Introduction

In the four year period 2007 – 2011 Danish Geodesy has developed further as reflected in the reporting below of central national and international geodetic research and activities. Utilization, building and investigation of the national and international geodetic space infrastructure is a striking feature for the main activities and this is done in close cooperation with many national and international institutions.

A markedly organizational change was the merging by January 1st, 2007 of the National Space Centre, including the department of Geodesy and the department of Geodynamics with the Technical University of Denmark (DTU) forming a new National Space Institute (DTU Space) now housing most of the geodesy research in Denmark and again reflecting the increasing overlap between geodesy and space research.
Geodetic Activities and Research 2007 - 2011

Since 2007 the Department of Geodesy has been affiliated with DTU Space, the National Space Institute at the Technical University of Denmark. The main objectives remain to be research in the field of Geodesy with a special focus on positioning and reference frames as well as in Earth Observation where we focus on the use of radar altimetry for estimation of marine geodetic quantities and monitoring of sea level. During the transfer to DTU Space we merged with the Geoinformatics group expanding our activities to include research in surveying and mapping as well.

Along with the geodetic research we carry out practical tasks for the National Survey and Cadastre (KMS). Those tasks are mainly focused on operating permanent GNSS stations and tide gauge stations in Greenland and on development of the geodetic infrastructure such as realizing new reference frames in Denmark, Greenland and the Faeroe Islands. Furthermore, we advise KMS on issues related Navigation and Mapping. In addition, we also carry out government consultancy of other agencies such as the Danish Agency for Science, Technology and Innovation and Asiaq - the Greenland Survey. In 2007, we launched a new education Geomatics Engineering as a focus line on the Mathematical Modelling and Computation master programme at DTU.

During the last 4 year period the Department of Geodesy has been involved in many cutting edge research projects where new methodologies for studying and monitoring the impacts of climate change have been developed. Furthermore, methodologies for using new satellite based techniques for both climate monitoring as well as strengthening the infrastructure have been developed.

Positioning and reference frames

The research activities related to positioning and reference frames have mainly been focusing on Greenland and on how the melting of the ice sheet may influence the stability of the reference frame realisation. For that purpose data from permanently operating GNSS stations is being analysed to detect crustal movements caused by the changes in the load of the ice sheet masses. The estimated movements have been compared to estimates of ice mass loss derived from GRACE gravity data. For Denmark another study on climate adaptation is being carried with a special focus on sea level rise and its effects along the Danish coastline. Here uplift due to postglacial rebound is modelled using historical precise levelling in combination with GPS data from permanent station.

We continue to operate, maintain and develop a number of high class permanent GNSS stations in Greenland. Those stations are equipped with stable monuments, external frequencies and met sensors and contribute to the IGS networks for reference frame realization. Most of the stations supply hourly data and some combined GPS and Glonass data. In addition to GNSS, we operate tide gauges at three of those sites. The vertical reference points are connected to the nearby GNSS station using precise levelling.
The data from the permanent GPS stations have been used to study uplift due to mass loss of the Greenland ice sheet. Greenland's main outlet glaciers have more than doubled their contribution to global sea level rise over the last decade. Recent work has shown that Greenland's mass loss is still increasing. Here we show that the ice loss, which has been well-documented over southern portions of Greenland, is now spreading up along the northwest coast, with this acceleration likely starting in late 2005. We support this with two lines of evidence. One is based on measurements from the Gravity Recovery and Climate Experiment (GRACE) satellite gravity mission, launched in March, 2002. The other comes from continuous Global Positioning System (GPS) measurements from three long-term sites on bedrock adjacent to the ice sheet. The GRACE results provide a direct measure of mass loss averaged over scales of a few hundred km. The GPS data are used to monitor crustal uplift caused by ice mass loss close to the sites. The GRACE results can be used to predict crustal uplift, which can be compared with the GPS data. In addition to showing that the northwest ice sheet margin is now losing mass, the uplift results from both the GPS measurements and the GRACE predictions show rapid acceleration in southeast Greenland in late 2003, followed by a moderate deceleration in 2006. Because that latter deceleration is weak, southeast Greenland still appears to be losing ice mass at a much higher rate than it was prior to fall 2003. In a more general sense, the analysis described here demonstrates that GPS uplift measurements can be used in combination with GRACE mass estimates to provide a better understanding of ongoing Greenland mass loss; an analysis approach that will become increasingly useful as long time spans of data accumulate from the 51 permanent GPS stations recently deployed around the edge of the ice sheet as part of the Greenland GPS Network (GNET).

Our activities have benefitted vastly from the collaboration in the international project Greenland Network - GNET. GNET is a major US project supported by NSF and lead by Mike
Bevis, Ohio State University. The objective of GNET is to study the vertical crustal movements caused by changes in the ice mass using GPS to better understand the impact of climate change and involve the installation of about 45 permanent GPS stations around Greenland. University of Luxembourg and University of Colorado contribute to the project as well. The installation of the station was carried out during 2007-2009 by UNAVCO with our assistance in both the planning and the field work phases. Some of the stations are established at facilities where electricity and communication are available but more than half of the stations are established in remote regions with none of those only accessible by helicopter. The remote stations are powered by solar panels and wind mills through batteries and need to be visited to acquire data from the receivers.

The direct signals from satellites in global satellite navigation satellites systems (GNSS), as GPS, GLONASS and GALILEO, constitute the primary signal source for positioning, navigation and timing from space. But also the reflected GNSS signals contain an important information content of signal travel times and the characteristics of the reflecting surfaces and structure.

Ocean reflected signals from GNSS satellite systems reveal the mean height, the significant wave height and the roughness of the ocean. The estimated accuracy of the average surface height can be as low as 10 cm. For low elevations, the signals reveal the incoherent scatter process at the reflection zone. By using open-loop high-precision GNSS receivers, it is possible to provide the in-phase and quadrature components of the signal at high sample rates, which enables investigation of the spectral signatures of the observations.

The retrieval method consists of a radio occultation technique for the phase differences between the direct and reflected signal combined with a statistical method. Results are derived through a sequential Bayesian estimation method, where the retrieval algorithms are based on a particle filtering technique. The horizontal size of the probability density function, which uniquely describes the ocean reflection zone using the recursive particle filter method, is determined to have an extend of 200 to 500 meters for all observations used in the experiments.
Earth Observation for Marine Geodesy

Our activities related to the use of satellite based Earth Observation have mainly been focused on improving the methodologies for deriving mean sea surface heights and marine gravity. Important global products such as the DNSC08 and the DTU10 series are results of those activities. Furthermore, the use of GOCE gravity fields for estimating mean dynamic ocean topography models has been investigated. Finally, the use of satellite altimetry for retrieving operational sea levels and for monitoring mean sea level has been studied.

Satellite altimetry continues to provide new information about the variations in the sea surface height that contribute to improvements of marine geodetic products such as the mean sea surface and the marine gravity field. During the reporting period we have continued to enhance the data processing using re-tracked data merged with enhanced corrections. Especially, the enhanced data from the ERS and the ENVISAT satellite missions together with the utilisation of ICESAT has improved the products in the coastal areas and in the Polar Regions. For the mean sea surface modelling the extension of the time period provided by JASON 2 has been important. The DNSC08 series of products has been made publically available and went into the computation of EGM08 models as well.

