Contents

Part I **Gravimetry (Terrestrial, Shipborne, Airborne) and Gravity Networks** 1

1 Preliminary Results of a GPS/INS Airborne Gravimetry Experiment Over the German Alps 3
Ch. Gerlach, R. Dorobantu, Ch. Ackermann, N.S. Kjørsvik, and G. Boedecker

2 Co-seismic Gravity Changes Computed for a Spherical Earth Model Applicable to GRACE Data 11
W. Sun, G. Fu, and Sh. Okubo

3 On Ambiguities in Definitions and Applications of Bouguer Gravity Anomaly 19
P. Vajda, P. Vaníček, P. Novák, R. Tenzer, A. Ellmann, and B. Meurers

4 Harmonic Continuation and Gravimetric Inversion of Gravity in Areas of Negative Geodetic Heights 25
P. Vajda, A. Ellmann, B. Meurers, P. Vaníček, P. Novák, and R. Tenzer

5 Results of the European Comparison of Absolute Gravimeters in Walferdange (Luxembourg) of November 2007 . . . 31
O. Francis, T. van Dam, A. Germak, M. Amalvict, R. Bayer, M. Bilker-Koivula, M. Calvo, G.-C. D'Agostino, T. Dell'Acqua, A. Engfeldt, R. Faccia, R. Falk, O. Gitlein, Fernandez, J. Gjevestad, J. Hinderer, D. Jones, J. Kostelecky, N. Le Moigne, B. Luck, J. Mäkinen, D. Mclaughlin, T. Olszak, P. Olsson, A. Pachuta, V. Palinkas, B. Pettersen, R. Pujol, I. Prutkin, D. Quagliotti, R. Reudink, C. Rothleitner, D. Ruess, C. Shen, V. Smith, S. Svitlov, L. Timmen, C. Ulrich, M. Van Camp, J. Walo, L. Wang, H. Wilmes, and L. Xing

6 Aerogravity Survey of the German Bight (North Sea) 37
I. Heyde

Contents

7 **Results of the Seventh International Comparison of Absolute Gravimeters ICAG-2005 at the Bureau International des Poids et Mesures, Sèvres** 47
L. Vitushkin, Z. Jiang, L. Robertsson, M. Becker, O. Francis, A. Germak, G. D'Agostino,V. Palinkas, M. Amalvict, R. Bayer, M. Bilker-Koivula, S. Desogus, J. Faller, R. Falk, J. Hinderer, C. Gagnon, T. Jakob, E. Kalish, J. Kostelecky, Chiungwu Lee, J. Liard,Y. Lokshyn, B. Luck, J. Mäkinen, S. Mizushima, N. Le Moigne, V. Nalivaev, C. Origlia, E.R. Pujol, P. Richard, D. Ruess, D. Schmerge, Y. Stus, S. Svitlov, S. Thies, C. Ullrich, M. Van Camp, A. Vitushkin, and H. Wilmes

8 **Post-Newtonian Covariant Formulation for Gravity Determination by Differential Chronometry** 55
P. Romero

9 **Robust and Efficient Weighted Least Squares Adjustment of Relative Gravity Data** 59
F. Touati, S. Kahlouche, and M. Idres

10 **Comparison Between GPS Sea Surface Heights, MSS Models and Satellite Altimetry Data in the Aegean Sea. Implications for Local Geoid Improvement** 67
I. Mintourakis and D. Delikaraoglou

11 **First Experience with the Transportable MPG-2 Absolute Gravimeter** 75
S. Svitlov, C. Rothleitner, and L.J. Wang

12 **Absolute Gravimetry at BIPM, Sèvres (France), at the Time of Dr. Akihiko Sakuma** 83
M. Amalvict

13 **Correcting Strapdown GPS/INS Gravimetry Estimates with GPS Attitude Data** 93
B.A. Alberts, B.C. Gunter, A. Muis, Q.P. Chu, G. Giorgi, L. Huisman, P.J. Buist, C.C.J.M. Tiberius, and H. Lindenburg

14 **Gravity Measurements in Panama with the IMGC-02 Transportable Absolute Gravimeter** 101
G. D'Agostino, A. Germak, D. Quagliotti, O. Pinzon, R. Batista, and L.A. Echevers

15 **Comparison of Height Anomalies Determined from SLR, Absolute Gravimetry and GPS with High Frequency Borehole Data at Herstmonceux** 107
G. Appleby, V. Smith, M. Wilkinson, M. Ziebart, and S. Williams

16 **Vibration Rejection on Atomic Gravimeter Signal Using a Seismometer** 115
S. Merlet, J. Le Gouët, Q. Bodart, A. Clairon, A. Landragin, F. Pereira Dos Santos, and P. Rouchon

