

Gravity, Geoid and Geodynamics 2000

GGG2000 IAG International Symposium
Banff, Alberta, Canada
July 31 – August 4, 2000

Edited by Professor Michael G. Sideris



Springer

TABLE OF CONTENTS

Session 0: Keynote addresses

Convener: M.G. Sideris

- Time Variable Gravity: An Emerging Frontier in Interdisciplinary Geodesy 1
J. Dickey

- Earth Physics and Global Glacial Isostasy: from Paleo-Geodesy to Space-Geodesy 7
R. Peltier

Session 1: Reference Frames and the Datum Problem

Conveners: C. Boucher and E.W. Grafarend

- Global Unification of Height Systems and GOCE 13
R. Rummel

- A Discussion of Fundamental Constants in View of Geodetic Reference Systems 21
E. Groten

- A Study of the Transfer of the ITRF Datum to a GPS Network in Antarctica 29
S. Schön, H. Kutterer, M. Mayer, and B. Heck

Session 2: New Mathematical Methods and Integrated Data Processing

Conveners: R. Klees and B. Schaffrin

- Establishing Global Reference Frames. Nonlinear, Temporal, Geophysical and Stochastic Aspects 35
A. Dermanis (invited)

- Aliasing Error Modeling in Single-Input Single-Output Linear Estimation Systems 43
C. Kotsakis and M.G. Sideris

- Integrating Heterogeneous Data Sets with Partial Inconsistencies 49
B. Schaffrin and H. Bâki Iz

Optimization of Computations in Spherical Geopotential Field Applications <i>J.A.R. Blais, D.A. Provins, and C.J.K. Tan</i>	55
TcLight: a New Technique for Fast RTC Computation <i>L. Biagi and F. Sansó</i>	61
A Fast, Spatial Domain Technique for Terrain Corrections in Gravity Field Modeling <i>G. Strykowski, F. Boschetti, and F.G. Horowitz</i>	67
Some Considerations on Fuzzy Least-Squares <i>H. Kutterer</i>	73
A Wavelet Solution to 1D Non-Stationary Collocation With an Extension to 2D Case <i>W. Keller</i>	79
A Wavelet Based Gravity Model with an Application to the Evaluation of Stokes' Integral <i>P.H. Salamonowicz</i>	85
Satellite Gravity Anomaly Recovery Using Multigrid Methods <i>J. Kusche and S. Rudolph</i>	91
Session 3: Geodynamic Applications of GPS Convenors: J. Freymueller and F. Webb	
Inverting Land Uplift near Vatnajökull, Iceland, in Terms of Lithosphere Thickness and Viscosity Stratification <i>M. Thoma, D. Wolf, and J. Neumeyer</i>	97
Session 4: Gravity from Dedicated Satellite Experiments Convenors: B. Tapley and R. Rummel	
Error Analysis of the Gravity Recovery and Climate Experiment (GRACE) Mission <i>J.R. Kim, P.J. Roesset, S.V. Bettadpur, B.D. Tapley, and M.M. Watkins</i>	103
GOCE Gravity Field Recovery Using Massive Parallel Computing <i>R. Klees, R. Koop, R. van Geemert, and P.N.A.M. Visser</i>	109
Regularization for the Gravity Field Recovery from GOCE Observations <i>M. van Lonkhuyzen, R. Klees, and J. Bouman</i>	117

Local Geoid Determination with in situ Geopotential Data Obtained from Satellite-to-Satellite Tracking <i>C. Jekeli and R. Garcia</i>	123
Energy Relations for the Motion of two Satellites within the Gravity Field of the Earth <i>K.H. Ilk</i>	129
Dynamic Satellite Geodesy on the Torus: Block-Diagonality from a Semi-Analytical Approach <i>N. Sneeuw</i>	137
Evaluation of Temporal Variations on the Gravity Field Caused by Geophysical Fluids and Their Possible Detection by GRACE <i>L. Foldvary and Y. Fukuda</i>	143
GRIM5-C1: Combination Solution of the Global Gravity Field to Degree and Order 120 <i>T. Gruber, A. Bode, C. Reigber, P. Schwintzer, G. Balmino, R. Biancale, and J.-M. Lemoine</i>	149
High Resolution Gravity Field Modeling with Full Variance-Covariance Matrices <i>T. Gruber</i>	151
Session 5: Oceanography from Gravity and Altimetry Conveners: R. Coleman, C.K. Shum, and V. Zlotnicki	
Gravity, Oceanic Angular Momentum, and the Earth's Rotation <i>R. Gross</i>	153
Ocean Tide Effects on Grace Gravimetry <i>P. Knudsen, O. Andersen, S.A. Khan, and J. Høyer</i>	159
Principal Component Analysis on Temporal-Spatial Variations of Sea Level Anomalies from T/P Satellite Altimetry Data over the Northwest Pacific <i>H. Wang</i>	165
Application of GPS-Buoy Water Level Instrument for Radar Altimeter Calibration <i>K. Cheng, C.K. Shum, S. Han, Y. Yi, and D. Martin</i>	171

Session 6: Postglacial Rebound from Geodetic Missions

Convenors: J.X. Mitrovica and B. Vermeersen

This session was designed for oral presentations only (no written manuscripts were submitted)