The DTU-10 is the latest release of the global high resolution suite of geophysical and geodetic fields from DTU space formerly the Danish National Space Center. In the DTU suite of fields all six fields (free air gravity, mean sea surface, mean dynamic topography, bathymetry and error) have a spatial resolution of 1 minute by 1 minute covering all marine regions of the world including the Arctic Ocean up to the North Pole.

All these fields are available for free download from ftp.space.dtu.dk/pub/DTU10.

The use of GOCE gravity fields for deriving mean dynamic ocean topography models has been studies in a European collaboration supported by various EU and ESA supported projects coordinated by us. The studies have been carried out as joint Geodetic and Oceanographic projects. An important outcome has been the GOCE User Toolbox supported by ESA which may be used for combining GOCE data with a mean sea surface into a dynamic topography applying different strategies for filtering.
Government consultancy
As mentioned above we carry out practical tasks for the National Survey and Cadastre (KMS). Those tasks are mainly focused on operating permanent GNSS stations and tide gauge stations in Greenland and on development of the geodetic infrastructure such as realizing new reference frames in Denmark, Greenland and the Faeroe Islands. During the reporting period we assisted KMS in defining a new reference system for the Faeroe Islands. The reference frame is realized in ITRF2005 and transferred to ETRS89. The height system is referenced to current mean sea level. At Nordic level we have been chairing the NKG working group Positioning and Reference frames and contributed to the joint Nordic effort to realize a common reference frame in ITRF2005. Furthermore, we advise KMS on issues related Navigation and Mapping. In addition, we also carry out government consultancy of other agencies such as the Danish Agency for Science, Technology and Innovation and Asiaq - the Greenland Survey.

Education
The transfer to DTU Space and the merge with the Geoinformatics group formed the basis for expanding our activities to include research in surveying and mapping as well. In 2007, we launched a new education Geomatics Engineering as a focus line on the Mathematical Modelling and Computation master programme at DTU. Geomatics Engineering cover in addition to Geoinformatics and Geodesy also Navigation and Earth Observation. At diploma level we teach student on the civil engineering education surveying and mapping. In Greenland, we contribute to the Arctic Technology education as well.
The work of the **Geodynamics Department, National Space Institute, DTU** has continued in the 4-year period to be a healthy mix of in-house research, mainly in the area of physical geodesy, airborne geodesy and cryosphere research, with numerous field campaigns nationally and internationally. Government work continues through several re-organizations to focus on gravity networks and geoid, advice and data collection related to UNCLOS (UN Laws of the Seas), especially in the polar areas, and advice and research of sea-ice and ice sheet changes in Greenland.

**Gravity network and geoid activities**

A new gravity network has been established in Denmark as part of the modernization of the national geodetic reference networks by KMS (National Survey and Cadastre). The new “5D” network of some 50 points has been measured with Scintrex gravimeters and tied to a number of absolute gravity points, measured both by FG5 and A10 absolute gravimeters. A new A10 gravimeter was purchased in 2008 to support this work, as well as to measure at points in the GNET US-Danish-Luxembourg new GPS network in Greenland to monitor ice load changes. The A10 works satisfactory now, after more than a year of hardware teething problems with several equipment returns to the manufacturer.

Gravity measurements in Greenland have been initiated to survey as many GNET points as possible within logistic and economic constraints, and to improve the gravity network in cities, airports and remote stations. The GNET A10 measurements will be repeated on a 2-5 year cycle, to monitor point gravity changes along with GRACE and height changes, especially to better understand the GIA process.

*Absolute gravity measurement at GNET site in East Greenland*

Geoid determination continued through the period, with new software modules added to the GRAVSOFT software system, developed in cooperation with University of Copenhagen. A joint Nordic data base supports Nordic and North Atlantic geoid computations. Specific geoid projects have included support for major engineering projects (bridges), new marine geoids, and a new national geoid of the Faeroe Islands. In addition a number of international research or geoid consultancy tasks have been carried out, often hand in hand with airborne gravity surveys.
Airborne gravity and lidar surveys
The Geodynamics Department continues to develop and improve our airborne survey methodology. Large-scale lidar and radar surveys have been done 2007-2009 in connection with the International Polar Year (IPY), to determine sea-ice thickness as well as ice sheet monitoring. These surveys have been done as part of EU projects (mainly Damocles), ESA projects (CryoSat cal/val campaigns) and national projects (Greenland ice sheet monitoring and GreenArc national IPY ice camp north of Greenland).

Airborne gravity surveys include major surveys of Indonesia (Kalimantan, Sulawesi, Papua), in cooperation with Bakosurtanal and NGA, several surveys in the North Sea and Baltic regions carried out in cooperation with BKG, Germany, and a complete survey of Nepal, in cooperation with the Nepal Survey Dept and NGA. Together with National Ressources, Canada, a major airborne gravity and magnetic project was carried out north of Greenland and Ellesmere Island 2009, to support both Danish and Canadian UNCLOS programmes. The UNCLOS Arctic programme used a long-range DC3 aircraft, capable of covering areas beyond the North Pole. The DC3 airborne programme has since 2010 continued in Antarctica with major surveys in the Antarctic Peninsula and East Antarctica, in cooperation with several national programs (Argentina, Chile, UK, Norway), University of Texas (ice radar) and NGA.
To enhance the airborne research and give higher redundancy in field operations, new scanning lasers, IMU’s and a new gravimeter – Chekan AM – has been acquired during the period.

**Satellite-based research**

The research has focused on use of satellites such as GRACE, ICESat, Envisat and CryoSat. The monitoring of the ice sheets, determination of sea ice thickness, gravity field and ocean dynamic topography in the Arctic Ocean has been a special focus for this research, and a.o. supported by an ESA study (ArcGICE) and EU-projects. Operational kinematic GPS research has also continued, especially to support airborne and marine activities. A post.doc. from Wuhan University has visited as part of this research, and has been applied a.o. to a global marine cruise (Galathea-3), where the department participated with a gravimeter and GPS/lasers capable of measuring ocean heights.

**Government work**

The Geodynamics Department support the national UNCLOS programme through consultancy on sea-ice conditions and geophysical data collections and –interpretations. This work involves major icebreaker cruises in the Arctic Ocean (LOMROG 2007 and 09), on-ice activities supported by helicopters (2006-9) and the earlier mentioned LOMGRAV aerogeophysical survey. Other national
activities include support to the Greenland self-rule government for sea-ice conditions (satellite data and survey flights) as well as general geodetic and geophysical consulting.

During 2007 – 2011 the company **AJ Geomatics** has been involved in various projects on geodesy and positioning mainly in cooperation with geodetic government organizations in Denmark, Norway, and Germany.

In the period from 2007 to 2009 AJ Geomatics worked with the Norwegian Mapping Authority on development of a regional ionosphere model for Norway based on GNSS data from the SATREF network of permanent GNSS stations. Contributions to other research projects with the Norwegian Mapping Authority were also carried out for instance data analyses for the EPINOL project on EGNOS Performance In Northern Latitudes.

\[ EGNOS APV-1 availability in percent, interpolated for parts of Norway and the Norwegian Sea. \]
\[ From Jensen et al. (2009). \]

With the National Survey and Cadastre in Denmark, AJ Geomatics worked on the development and initial operation of a Norm RTK services. The implementation of the Norm was initiated by the National Survey and Cadastre to make sure GNSS RTK service providers in Denmark for instance operate in the correct national geodetic reference frame.

