Geophysical Research Abstracts, Vol. 8, 08144, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08144

The Precise Orbital Determination: a Tool to Investigate Atmospheric Parameters

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In the present decade Earth's explorer missions like CHAMP, GRACE and GOCE are going to dramatically improve the knowledge of the Earth's gravity field. The deep knowledge of the gravity field with unprecedented precision is making feasible new experiments and investigations in the field of geophysics.

Therefore the present work plans to investigate if the current and future improvement of the gravity field models will make feasibile the use of precise orbit determination of Earth satellites as a tool for sensing a global changes of some key atmosphere parameters like refractivity and extinction. The huge number of running Earth's satellites and combinations of their orbital parameters (namely the nodes) in a gravity field free fashion (GF-free) can magnify the solar radiation pressure acting on high Earth's Satellites (like GPS or Etalon satellites) and its smooth modulation through the Earth's atmosphere (penumbra). We would remind that The GF-free technique is able to cancel out with n satellite orbital parameters the first $n - 1$even zonal harmonics of the gravity field. The technique was widely applied for measuring subtle general relativistic effects like the gravitomagnetic field.