

The Decade of the Geopotential - techniques to observe the gravity field from space

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Before the year 2000 gravity observations were sparsely and unevenly distributed, mostly located on land with denser networks in industrial countries and of inhomogeneous quality. On the oceans only few observations along ship tracks were available but most information has been derived from altimetry by neglecting the effect of sea-surface topography. Space observations were available but mostly based on satellite laser ranging which does not provide global coverage as well. This changed with the launch of the dedicated gravity field missions CHAMP, GRACE and GOCE - each of them offering substantial improvements in the spatial and temporal resolution of the gravity field. GRACE in particular allowed for the first time to observe the temporal variations of the gravity field with unprecedented precision and resolution. Therefore, the phrase "decade of the geopotential" has formed which is nowadays a synonym for the vast improvement in our knowledge of the gravity field and its temporal variation. This talk will give an overview about the observation principles and the processing methods to derive gravity field parameters from the geometric observations and will show the gain in the last decade.