



Short term gravity variations in Antarctica

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Antarctica ice sheet is the largest reservoir of ice on Earth. Actual challenges are to evaluate its mass balance for sea level change, and the accumulation rate for ice sheet modelling and climate study.

Grace mission is so a performing tool to provide information about the ice mass fluctuations in Antarctica. We used the new gravity solutions computed by the GRGS team (OMP, Toulouse) to study temporal variations from July 2002 to February 2005. Because of this short period of observation, we focus on the seasonal signal. The potential coefficients are well adapted to this purpose as they are obtained every 10 days, improving the previous monthly resolution.

The temporal variations over the Antarctic continent show a clear annual signal, with a maximum during September, and a minimum in March. The snow accumulation is related to the derivate of this curve, but it is poorly estimated without the knowledge of mass losses (ice flow, ice melting, etc.). At this time scale, one can assume, due to the large dynamical inertia, that loss by ice flow is constant, so that gravity variability reflects snow precipitation and melting events. We then can learn information on temporal precipitation distribution.

Even if Grace's coefficients are computed up to degree 50, time varying information is no relevant after degree 30. Such a spatial resolution is enough to focus our study over smaller areas. We chose to extract five zones: the peninsula region, three coastal areas between -20°E and 180°E , and a central region. In agreement with climatic studies, the signal over coastal areas is much higher than in central Antarctica. It shows annual plus semi annual variations, and it is noisier, due to the presence of very short term events.

The peninsula has a strong decreasing tendency, related to a constant loss of mass as found by others studies. In this area, it is necessary to accurately estimate the post-

glacial rebound effect when dealing with the ice mass balance. So, the eastern more area of our work shows a positive tendency, possibly explained by snow accumulation in this ice basin. These first results could be confronted with tendencies from altimetric data.