**Geodetic foundation for the fixed link across Fehmarnbelt**

During 2009 – 2011 the main project for AJ Geomatics was establishment of the geodetic foundation for the Fehmarnbelt Fixed Link (bridge or tunnel) to be established between Germany and Denmark across the Fehmarnbelt, a 20 km stretch of water of the Baltic Sea. Contracted by Femern A/S and Rambøll Denmark, AJ Geomatics worked on management, coordination, testing and quality control of all parts of the geodetic foundation for the large infrastructure project.
The geodetic foundation of the Fehmarnbelt Fixed Link includes establishment of four new geodetic grade permanent GNSS stations to form the basis for the reference frame, realization of the ITRF2005 in the Fehmarnbelt area, definition of a map projection, leveling campaigns for definition of mean sea level in the Fehmarnbelt and realization of a local height system, development of a geoid model and fit to the reference frame and the height system, derivation of transformation parameters between ITRF2005 and the national reference frames of Germany and Denmark, development of a software for coordinate transformations, and finally establishment of an RTK service for precise positioning and navigation in the area.

The work was carried out in close cooperation with several organizations for instance the National Survey and Cadastre, Denmark (KMS), AXIO-NET GmbH in Germany, the Danish National Space Institute (DTU-Space), the Land Survey Office of the State of Schleswig-Holstein in Germany, the Federal Agency for Cartography and Geodesy in Germany (BKG), and Allsat GmbH Network and Services in Germany.

Permanent GNSS station of Femern A/S near the coast of the Fehmarnbelt. Antenna mast for data communication is located directly north of the GNSS pillar. Photo: A. Jensen.

University of Copenhagen, Niels Bohr Institute


The main activity in the period has been the work within ESA’s Gravity and Ocean Circulation Explorer mission’s (GOCE) High Level processing System (HPF). We have contributed to two areas.
(1) Calibration of the GOCE gravity gradients using ground data (see Arabelos et al., 2007 and Bouman et al. 2008)
(2) Preprocessing of data used in the so-called “Space-wise” approach, (see Micgliaccio et al., 2007, 2010).

An overview of the use of Least-Squares Collocation is given in Tscherning (2010), and the use of reduced point-masses or multipole functions is discussed initially in Tscherning et al. 2010.

The computation of error covariances have been studied both for ground point values and spherical harmonic coefficients in cooperation with D. Arabelos (University of Thessaloniki), (see Arabelos et al., 2007, Arabelos & Tscherning, 2008) and we have studied the contribution of new Earth Global Gravity Field Models (EGM) to geoid determination, (see Arabelos & Tscherning, 2010).

The GRAVSOFT package of programs (Forsberg & Tscherning, 2008) is widely used, and it has been upgraded to have a more user-friendly interface (Nielsen et al. 2008, 2010). We have weakly requests for the package which is developed in cooperation with DTU-Space, and used at International Schools for the determination of the Geoid.

The mapping of sea-ice has been studied in an ESA project, (see Forsberg et al. 2007) and resulting in a PhD-thesis (Skourup, 2010).

Geoid determination has been investigated in Pakistan using various data types, (see Sadiq (2019, 2010).

Research in GNSS has been on ionospheric effects (see Yuan et al. 2008), and on multipath in a PhD-thesis (Jakobsen, 2010).

The use of satellite radar altimetry in coastal areas has been studied in (Madsen et al. 2007 and Tscherning et al. 2009).

Publication 2007 - 2010

Publication 2007-2010 for Niels Bohr Institute


Arabelos, D. and C.C.Tscherning: A comparison of recent geopotential models with emphasis on their contribution in refining the gravity and geoid in continental or regional scale. DOI: 10.1007/s00190-10-0397z, J.Geod(2010)84:643-660.


Sadiq,Muhammad, C.C. Tscherning and Zulfiqar, Ahmad: Regional gravity field model in Pakistan area from the combination of CHAMP, GRACE and ground data using least squares

**Publication 2007-2010 for AJ Geomatics**


**Conferences, lecturing and committees**

During 2007 – 2011 Dr. Anna B.O. Jensen has been lecturing the course “Satellite Positioning” every year at the Technical University of Denmark, she has supervised master and Ph.D. students, and has been a member of several evaluation committees and review bodies.

Dr. Jensen has also been involved in arranging conferences, most significantly the *13th IAIN World Congress* in Stockholm, Sweden, October 2009, and the *3rd International Colloquium on Scientific and Fundamental Aspects of the Galileo Programme* in Copenhagen, Denmark, September 2011. She has acted as session chair at several other conferences, and has during the four years contributed with presentations and papers to a number of conferences and meetings.

During 2006 – 2009 Dr. Jensen was a member of the board of the Nordic Institute of Navigation, and since 2008 Dr. Jensen has been a member of GNSS Scientific Advisory Committee of the European Space Agency.

**Presentations and lectures**

*Geodesy and Reference Frames,* course for GeoForum Danmark, Lyngby, Denmark, December 2010.

*Positioning System for Fehmarnbelt Fixed Link.* Geodätische Woche 2010, Cologne, Germany, October 2010.

*GPS,* Presentation for Youth in Science and Technology. Lyngby, Denmark, October 2010


GNSS. Lecture at the Nordic Course on Geographic Information, arranged by the National Survey and Cadastre – Denmark for the armed forces in the Nordic countries. Copenhagen, Denmark. September 2009.


**Solar Activity and GPS Surveying.** Presentation at seminar by the Danish Association of Map and Survey Technicians. Ry, Denmark. April 2009.


**Monitoring EGNOS quality at Northern Latitudes.** Presentation at SATREF User Conference, Norwegian Mapping Authority, Hønefoss, Norway, December 2008.

**GPS, Galileo and GLONASS.** Presentation for the employees at Thrane & Thrane, Lyngby, Denmark, November 2008.

**Best practice with RTK for land surveying.** course for the Danish Association of Chartered Land Surveyors. Fredericia, Denmark, October 2008.

**Regulation of RTK Services in Denmark.** Presentation at the 48th Meeting of the Civil GPS Service Interface Committee, Savannah, Georgia, USA, September 2008.

**A Norwegian Ionosphere Model based on GPS Data.** Presentation at the High Precision Navigation and Positioning Conference by the Nordic Institute of Navigation, Oslo, June 2008.

**System for Performance Monitoring with Respect to Ionospheric Activity at High Latitudes.** Presented at the European Navigation Conference, Toulouse, France. April 2008.


**Satellite Navigation Today and in the Future.** Presentation for Youth in Science and Technology. Aalborg, December 2007


**Norm for RTK services in Denmark.** Presentation at NavConf, Navigation Conference by the Nordic Institute of Navigation. Copenhagen, April 2007.

**GPS for cadastral purposes,** course for the Danish Association of Map and Survey Technicians. Ry, Denmark, April and May 2007
Introduction to error statistics and least squares adjustment, 2-day course for employees in the department of reference networks, the National Survey and Cadastre – Denmark. March 2007.