17 **Gravity vs Pseudo-Gravity: A Comparison Based on Magnetic and Gravity Gradient Measurements** 123
C. Jekeli, K. Erkan, and O. Huang

Part II Space-Borne Gravimetry: Present and Future 129

18 **Designing Earth Gravity Field Missions for the Future: A Case Study** 131
P.N.A.M. Visser

19 **Regional Gravity Field Recovery from GRACE Using Position Optimized Radial Base Functions** 139
M. Weigelt, M. Antoni, and W. Keller

20 **External Calibration of SGG Observations on Accelerometer Level** 147
R. Mayrhofer and R. Pail

21 **Covariance Propagation of Latitude-Dependent Orbit Errors Within the Energy Integral Approach** 155
H. Goiginger and R. Pail

22 **Future Mission Design Options for Spatio-Temporal Geopotential Recovery** 163
T. Reubelt, N. Sneeuw, and M.A. Sharifi

23 **A Simulation Study Discussing the GRACE Baseline Accuracy** . . . 171
U. Meyer, F. Flechtner, R. Schmidt, and B. Frommknecht

24 **GRACE Gravity Field Determination Using the Celestial Mechanics Approach – First Results** 177
A. Jäggi, G. Beutler, and L. Mervart

25 **Fast Variance Component Estimation in GOCE Data Processing** 185
J.M. Brockmann and W.-D. Schuh

26 **Analysis of the Covariance Structure of the GOCE Space-Wise Solution with Possible Applications** 195
L. Pertusini, M. Reguzzoni, and F. Sansò

Part III Earth Observation by Satellite Altimetry and InSAR 203

27 **Soil Surface Moisture From EnviSat RA-2: From Modelling Towards Implementation** 205
S.M.S. Bramer and P.A.M. Berry

28 **An Enhanced Ocean and Coastal Zone Retracking Technique for Gravity Field Computation** 213
P.A.M. Berry, J.A. Freeman, and R.G. Smith

29 **Measurement of Inland Surface Water from Multi-mission Satellite Radar Altimetry: Sustained Global Monitoring for Climate Change** 221
P.A.M. Berry and J. Benveniste

30 **ACE2: The New Global Digital Elevation Model** 231
P.A.M. Berry, R.G. Smith, and J. Benveniste

31 **Ocean Dynamic Topography from GPS – Galathea-3 First Results** 239
O.B. Andersen, A.V. Olesen, R. Forsberg, G. Strykowski, K.S. Cordua, and X. Zhang

32 **Filtering of Altimetric Sea Surface Heights with a Global Approach** 247
A. Albertella, X. Wang, and R. Rummel

33 **Coastal Sea Surface Heights from Improved Altimeter Data in the Mediterranean Sea** 253
L. Fenoglio-Marc, M. Fehlau, L. Ferri, M. Becker, Y. Gao, and S. Vignudelli

34 **On Estimating the Dynamic Ocean Topography – A Profile Approach** 263
W. Bosch and R. Savcenko

Part IV Geoid Modeling and Vertical Datums 271

35 **Evaluation of the Topographic Effect using the Various Gravity Reduction Methods for Precise Geoid Model in Korea** 273
S.B. Lee and D.H. Lee

36 **Analysis of Recent Global Geopotential Models Over the Croatian Territory** 283
M. Liker, M. Lučić, B. Barišić, M. Repanić, I. Grgić, and T. Bašić

37 **On the Merging of Heterogeneous Height Data from SRTM, ICESat and Survey Control Monuments for Establishing Vertical Control in Greece: An Initial Assessment and Validation** 289
D. Delikaraoglou and I. Mintourakis

38 **Implementing a Dynamic Geoid as a Vertical Datum for Orthometric Heights in Canada** 295
E. Rangelova, G. Fotopoulos, and M.G. Sideris

39 **Evaluation of the Quasigeoid Models EGG97 and EGG07 with GPS/levelling Data for the Territory of Bulgaria** 303
E. Peneva and I. Georgiev

40 **Combination Schemes for Local Orthometric Height Determination from GPS Measurements and Gravity Data** 309
A. Fotiou, V.N. Grigoriadis, C. Pikridas, D. Rossikopoulos, I.N. Tziavos, and G.S. Vergos

41 **EUVN_DA: Realization of the European Continental GPS/leveling Network** 315
A. Kenyeres, M. Sacher, J. Ihde, H. Denker, and U. Marti

42 **Analysis of the Geopotential Anomalous Component at Brazilian Vertical Datum Region Based on the Imarui Lagoon System** 321
S.R.C. de Freitas, V.G. Ferreira, A.S. Palmeiro, J.L.B. de Carvalho, and L.F. da Silva