Session 7: Dynamics of Gravity and Deformation Fields

Convenors: D. Wolf and S. Zerbini

Methodological Investigation of the Processing of Absolute Gravity Data <i>M. Amalvict, J. Hinderer, J-B. Boy, P. Gegout, M. Llubes, and N. Florsch</i>	179
Determination of Atmospheric Influence on High-Accuracy Gravity Measurements with Elastic Earth Models <i>J.M. Hagedoorn, D. Wolf, and J. Neumeyer</i>	185
Postglacial Rebound in Fennoscandia: New Results from Estonian Tide Gauges <i>S. Jevrejeva, A. Rüdja, and J. Mäkinen</i>	193
Time Stability of Gravity at Different Sites in France <i>M. Amalvict, J. Hinderer, E. Calais, P. Exertier, J-J. Walch, M-F. Lalancette, N. Florsch, and M. Llubes</i>	199
The Gravitational Signature of Earthquakes <i>R. Gross and B.F. Chao</i>	205

Session 8: Airborne and Terrestrial gravimetry

Convenors: I. Marson and K.P. Schwarz

Experiences with AIRGrav: Results from a New Airborne Gravimeter <i>S.T. Ferguson and Y. Hammada</i>	211
STAR-3 <i>i</i> Airborne Gravity and Geoid Mapping System <i>M. Wei and K. Tennant</i>	217
Towards a Dynamic Absolute Gravity System <i>J.M. Brown, T.M. Niebauer, and E. Klingele</i>	223
Impact of BRAGS'99 Airborne Gravimetric Data on Geoid Computation in Australia, and Possibilities of Utilization of Bathymetric Information <i>D.M. Sproule, A.H.W. Kearsley, and M.B. Higgins</i>	229
Airborne Gravity Survey of the North Greenland Continental Shelf <i>R. Forsberg, A.V. Olesen, and K. Keller</i>	235

Accuracy and Resolution of the Local Geoid Determined from Airborne Gravity Data <i>K.P. Schwarz and Y.C. Li</i>	241
Great Barrier Reef Airborne Gravity Survey (BRAGS'99). A Gravity Survey Piggybacked on an Airborne Bathymetry Mission <i>A.V. Olesen, R. Forsberg, and A.H.W. Kearsley</i>	247
Gravity Anomalies from Airborne Measurements-Experiments Using a Low Cost IMU Device <i>L. Bastos, P. Tomé, T. Cunha, M.J. Fernandes, and S. Cunha</i>	253
Mean Vertical Gradient of Gravity <i>P. Vanicék, J. Janák, and J. Huang</i>	259
Absolute Accounting for Vertical Gravity Gradient in Absolute Gravimeters <i>V.D. Nagornyi</i>	263
Session 9: The Challenge of the cm-geoid Conveners: P. Vanicék and M. Vermeer	
The 1-cm geoid after GOCE <i>C.C. Tscherning, D. Arabelos, and G. Strykowski</i>	267
Density Modeling for Geoid Determination <i>M. Kuhn</i>	271
Variational Methods in the Recovery of the gravity Field – Galerkin's Matrix for an Ellipsoidal Domain <i>P. Holota</i>	277
Recent Investigations Toward Achieving a One Centimeter Geoid <i>D.R. Roman and D. Smith</i>	285
Quasi-Geoid Estimations in South America <i>R. Barzaghi, A. Borghi, F. Sansó, D. Blitzkow, M.C. Lobianco, S.C. Kenyon, J. Beale, and J. Factor</i>	291
A Gravimetric Geoid for Egypt Derived by FFT Technique – EGGG2000 <i>H.A. Abd-Elmotaal</i>	295
High Resolution Regional Geoid Computation <i>A.A. Ardalan and E.W. Grafarend</i>	301

Gravimetric Geoid Computation for Austria Using Seismic Moho Data <i>N. Kühtreiber and H.A. Abd-Elmotaal</i>	311
Development of Improved Gravity Field Models Around Japan <i>Y. Kuroishi and H. Denker</i>	317
Truncation of Poisson's Integral in Upward and Downward Continuations of the Earth's Gravity <i>J. Huang, S.D. Pagiatakis, and M. Véronneau</i>	323
A New Geoid Model for Japan, JGEOD2000 <i>Y. Kuroishi</i>	329
First Results of Using Digital Density Data in gravimetric Geoid Computation in Australia <i>I.N. Tziavos and W.E. Featherstone</i>	335
GPS Leveling and the Second Geodetic Boundary Value Problem <i>Z.L. Fei and M.G. Sideris</i>	341
A High-Resolution Geoid for the Establishment of the Gavdos Multi-Satellite Calibration Site <i>A.D. Andritsanos, G.S. Vergos, I.N. Tziavos, E.C. Pavlis, and S.P. Mertikas</i>	347
Session 10: Geodesy and Geodynamics in Polar Regions	
Conveners: E. Ivins and R. Forsberg	
Changes in Ice-Mass Balance Inferred from Time Variations of the Geopotential Observed Through SLR and Doris Tracking <i>C.M. Cox, S.M. Klosko, and B.F. Chao</i>	355
Temporal Geoid of a Rebounding Antarctica and Potential Measurement by the GRACE and GOCE Satellites <i>E.R. Ivins, X. Wu, C.A. Raymond, C.F. Yoder, and T.S. James</i>	361
Determination of Mass Balance of Polar Ice from Gravity <i>A.S. Trupin and C.K. Shum</i>	367
First Absolute Gravity Measurements at the French Station Dumont d'Urville (Antarctica) <i>M. Amalvict, J. Hinderer, and B. Luck</i>	373
VLNDEF Project: Geodetic Contribution to Geodynamics Study of Victoria Island, Antarctica <i>A. Capra, S. Gandolfi, F. Mancini, P. Sarti, and L. Vittuari</i>	379

Gravity and GPS Observations in the Inland, Antarctica
T. Higashi, M. Kanao, and H. Motoyama

387

Arctic Gravity Project – a Status
S. Kenyon and R. Forsberg

391