Publication 2007-2010 for DTU Space, Geodesy & geodynamics
Hvidegaard, Sine Munk; Forsberg, René; Skourup, Henriette; Stenseng, Lars; Hanson, Susanne
A decade of sea ice thickness mapping by airborne lidar between Greenland and the North Pole. Presented at: AGU Fall Meeting, 2007 Type: Conference contribution, Poster presentation

Engsager, Karsten Enggaard; Poder, K.
A highly accurate world wide projection algorithm for traverse Mercator

Nielsen, Allan Aasbjerg
A kernel version of spatial factor analysis
Presented at: 57th Session of the International Statistical Institute, ISI. Durban, South Africa, 2009
In: 57th Session of the International Statistical Institute, ISI : , 2009Type: Conference paper published in book/proceeding

Matzka, Jürgen; Rasmussen, Thorkild M.; Olesen, Arne Vestergaard; Nielsen, Jens Emil; Forsberg, René; Olsen, Nils; Halpenny, John; Verhoeof, Jacob
A new aeromagnetic survey of the North Pole and the Arctic Ocean north of Greenland and Ellesmere Island

Ahlstrøm, A. P.; As, D.; Citterio, M.; Andersen, S. B.; Fausto, R. S.; Andersen, M. L.; Forsberg, René; Stenseng, Lars; Christensen, E. L.; Kristensen, S. S.
A new program for Monitoring the Mass Loss of the Greenland Ice Sheet
Presented at: American Geophysical Union (AGU), Joint Assembly. San Francisco, USA, 2007 Type: Conference contribution, Poster presentation

Ahlstrøm, Andreas P.; Gravesen, Peter; Bech Andersen, Signe; van As, Dirk; Citterio, Michele; Fausto, Robert S.; Nielsen, Søren; Jepsen, Hans F.; Kristensen, Steen Savstrup; Christensen, Erik Lintz; Stenseng, Lars; Forsberg, René; Hanson, Susanne; Petersen, Dorthe
A new programme for monitoring the mass loss of the Greenland ice sheet

Mottram, R.; Nielsen, C.; Ahlstrøm, A. P.; Reeh, N.; Kristensen, Steen Savstrup; Christensen, Erik Lintz; Forsberg, René; Stenseng, Lars
A new regional high-resolution map of basal and surface topography for the Greenland ice-sheet margin at Paakitsoq, West Greenland
Skourup, Henriette
A study of Arctic sea ice freeboard heights, gravity anomalies and dynamic topography from ICESat measurementes. - Copenhagen : University of Copenhagen, 2010 (p. 145) Type: PhD Thesis

Hanson, Susanne; Stenseng, Lars; Forsberg, René; Hvidegaard, Sine Munk; Skourup, Henriette
A Study of Snow Thickness on First- and Multiyear Sea Ice Using Laser and Radar Altimetry.
Presented at: AGU Fall Meeting, 2007 Type: Conference contribution, Poster presentation

Knudsen, Per; Knudsen, Thomas
Absolute subsidence rates from persistent scatterer
Presented at: International Geohazards Week. Frascati, 2007 Type: Conference contribution, Poster presentation

Canty, Morton John; Nielsen, Allan Aasbjerg
Advances in statistical change detection methods within the GMOSS Network

Hvidegaard, Sine Munk
Airborne and Satellite Measurements of the Cryosphere Changes
Presented at: NKG Summer School. Iceland, 2008 Type: Conference contribution, Conference abstract

Hvidegaard, Sine Munk; Forsberg, René; Skourup, Henriette; Stenseng, Lars
Airborne campaigns for CryoSat pre-launch calibration and validation

Barzaghi, R; Borghi, A; Keller, K; Forsberg, René; Giori, I; Loretti, I; Olesen, Arne Vestergaard; Stenseng, Lars
Airborne gravity tests in the Italian area to improve the geoid model of Italy

Reeh, Niels; Christensen, Erik Lintz; Hanson, Susanne; Kristensen, Steen Savstrup; Stenseng, Lars

Kristensen, Steen Savstrup; Christensen, Erik Lintz; Hanson, Susanne; Reeh, Niels; Skourup, Henriette; Stenseng, Lars

Keller, K.; Casassa, G.; Rivera, A.; Forsberg, René; Gundestrup, N.
Airborne laser altimetry survey of Glaciar Tyndall, Patagonia

Stenseng, Lars; Hvidegaard, Sine Munk; Skourup, Henriette; Forsberg, René; Andersen, C. J.; Hanson, Susanne; Cullen, R.; Helm, V.
Airborne Lidar and Radar Measurements In and Around Greenland CryoVEx 2006. - Copenhagen : DRC, 2007 (p. 158) ; 9 Type: Report

Olesen, Arne Vestergaard; Forsberg, René
Airborne Scalar Gravimetry for Regional Gravity Field Mapping and Geoid Determination.
Presented at: Gravity Field of the Earth – 1st meeting of the International Gravity Field Service.
Ankara, 2007

Hanson, Susanne; Forsberg, René
In: The Sixth Framework Programme (2002-2006) ; D8.4-06b1 Type: Report

Andersen, Ole Baltazar; Knudsen, Per
Altimetric Mean Sea Surfaces (DNSC06-MSS) and Ocean Variability

Knudsen, Thomas
An Algorithm for Verification and Change Detection Between 3D Geospatial Databases and Aerial Images
Presented at: ISPRS Hannover Workshop, 2007 Type: Conference contribution, Poster presentation

Nettles, M.; Larsen, T.B.; Elósegui, P.; Ahlstrøm, Andreas P.; Davis, J.L.; de Juan, J.; Ekström, G.; Forsberg, René; Hamilton, G.S.; Khan, Shfaqat Abbas; Andersen, M.L.; Stearns, L.A.; Stenseng, Lars
Analysis of ionospheric errors and correction techniques in high-rate GPS glaciology
Presented at: Geophysical Research Abstracts, 2008 Type: Conference contribution, Conference abstract

Jakobsen, Jakob Anders; Knudsen, Per; Jensen, Anna B. O.
Analysis of local ionospheric time varying characteristics with singular value decomposition

Muggah, J.; Mioc, Darka
Arctic Basemaps In Google Maps
Como, Italy, 2010
In: WebMGS (2010). Type: Conference paper published in journal

Forsberg, René; Skourup, Henriette; Kenyon, S.; Braun, A.
Arctic Gravity Project revised: gravity and geoid of the Arctic from surface and airborne gravity, ICESAT and GRACE.
Forsberg, René; Skourup, Henriette
Arctic Ocean mean-sea surface, geoid and gravity from surface data, ICESAT and GRACE – a reference for CryoSat sea-ice mapping
Type: Talk / Oral presentation

Skourup, Henriette; Forsberg, René; Laxon, S.; Ridout, A.
Arctic sea ice freeboards and mean dynamic topography in the Arctic Ocean from satellite altimetry
Presented at: IUGG Perugia. Italy, 2007 Type: Conference contribution, Poster presentation

Arctic vegetation damage by winter-generated coal mining pollution released upon thawing

Watermann, J.; Stauning, P.; Luhr, H.; Newell, P.T.; Christiansen, Freddy; Schlegel, K.
Are small-scale field-aligned currents and magneto sheath-like particle precipitation signatures of the same low-altitude cusp?

Zhang, X.H.; Forsberg, René
Assessment of long-range kinematic GPS positioning errors by comparison with airborne laser altimetry and satellite altimetry

Lukianova, R.; Hanuise, C.; Christiansen, Freddy
Asymmetric distribution of the ionospheric electric potential in the opposite hemispheres as inferred from the SuperDARN observations and FAC-based convection model

Lukianova, R. Yu.; Kozlovsky, A.; Christiansen, Freddy
Asymmetric structures of field-aligned currents and convection of ionospheric plasma controlled by the IMF azimuthal component and season of year

Knudsen, Thomas
Automatic change detection for semi-automatic map updates
Type: Workshop / Seminar

Nielsen, Allan Aasbjerg; Hecheltjen, Antje; Thonfeld, Frank; Canty, Morton John
Automatic change detection in RapidEye data using the combined MAD and kernel MAF methods
Presented at: International Geoscience and Remote Sensing Symposium, Honolulu, HI, USA, 2010
Knudsen, Thomas
Automatic change detection using a cluster covariance distance metric, for image based revision of GIS data.

