascon definitions for the GRACE equivalent water thickness solutions.

Supervisor: Ernst Schrama, office 9.13, E.J.O.Schrama@tudelft.nl

Monthly potential coefficients sets from the GRACE mission are inverted towards an equivalent water thickness on so-called mascons. In this approach mascons can be defined in many ways, for regional ice sheet studies one can take for instance the stream regions of an ice flow, but for global studies we normally take an mesh generation algorithm that defines the mascons. The only criteria in the second case is that the mascon elements are roughly equal in area, but they do not follow any stream region. One well known set of mascons consists of 10242 members, this size allows a resonable processing time (10 minutes to invert the entire GRACE coefficient set) so that we can easily process different variations depending on the required corrections that we apply to the GRACE data. Typical corrections depend on the used GIA model or other de-aliasing corrections.

The task for this thesis topic: Is there a possibility to increase the mascon resolution for instance to 40000 (or more) elements where we can still expect reasonable processing times. Within our group there is a multicore unix system and the resulting set of equations for the mascon problem could for instance be treated with a parallel processing library such as plapack. Alternatively, it is attractive to redefine the mascon set so that smaller mascons are put there where there is a need for it. In the latter case one should also investigate whether constraint equations must be use to stabilize the solution.

Reference: