

First Circular

Workshop of the International Space Science Institute (ISSI) Bern Switzerland

Earth Gravity Field From Space – From Sensors to Earth Sciences

at ISSI Bern, Switzerland on 11–15 March 2002

**Convenors: R. Rummel / Techn.Univ.München,
G. Beutler / Univ.Bern,
M. Drinkwater / ESA-ESTEC Noordwijk
R. von Steiger / ISSI Bern,**

Objective: The ESA explorer mission GOCE, to be launched in 2005, will enhance our knowledge of the global static gravity field and of the geoid by orders of magnitude. The U.S. satellite gravity mission GRACE (2001 – 2006) will measure, in addition, the temporal variations of the gravity field. With these new data a whole range of fascinating new possibilities will be opened for solid Earth physics, oceanography, geodesy and sea level research. The new generation of gravity missions employs sensor concepts for gravity field measurement, orbit and attitude control and orbit determination that show interesting similarities with space experiments planned in the field of fundamental physics. This seminar brings together acknowledged experts in their field to discuss

- (1) strategies for ultra precision orbit determination and gravity field modelling with the data of the upcoming gravity field missions,
- (2) the use of accurate and high resolution gravity models in Earth sciences whereby, in particular, synergy is expected between the various science fields in their use of this type of new information, and
- (3) gravity field requirements and possible sensor and mission concepts for the time after GRACE and GOCE.

Session 1	Chair: G. Balmino	Precise Orbit Determination and Gravity Field Modelling
Watkins, M.M.		The challenge of cm-precision orbits and the gravity field modelling improvement from the new gravity missions
Hugentobler, U.		Single step vs. two-step OD of LEOs using GPS tracking. Choosing the optimal strategy at the centimetre level precision
Visser, P.		Reduced dynamics and purely kinematics approaches for POD of LEOs. Principles, Comparisons, Results.
Milani, A.		Modelling non-gravitational forces in fully dynamical OD from band-limited accelerometer/gradiometer data.
Sneeuw, N.		Solution strategies in gravity field modelling. Feasibility, precision. Cases of GRACE and GOCE.
Schwintzer, P.		Processing non-differenced GPS observations of a LEO for precise OD and gravity modelling. Results from CHAMP.
Biancale, R.		Simultaneous use and calibration of accelerometer data for and from OD, and gravity field determination.
Schuh, W.D.		The processing of band-limited measurements. Filtering techniques in the least squares context and in the presence of data gaps.
Bettadpur, S.V.		Gravity field recovery from GRACE. Unique aspects of the high precision inter-satellite data and analysis methods.
Balmino, G.		Discussion Session, with introduction on specific new problems.

Session 2	Chair: R. Sabadini	Solid Earth Physics
Schmeling, H.		The gravity signal of mantle convection
Mitrovica, J.X.		Mass instabilities in Antarctica and Greenland: sea level changes and gravity variabilities
Ricard, Y.		The dynamics, structure and composition of the Earth mantle
Marotta, A.M.		Combined effects of tectonics and Glacial Isostatic Adjustment on the style of crustal deformation
Spakman, W.		Seismic tomography
Vermeersen, L.L.A.		The potential of GOCE in constraining the structure of the crust and lithosphere from post-glacial rebound
De Franco, R.		Improving our knowledge of the Earth crust by simultaneous inversion of gravity and seismic tomography data
Cazenave, A.		The time dependent gravity field
Sabadini, R.		Discussion session

Session 3	Chair: C. Le Provost	Ocean Circulation
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| Wunsch, C. | How can ocean circulation research benefit from dynamic topography estimates as derived from altimetry and new geoid models? |
| Le Provost, C. | What is the higher resolution needed for adequate determination of the ocean circulation from altimetry? |
| Schrama, E.J.O. | Error characteristics estimates from CHAMP / GRACE / GOCE derived geoid and from altimetry derived mean dynamic topography |
| Stammer, D.B. | How to combine altimetric and geoid information for providing the most adequate global ocean circulation estimates? |
| Imawaki, S. | How can we improve geoid estimates at high resolution ?
Combined use with altimetry and in situ data for mesoscale dynamic studies. |
| Haines, K. | How can we improve geoid estimates at high resolution ?
Combined use with altimetry and in situ data for coastal dynamic studies. |
| Hughes, C.W. | Is bottom pressure determination feasible? and its contribution to ocean circulation studies. |
| Legrand, P. | Impact of geoid improvement on ocean mass and heat transport |
| Le Traon, P.Y. | How operational oceanography can benefit from dynamic topography estimates as derived from altimetry and improved geoid? |
| Le Provost, C. | Discussion session |

Session 4	Chair: C. Tscherning	Geodesy
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| Knudsen, P. | Tidal effects |
| Sanso, F. | Vertical datum |
| | (Rest of session still TBD) |
| Tscherning, C. C. | Discussion session |

Session 5	Chair: P. Woodworth	Sea Level
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Woodworth, P.	Introduction; benefits of GOCE and GRACE to sea level studies.
Wahr, J.	Benefits to GIA studies.
Sabadini, R.	Benefits to tectonics etc
Wingham, D. J.	Benefits to ice sheet mass balance studies
Gregory, J.	Value of improved oceanographic etc. insight to AOGEM development including sea level change modelling
Nerem, S.	Value to construction of long altimetric time series
Wahr, J. & Cazenave A.	Value to global water budget studies
Chao, B.F.	Ocean / sea level in geophysics studies
Woodworth, P.	Discussion Session

Session 6	Chair: M. Aguirre	Future Concepts
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Anselmi, A.	Attitude and drag control
Lumley, J.	Cryogenic gradiometry
Zarembinski, S.	High temperature superconductive gradiometry
Jafry, Y.	Gravity from space, concepts in the Space Science Fundamental Physics Community
Bender, P.	Satellite-satellite laser links for future gravity missions
Aguirre-Martinez, M.	Criticality of future gravity mission concepts

Pre-registration

ISSI Workshop
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Bern, Switzerland, 11–15 March 2002

I accept the invitation to this workshop and plan to attend.

Last Name:.....

First Name:.....

Affiliation:.....

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Comments:

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