43 **Preliminary Results of Spatial Modelling of GPS/Levelling Heights: A Local Quasi-Geoid/Geoid for the Lisbon Area** 329
A.P. Falcão, J. Matos, A. Gonçalves, J. Casaca, and J. Sousa

44 **Physical Heights Determination Using Modified Second Boundary Value Problem** 333
M. Mojzes and M. Valko

Part V Regional Gravity Field Modeling 339

45 **Impact of the New GRACE-Derived Global Geopotential Model and SRTM Data on the Geoid Heights in Algeria** 341
S.A. Benahmed Daho

46 **On Modelling the Regional Distortions of the European Gravimetric Geoid EGG97 in Romania** 349
R. Tenzer, I. Prutkin, R. Klees, T. Rus, and N. Avramiuc

47 **Effect of the Long-Wavelength Topographical Correction on the Low-Degree Earth's Gravity Field** 355
R. Tenzer and P. Novák

48 **A Comparison of Various Integration Methods for Solving Newton's Integral in Detailed Forward Modelling** 361
R. Tenzer, Z. Hamayun, and I. Prutkin

49 **Further Improvements in the Determination of the Marine Geoid in Argentina by Employing Recent GGMs and Sea Surface Topography Models** 369
C. Tocho, G.S. Vergos, and M.G. Sideris

50 **Comparison of Various Topographic-Isostatic Effects in Terms of Smoothing Gradiometric Observations** 377
J. Janák and F. Wild-Pfeiffer

51 **Evaluation of Recent Global Geopotential Models in Argentina** 383
A. Pereira and M.C. Pacino

52 **On the Determination of the Terrain Correction Using the Spherical Approach** 389
G. Kloch and J. Krynski

53 **Smoothing Effect of the Topographical Correction on Various Types of the Gravity Anomalies** 397
Z. Hamayun, R. Tenzer, and I. Prutkin

54 **Determination of a Gravimetric Geoid Model of Greece Using the Method of KTH** 407
I. Daras, H. Fan, K. Papazissi, and J.D. Fairhead

55 **Method to Compute the Vertical Deflection Components** 415
E.A. Boyarsky, L.V. Afanasieva , and V.N. Koneshov

56 **On Finite Element and Finite Volume Methods and Their Application in Regional Gravity Field Modeling** 421
Z. Fašková, R. Čunderlík, and K. Mikula

57 **Quasi-Geoid of New Caledonia: Computation, Results and Analysis** 427
P. Valty and H. Duquenne

58 **Assessment of a Numerical Method for Computing the Spherical Harmonic Coefficients of the Gravitational Potential of a Constant Density Polyhedron** 437
O. Jamet, J. Verdun, D. Tsoulis, and N. Gonindard

59 **Improving Gravity Field Modelling in the German-Danish Border Region by Combining Airborne, Satellite and Terrestrial Gravity Data** 445
U. Schäfer, G. Liebsch, U. Schirmer, J. Ihde, A.V. Olesen, H. Skourup, R. Forsberg, and H. Pflug

60 **An Inverse Gravimetric Problem with GOCE Data** 451
M. Reguzzoni and D. Sampietro

Part VI Global Gravity Field Modeling and EGMO8 457

61 **Assessment of the EGM2008 Gravity Field in Algeria Using Gravity and GPS/Levelling Data** 459
S.A. Benahmed Daho

62 **On High-Resolution Global Gravity Field Modelling by Direct BEM Using DNSC08** 467
R. Čunderlík and K. Mikula

63 **Is Australian Data Really Validating EGM2008, or Is EGM2008 Just in/Validating Australian Data?** 473
S.J. Claessens, W.E. Featherstone, and I.M. Anjasmara

64 **Evaluation of EGM08 Using GPS and Leveling Heights in Greece** 481
C. Kotsakis, K. Katsambalos, D. Ampatzidis, and M. Gianniou

65 **Validation of the New Earth Gravitational Model EGM08 Over the Baltic Countries** 489
A. Ellmann

66 **Evaluation of EGM2008 by Comparison with Global and Local Gravity Solutions from CHAMP** 497
M. Weigelt, N. Sneeuw, and W. Keller

67 **Testing EGM2008 on Leveling Data from Scandinavia, Adjacent Baltic Areas, and Greenland** 505
G. Strykowski and R. Forsberg

68 Least Squares, Galerkin and BVPs Applied to the Determination of Global Gravity Field Models 511
F. Sacerdote and F. Sansò