Canty, Morton John; Nielsen, Allan Aasbjerg
Automatic Radiometric Normalization of Multitemporal Satellite Imagery with the Iteratively Re-weighted MAD Transformation

Yildiz, H.; Andersen, Ole Baltazar; Simav, M.; Kilicogul, A.; Lenk, O.
Black sea annual and inter-annual water mass variations from space
In: Journal of Geodesy (2010). SpringerType: Journal article

Lund, Niels; Forsberg, René; Cooper-Jensen, C. P.; Svensmark, Henrik; Christensen, Finn Erland; Svensmark, Ulla
Blue Planet arrangement
Type: Talk / Oral presentation Note

Leiriao, Silvia; He, Xin; Christiansen, Lars; Andersen, Ole Baltazar; Bauer-Gottwein, Peter
Calculation of the temporal gravity variation from spatially variable water storage change in soils and aquifers

Christiansen, Lars; Hansen, A. B.; Looms, M. C.; Haarder, E. B.; Binning, Philip John; Rosbjerg, Dan; Andersen, Ole Baltazar; Bauer-Gottwein, Peter
Calibrating Vadose Zone Models with Time-Lapse Gravity Data
Presented at: American Geophysical Union Fall Meeting, 2009
In: AGU Fall Meeting Abstracts, Article no. H52B-05 American Geophysical Union, 2009Type: Conference contribution, Conference abstract

Forsberg, René; Sorensen, L. S.
Change of the Greenland ice sheet from GRACE . : comparison of inversion and filtering methods
Presented at: GRACE science team meeting. Postdam, 2007 Type: Conference contribution, Poster presentation

Forsberg, René; Sorensen, L.
Change of the Greenland ice sheet from GRACE, ICESat and airborne laser
Presented at: IUGG07 Symposium JGS005. Perugia, 2007 Type: Conference contribution, Poster presentation

Forsberg, René; Skourup, Henriette; Andersen, Ole Baltazar; Knudsen, Per; Laxon, S.W.; Ridout, A.; Johannesen, J.; Siegismund, F.; Drange, H.; Tscherning, C. C.; Arabelos, D.; Braun, A.; Renganathan, V.
Combination of Spaceborne, Airborne and In-Situ Gravity Measurements in Support of Arctic Sea Ice Thickness Mapping

Forsberg, René; Skourup, Henriette; Andersen, Ole Baltazar; Laxon, S. W.; Ridout, A.; Braun, A.; Johannessen, J.; Siegismund, F.; Tscherning, C. C.; Knudsen, Per
Combination of Spaceborne, Airborne and Surface Gravity in Support of Arctic Ocean Sea-Ice and MDT Mapping.
Presented at: IUGG07 Symposium JGS005. Perugia, 2007
Type: Conference contribution, Poster presentation

Combining altimetric/gravimetric and ocean model mean dynamic topography models in the GOCINA region
Type: Talk / Oral presentation

Knudsen, Per; Andersen, Ole Baltazar; Forsberg, René; Föh, Henning Pontoppidan; Olesen, Arne Vestergaard; Vest, A.L.; Solheim, D.; Omang, O.D.; Hipkin, R.; Hunegnaw, A.; Haines, K.; Bingham, R.; Drecourt, Jean-Philippe; Johannessen, J.A.; Orange, H.; Siegismund, F.; Hernandez, F.; Larnicol, G.; Rio, M-H; Schaeffer, P.
Combining altimetric/gravimetric and ocean model mean dynamic topography models in the GOCINA region
Presented at: IAG symposia, 2007
In: IAG symposia : , 2007
Type: Conference paper published in book/proceeding

Stenseng, Lars; Hanson, Susanne; Skourup, Henriette; Hvidegaard, Sine Munk; Forsberg, René
Combining Radar Altimetry and Lidar to Study Snow Accumulation
Presented at: American Geophysical Union (AGU), Joint Assembly. San Francisco, USA, 2007
Type: Conference contribution, Poster presentation

Knudsen, Per; Andersson, Toke Bech
Consolidating User Requirements for the GOCE User Toolbox
Type: Conference paper published in book/proceeding

Lui, L.; Wahr, J.; Howat, I.; Khan, Shfaqat Abbas; Furuya, M.; Joughin, I.
Crustal Deformation due to Ice Mass Unloading at Jakobshavn Isbrae, Greenland, Measured with ERS/Envisat/Radarsat SAR Interferometry
Presented at: EOS Trans, 2008
Type: Conference contribution, Conference abstract

Forsberg, René; Stenseng, Lars; Hvidegaard, Sine Munk
Danish CryoSat pre-launch event
Type: Workshop / Seminar

Svensmark, Ulla; Khan, Shfaqat Abbas; Hoeg, Per; Heilmann-Clausen, Arne; Hornstrup, Allan
Dansk Metal besøger DTU Space - en palette af projektpræsentationer
Type: Talk / Oral presentation

Joos, Gerhard
Data access technical panel - status report I 2007
Type: Talk / Oral presentation

Joos, Gerhard
Data access technical panel - status report II 2007
Type: Talk / Oral presentation

Andersen, Ole Baltazar
Den dynamiske jord : Temahæfte om jordskælv, geodæsi og pladetektonik til gymnasieelever og folkeskolens ældste klasser Type: Book

Hanson, Susanne; Forsberg, René
Detailed time plan and fuel arrangements for 2008 airborne activities : Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006). - Copenhagen : DTU Space, 2008 Type: Report Note

Hanson, Susanne; Hvidegaard, Sine Munk; Skourup, Henriette
Detecting Sea Ice Thickness with Laser Altimetry – Preliminary Results from TARA
Presented at: American Geophysical Union, Joint Assembly. San Francisco, USA, 2007 Type: Conference contribution, Poster presentation

Hanson, Susanne; Haapala, J.; Gerland, S.; Nicolaus, M.
Detecting sea ice thickness with laser altimetry – results from TARA, spring 2007
Presented at: DAMOCLES 4th General Assembly. Sopot, Poland, November 27. - 28., 2008, 2008 Type: Conference contribution, Conference abstract

Knudsen, Thomas; Olsen, Brian Pilemann
Detection of changes in building coverage using digital and analogue aerial images
Presented at: Geomatics Week, 2007

Bøvith, Thomas
Detection of Weather Radar Clutter, 2008
In: IMM-PHD-2008-201 Type: PhD Thesis

Knudsen, Thomas; Olsen, Brian P.
Detektion af bygninger i analoge og digitale billeder
Type: Workshop / Seminar

Determining glacier flow with novel polar GPS systems
Presented at: EOS Trans, 2008, Article no. G13B-0657 Type: Conference contribution, Conference abstract

Davis, J.L.; Elosegui, P.; de Juan, J.; Nettles, M.; Ahlstrøm, Andreas P.; Andersen, M.L.; Ekström, G.; Forsberg, René; Hamilton, G.S.; Khan, Shfaqat Abbas; Larsen, T.B.; Stearns, L.; Stenseng, Lars
Determining the Timing of Helheim Glacial Earthquakes from Glacier-Based GPS Time Series
Presented at: EOS Trans, 2008 Type: Conference contribution, Conference abstract

Stenseng, Lars
Development of SAR Altimetry Mode Studies and Applications over Ocean, Coastal Zones and Inland Water (SAMOSA). - 1.1 ed. - Copenhagen : DTU Space, 2009 (p. 27) Type: Report

Stenseng, Lars
Digital Height Models of Ice in the Arctic
Presented at: NKG Workshop on National DEMs, 2008 Type: Conference contribution, Conference abstract

Digital high resolution images and their application in operational mapping environments.
Presented at: Geomatics Week. Barcelona, 2007
In: Proceedings of Geomatics Week ; , 2007 Type: Conference paper published in book/proceeding

Andersen, Ole Baltazar; Knudsen, Per
DNSC08 mean sea surface and mean dynamic topography models
In: Journal of Geophysical Research, vol: 114 (2009). American Geophysical Union Type: Journal article

Strykowski, Gabriel; Lorenzen, Bjarne
Domus Vista Gravity Project. - Copenhagen : DTU Space, 2010 (p. 4) Type: Report

Forsberg, René; Olesen, Arne Vestergaard; Munkhtsetseg, D.; Amarzaya, A.
Downward continuation and geoid determination in Mongolia from airborne and surface gravimetry and SRTM topography
In: Harita Dergisi (2007). Type: Journal article

Knudsen, Thomas
DRCs højdemodelaktiviteter : Dialogmøde om ny højdemodel
Type: Talk / Oral presentation

Larsen, T.B.; Nettles, M.; Elósegui, P.; Andersen, M.L.; Ahlstrøm, Andreas P.; Davis, J.L.; de Juan, J.; Ekström, G.; Forsberg, René; Hamilton, G.S.; Khan, Shfaqat Abbas; Stearns, L.A.; Stenseng, Lars
East Greenland Glacier Dynamics : an Interdisciplinary Study of Helheim Glacier
Presented at: EOS Trans, 2008 Type: Conference contribution, Conference abstract

Hendricks, Stefan; Stenseng, Lars; Helm, Veit; Haas, Christian
The document contains a list of references and conference presentations, likely related to geoscience and remote sensing. The references include titles such as "Efficient Incorporation of Markov Random Fields in Change Detection" and "Elastic uplift in southeast Greenland due to rapid ice mass loss." The document also includes references to journals and conference proceedings, indicating a comprehensive coverage of topics in geodesy and remote sensing. Each reference is detailed with publication information, such as the title of the paper, the authors, and the publication year.
Ahlstrøm, Andreas P.; Mottram, R.H.; Nielsen, C.; Reeh, Niels; Andersen, S.B.; Kristensen, Steen Savstrup; Christensen, Erik Lintz; Stenseng, Lars; Forsberg, René
Estimating the future ice sheet hydropower potential in Paakitsoq, Ilulissat, West Greenland

Krogh, Pernille Engelbretd; Andersen, Ole Baltazar; Michailovsky, Claire Irene B.; Bauer-Gottwein, Peter; Rowlands, D.D.; Luthcke, S.B.; Chinn, D.S.
Evaluating terrestrial water storage variations from regionally constrained GRACE mascon data and hydrological models over Southern Africa – Preliminary results

Fok, H.S.; Baki Iz, H.; Shum, C. K.; Yi, Yuehan; Andersen, Ole Baltazar; Braun, Alexander; Chao, Yi; Han, Guoqi; Kuo, C. Y.; Matsumoto, Koji; Song, Y. Tony
Evaluation of Ocean Tide Models Used for Jason-2 Altimetry Corrections

Exploring Arctic Transpolar Drift During Dramatic Sea Ice Retreat

Strykowski, Gabriel; Kildegaard Poulsen, Stine; Forsberg, René
Faroe Islands 2009 gravity project : Final report - DTU Space, 2010 (p. 9) Type: Report

Khan, Shfaqat Abbas
Findings on elasticity
In: Findings on elasticity ; Volume 2 - Baden, Switzerland : Lars Müller Publishers, 2010 (77-79 p.)Type: Book chapter

Nielsen, Jens Emil; Madsen, Finn Bo; Forsberg, René; Strykowski, Gabriel; Khan, Shfaqat Abbas
First measurements with the Danish absolute gravimeter A10-019 in Greenland

Andersen, Ole Baltazar; Butts, M.; Jakobsen, F.; Berry, P.; Freeman, J.; LeMoine, F.
Flooding in Bangladesh from Satellite Altimetry and GRACE Gravimetry
Presented at: ENVISAT Symposium. Montreux, Switzerland, 2007
de Juan, J.; Elosegui, P.; Nettles, M.; Davis, J. L.; Larsen, T. B.; Ahlstrom, A. P.; Andersen, M. L.; Ekstrom, G.; Forsberg, René; Hamilton, G. S.; Khan, Shfaqat Abbas; Schild, K.; Stearns, L. A.; Stenseng, Lars
Flow modulation by ocean tides at Helheim Glacier, East Greenland, observed using GPS

Hanson, Susanne
Forstå klimaforandringer i Arktis
Type: Talk / Oral presentation

Strykowski, Gabriel; Cordua, Knud Skou; Forsberg, René; Olesen, Arne Vestergaard; Andersen, Ole Baltazar
Galathea-3: A global marine gravity profile
In: Proceedings IAG symposium geodesy for planet earth (2010). Type: Conference paper
published in journal

Hwang, C.W.; Hsiao, Y.S.; Shih, H.C.; Yang, M.; Chen, K.H.; Forsberg, René; Olesen, Arne Vestergaard
Geodetic and geophysical results from a Taiwan airborne gravity survey: Data reduction and accuracy assessment
Type: Journal article

Elósegui, P.; Davis, J. L.; Nettles, M.; Larsen, T. B.; Ahlstrom, A. P.; Juan, J.; Ekström, G.; Forsberg, René; Hamilton, G.; Khan, Shfaqat Abbas; Stearns, L. A.; Andersen, M.; Stenseng, Lars
Geodetic Measurements and Analysis of Glacier Kinematics in East Greenland
Presented at: American Geophysical Union (AGU), Joint Assembly. San Francisco, USA, 2007
Type: Conference contribution, Poster presentation

Khan, Shfaqat Abbas; Wahr, J.; Leuliette, E.; van Dam, T.; Larson, K.M.; Francis, O.
Geodetic measurements of postglacial adjustments in Greenland
Type: Journal article

Forsberg, René; Strykowski, Gabriel
Geoid model for the Fehmarn Belt connection. - Copenhagen : DTU Space, 2010 (p. 10) Type: Report

Forsberg, René; Skourup, Henriette
Geoid, mean sea level and ice thickness in the Arctic Ocean from GRACE and ICESat
Type: Talk / Oral presentation Note

Forsberg, René; Skourup, Henriette; Hvidegaard, Sine Munk
Geoid, mean sea level and ice thickness in the Arctic Ocean from ICESat, GRACE and airborne measurements
Type: Talk / Oral presentation Note
Forsberg, René; Skourup, Henriette; Tscherning, C.C.
Geoid, mean sea level and ice thickness in the Arctic Ocean from GRACE and ICESAT
Type: Workshop / Seminar Note