Part VII Temporal Gravity Changes and Geodynamics 519

69 Terrestrial Water Storage from GRACE and Satellite Altimetry in the Okavango Delta (Botswana) 521
O.B. Andersen, P.E. Krogh, P. Bauer-Gottwein, S. Leiriao, R. Smith, and P. Berry

70 Greenland Ice Sheet Mass Loss from GRACE Monthly Models . . . 527
L. Sandberg Sørensen and R. Forsberg

71 Water Level Temporal Variation Analysis at Solimões and Amazonas Rivers 533
D. Blitzkow, A.C.O.C. Matos, I.O. Campos, E.S. Fonseca, F.G.V. Almeida, and A.C.B. Barbosa

72 Spatiotemporal Analysis of the GRACE-Derived Mass Variations in North America by Means of Multi-Channel Singular Spectrum Analysis 539
E. Rangelova, W. van der Wal, M.G. Sideris, and P. Wu

73 Analysing Five Years of GRACE Equivalent Water Height Variations Using the Principal Component Analysis 547
I.M. Anjasmara and M. Kuhn

74 Observed Gravity Change at Syowa Station Induced by Antarctic Ice Sheet Mass Change 557
K. Doi, K. Shibuya, Y. Aoyama, H. Ikeda, and Y. Fukuda

75 Evaluation of GRACE and ICESat Mass Change Estimates Over Antarctica 563
B.C. Gunter, R.E.M. Riva, T. Urban, R. Harpold, B. Schutz, P. Nagel, and M. Helsen

76 Baltic Sea Mass Variations from GRACE: Comparison with In Situ and Modelled Sea Level Heights 571
J. Virtanen, J. Mäkinen, M. Bilker-Koivula, H. Virtanen, M. Nordman, A. Kangas, M. Johansson, C.K. Shum, H. Lee, L. Wang, and M. Thomas

77 Water Storage in Africa from the Optimised GRACE Monthly Models: Iterative Approach 579
E. Revtova, R. Klees, P. Ditmar, X. Liu, H.C. Winsemius, and H.H.G. Savenije

78 Estimating Sub-Monthly Global Mass Transport Signals Using GRACE, GPS and OBP Data Sets 587
M.J.F. Jansen, B.C. Gunter, R. Rietbroek, C. Dahle, J. Kusche, F. Flechtner, S.-E. Brunnabend, and J. Schröter

79 **Regular Gravity Field Variations and Mass Transport in the Earth System from DEOS Models Based on GRACE Satellite Data** 595
P. Ditmar, X. Liu, R. Klees, E. Revtova, B. Vermeersen, R. Riva, C. Siemes, and Q. Zhao

80 **Estimating GRACE Monthly Water Storage Change Consistent with Hydrology by Assimilating Hydrological Information** 603
B. Devaraju, N. Sneeuw, H. Kindt, and J. Riegger

81 **Secular Geoid Rate from GRACE for Vertical Datum Modernization** 611
W. van der Wal, E. Rangelova, M.G. Sideris, and P. Wu

82 **Ten-Day Gravity Field Solutions Inferred from GRACE Data** 619
J.M. Lemoine, S.L. Bruinsma, and R. Biancale

Part VIII Earth Observation and the Global Geodetic Observing System (GGOS) 625

83 **GGP (Global Geodynamics Project): An International Network of Superconducting Gravimeters to Study Time-Variable Gravity** 627
D. Crossley and J. Hinderer

84 **Surface Mass Loading Estimates from GRACE and GPS** 637
E.J.O. Schrama and B. Wouters

85 **A Unified Approach to Modeling the Effects of Earthquakes on the Three Pillars of Geodesy** 643
R.S. Gross and B.F. Chao

86 **Modeling and Observation of Loading Contribution to Time-Variable GPS Sites Positions** 651
P. Gegout, J.-P. Boy, J. Hinderer, and G. Ferhat

87 **Investigating the Effects of Earthquakes Using HEPOS** 661
M. Gianniou

88 **Assessment of Degree-2 Zonal Gravitational Changes from GRACE, Earth Rotation, Climate Models, and Satellite Laser Ranging** 669
J.L. Chen and C.R. Wilson

Part IX Geodetic Monitoring of Natural Hazards and a Changing Environment 677

89 **PALSAR InSAR Observation and Modeling of Crustal Deformation Due to the 2007 Chuetsu-Oki Earthquake in Niigata, Japan** 679
M. Furuya, Y. Takada, and Y. Aoki

90 **On the Accuracy of LiDAR Derived Digital Surface Models** 689
M. Al-Durgham, G. Fotopoulos, and C. Glennie

91 Multiscale Segmentation of Polarimetric SAR Data Using Pauli Analysis Images **697**
M. Dabboor, A. Braun, and V. Karathanassi