Forsberg, René; Skourup, Henriette; Hvidegaard, Sine Munk
Geoid, mean sea level and ice thickness in the Arctic Ocean from ICESAT, GRACE and airborne measurements
Type: Workshop / Seminar Note

Skourup, Henriette; Forsberg, René
Geoid, sea-level and vertical datum of the Arctic – Improved by ICESat and GRACE

Skourup, Henriette; Forsberg, René; Braun, A.
Geoid, sea-level and vertical datum of the Arctic – Improved by ICESat and GRACE.
Presented at: IPY GeoNorth Conference. Yellowknife N.W.T. Canada, 2007 Type: Conference contribution, Poster presentation

Forsberg, René; Kenyon, S.
GGOS and the Gravity Field.
Presented at: IUGG07 Symposium GS005. Perugia, 2007 Type: Conference contribution, Poster presentation

Larsen, T.B.; Andersen, M.L.; Nettles, M.; Elósegui, P.; Ahlstrøm, Andreas P.; Davis, J.L.; de Juan, J.; Ekström, G.; Forsberg, René; Hamilton, G.S.; Khan, Shfaqat Abbas; Stearns, L.A.; Stenseng, Lars
Glacial earthquakes in Greenland
Presented at: Geophysical Research Abstracts, 2008 Type: Conference contribution, Conference abstract

Nettles, M.; Larsen, T.B.; Elósegui, P.; Hamilton, G.S.; Stearns, L.A.; Ahlstrøm, Andreas P.; Davis, J.L.; Andersen, M.L.; de Juan, J.; Khan, Shfaqat Abbas; Stenseng, Lars; Ekström, G.; Forsberg, René; Schild, K.M.
Glacier acceleration, glacial earthquakes, and ice loss at Helheim Glacier, Greenland
Presented at: EOS Trans, 2008 Type: Conference contribution, Conference abstract

Andersen, Ole Baltazar
Global and local tide modeling : Linear and non-linear tides from altimetry and GPS ; EGM2007-G9-1WE4O-001
Type: Talk / Oral presentation

Khan, Shfaqat Abbas; Liu, Lin; Wahr, John; Howat, Ian; Joughin, Ian; van Dam, Tonie van; Flemming, Kevin
GPS measurements of crustal uplift near Jakobshavn Isbræ due to glacial ice mass loss
In: Journal of Geophysical Research, vol: 115, Article no. B09405 (2010). American Geophysical Union Type: Journal article

Skourup, Henriette; Forsberg, René; Braun, A.
Gravity Anomalies and Sea Ice Thickness in the Arctic Ocean from ICESat
Presented at: Gravity Field of the Earth – 1st meeting of the International Gravity Field Service.
Ankara, 2007

Forsberg, René; Olesen, Arne Vestergaard
Gravity field determination by combination of satellite, airborne and surface gravity data
Type: Workshop / Seminar Note

Møller, M.J.; Olsen, Henrik; Ploug, C.; Strykowski, Gabriel; Hjorth, H.
Gravity field separation and mapping of buried quaternary valleys in Lolland, Denmark using old
geophysical data

Strykowski, Gabriel
Gravity geoid and geophysics – from data to models : Strategimøde Dept. of Geodynamics
Type: Workshop / Seminar

Strykowski, Gabriel; Madsen, K. M.; Schmidt, K. E.; Reinhold, A.; Hoppe, W.; Gitlein, O.;
Timmen, L.; Forsberg, René
Gravity measurements in Denmark in 2006-2007 Type: Report

Strykowski, Gabriel; Kildegaard Poulsen, Stine
Gravity measurements on offshore windmills in Lolland 2009 - DTU Space, 2010 (p. 5) Type: Report

Skourup, Henriette; Forsberg, René; Dalå, N.S.; Hvidegaard, Sine Munk
GreenICE field campaign 2004 – airborne laser measurements
Type: Workshop / Seminar

Sørensen, Louise Sandberg; Stenseng, Lars; Simonsen, Sebastian S.; Forsberg, René; Kildegaard
Poulsen, Stine; Helm, Veit
Greenland Ice Sheet Changes from Space Using Laser, Radar and Gravity
published in book/proceeding

Sørensen, Louise Sandberg; Forsberg, René
Greenland ice sheet mass loss from GRACE data
Presented at: International Symposium on Gravity, Geoid and Earth Observation. Crete, Greece,
2008 Type: Conference contribution, Conference abstract

Stenseng, Lars
Grønland rundt med POF’en : Foredrag i Dansk Geofysisk Forening
Type: Lecture given outside DTU

Andersen, Ole Baltazar; Knudsen, Per; Berry, P.; Mathers, L.; Freeman, J.; Kenyon, S.; Trimmer, R.
High resolution Global gravity field from retracked 2-Hz ERS-1 altimetry
Type: Talk / Oral presentation Note

Bauer-Gottwein, Peter; Andersen, Ole Baltazar; Leiriao, S.; He, X.
Hydrograv - Improving Hydrological Models with Ground-Based and Space-Borne Time-lapse Gravity Surveys
Type: Talk / Oral presentation

Hanson, Susanne
Ice in the Sea

Schäfer, U.; Liebsch, G.; Schirmer, U.; Ihde, J.; Olesen, Arne Vestergaard; Skourup, Henriette; Forsberg, René; Pflug, H.; Neumeyer, J.
Improving gravity field modeling in the German-Danish border region by combining airborne, satellite and terrestrial gravity data

Forsberg, René; Hvidegaard, Sine Munk; Khan, Shfaqat Abbas
Indlandsisen smelter
Type: TV Interview

Bondo, Torsten
Influence of cosmic radiation on aerosol and cloud formation over short time periods. - Kgs. Lyngby, Denmark : Technical University of Denmark (DTU), 2010 (p. 148) Type: PhD Thesis

Knudsen, Per; Andersen, Ole Baltazar
Integrating Satellite altimetry and tide gauge data for sea level mapping
Type: Talk / Oral presentation

Knudsen, Per
Integration of Altimetry and GOCE Geoid For Ocean Modeling: Results From The GOCINA Project

Joos, Gerhard
International standards on data quality description
Type: Talk / Oral presentation

Canty, M. J.; Nielsen, Allan Aasbjerg
Investigation of Alternative Iteration Schemes for the IR-MAD Algorithm
Hanson, Susanne; Stenseng, Lars
In: DYNAMO(11) (2007). Type: Journal article

Larsen, Rasmus; Nielsen, Allan Aasbjerg; Arngren, Morten; Hansen, Per Waaben
Kernel based subspace projection of hyperspectral images
Presented at: European Workshop on Challenges in Modern Massive Data Sets. Kgs. Lyngby, Denmark, 2009 Type: Conference contribution, Poster presentation

Larsen, Rasmus; Arngren, Morten; Hansen, Per Waaben; Nielsen, Allan Aasbjerg
Kernel based subspace projection of near infrared hyperspectral images of maize kernels
Presented at: Scandinavian Conference on Image Analysis. Oslo, Norway, 2009

Nielsen, Allan Aasbjerg; Andersen, Ole Baltazar; Knudsen, Per
Kernel empirical orthogonal function analysis of 1992-2008 global sea surface height anomaly data
Presented at: MultiTemp. Mystic, Connecticut, USA, 2009
In: MultiTemp : , 2009 Type: Conference paper published in book/proceeding

Nielsen, Allan Aasbjerg
Kernel methods in change detection based on generalised multivariate difference images
Type: Talk / Oral presentation Note

Nielsen, Allan Aasbjerg
Kernel methods in orthogonalization of multi- and hypervariate data

Nielsen, Allan Aasbjerg
Kernel methods in orthogonalization of near-infrared hyperspectral images of maize kernels
Presented at: Eighth French-Danish Workshop on Spatial Statistics and Image Analysis in Biology. Copenhagen, Denmark, 2010
In: The Eighth French-Danish Workshop on Spatial Statistics and Image Analysis in Biology : Book of Abstracts / Editor: Erbsoll, Bjarne Kjær ; Guillot, Gilles , 2010 Type: Invited conference contribution, Poster presentation

Nielsen, Allan Aasbjerg
Kernel parameter dependence in spatial factor analysis
In: IGARSS : IEEE, 2010 (4240-4243 p.) Type: Conference paper published in book/proceeding Note

Nielsen, Allan Aasbjerg; Canty, Morton John
Kernel principal component and maximum autocorrelation factor analyses for change detection
Mioc, Darka; Anton, François; Gold, Christopher; Moulin, Bernard

Kinetic Line Voronoi Operations and Their Reversibility
In: Lecture Notes in Computer Science, vol: 6290, p. 139-165 (2010). Type: Journal article

Hendricks, Stefan; Stenseng, Lars; Helm, Veit; Hanson, Susanne; Haas, Christian
Ku-Band radar penetration into Snow over Arctic Sea Ice
Presented at: EOS Trans. AGU, 2009, Article no. C52B-08 Type: Conference contribution, Conference abstract

Reeh, Niels; Christensen, Erik Lintz; Hanson, Susanne; Kristensen, Steen Savstrup; Stenseng, Lars
Lens-shaped ice body (superimposed ice?) detected by radio echo-sounding of a West Greenland ice-margin sector

Nielsen, Allan Aasbjerg; Canty, Morton J.
Linear and kernel methods for multi- and hypervariate change detection

Christiansen, L.; Krogh, Pernille Engelbrecht; Bauer-Gottwein, Peter; Andersen, Ole Baltazar; Leiriao, S.
Local to Regional Hydrological Model Calibration for the Okavango River Basin From In-Situ and Spaceborne Gravity Data
Type: Talk / Oral presentation
Marcussen, Christian; Skourup, Henriette; al., et.
LOMROG II – continued data acquisition in the area north of Greenland
(43-51 p.)Type: Book chapter

Andersen, Ole Baltazar; Knudsen, Per
Long-term sea level and sea surface temperature characteristics from satellite
Type: Talk / Oral presentation Note

Barbosa, S. M.; Knudsen, Per; Andersen, Ole Baltazar
Low-frequency variability of global sea surface temperature (solicited)
Presented at: EGU 2007. Vienna, Austria, 2007 Type: Conference contribution, Poster presentation

Forsberg, René
Luftbåren laserscanning til støtte af klima- og miljøovervågning.
In: Geoforum Perspektiv(12), p. 31-38 (2007). Type: Journal article

Stenseng, Lars
Luftbårne Observationer i Danmarks Rumcenter
Type: Talk / Oral presentation

Andersen, Ole Baltazar
Marine gravity from satellite altimetry
Type: Workshop / Seminar Note

Forsberg, René; Reeh, Niels
Mass change of the Greenland ice sheet from GRACE and a climatological-glaciological model
Type: Workshop / Seminar Note

Forsberg, René; Skourup, Henriette; Laxon, S.; Steele, M.; Maslowski, W.; Drange, H.; Johannessen, J.
Mean dynamic topography of the Arctic Ocean from altimetry and geoid compared to oceanographic models.
Presented at: IUGG07 Symposium JGS001. Perugia, 2007 Type: Conference contribution, Poster presentation

Andersen, Ole Baltazar; Knudsen, Per
Mean sea surface, geoid and bathymetry from multiple satellites in the Arctic region
Type: Talk / Oral presentation Note

Forsberg, René
Med isen i hånden : CryoSat aktiviteter i Grønland og Polhavet
Type: Workshop / Seminar
Andersen, Ole Baltazar; Berry, P.; Freeman, J.; Butts, M.; Jakobsen, F.; Bauer-Gottwein, Peter; Lemoine, F.G.; Lutcke, S.B. 
Merging GRACE gravimetry, satellite altimetry and in-situ data for Terrestrial water storage and flood monitoring; EGU2007 G3-1WE2O-001 
Type: Talk / Oral presentation 

Bondo, Torsten; Enghoff, Martin Andreas Bødker; Svensmark, Henrik 
Model of optical response of marine aerosols to Forbush decreases 
Type: Journal article Note 

Aanæs, Henrik; Sveinsson, J. R.; Nielsen, Allan Aasbjerg; Bøvith, Thomas; Benediktsson, J. A. 
Model-based satellite image fusion 
Type: Journal article Note 

Lukianova, R.; Christiansen, Freddy 
Modeling the UT effect in global distribution of ionospheric electric fields 
Type: Journal article 

Andersen, Ole Baltazar 
Modelling nonlinear shallow water tides from multi mission satellite altimetry 
Type: Talk / Oral presentation Note 

Friis-Christensen, Eigil; Forsberg, René; Lauritsen, Sune Nordentoft 
Monitoring and climate predictions 
In: DTU Climate Change Technologies: Recommendations on accelerated development and deployment of climate change technologies; 4.1.A - 1 ed. - Kgs. Lyngby: Technical University of Denmark (DTU), 2009 
Type: Book chapter 

Andersen, Ole Baltazar 
MSS improvements and errors 
Type: Workshop / Seminar Note 

Nielsen, Allan Aasbjerg 
Multi-temporal images and semi-automatic map updating 
Type: Talk / Oral presentation 

Hanson, Susanne 
Naufragés de la Banquise 
In: GEOexpedition (2007). Type: Journal article 

Forsberg, René; Skourup, Henriette; Kenyon, S. C.; Laxon, S. W.; Jakobsson, M. 
New Arctic Gravity Field Grids with Applications for Oceanography and Bathymetry 
Presented at: AGU fall meeting, session OS43, 2007 
Type: Conference contribution, Poster presentation
Skourup, Henriette; Olesen, Arne Vestergaard; Forsberg, René; Schäfer, U.; Liebsch, G.; Ihde, J. NorthGRACE 2007 - North Sea Airborne GRAvity Campaign : Data acquisition and processing report. - Copenhagen : DTU Space, 2008 (p. 8) Type: Report

Aanæs, Henrik; Nielsen, Allan Aasbjerg
Nye metoder til geobranchen
In: Geoforum.dk(115), p. 14-16 (2010). Geoforum Danmark Type: Journal article

Hvidegaard, Sine Munk
Observationer af havis
Type: Talk / Oral presentation

Hanson, Susanne; Haapala, J.; Gerland, S.; Nicolaus, M.
Observations of the annual cycle of sea ice – In situ measurements of sea ice in the Transpolar Drift, Arctic Ocean
Presented at: DAMOCLES 4th General Assembly. Sopot, Poland, November 27. – 28., 2008, 2008 Type: Conference contribution, Conference abstract

Observing Absolute Gravity Acceleration in the Fennoscandian Land Uplift Area
Presented at: TG – SMM. Saint Petersburg, Russia, 2007 Type: Conference contribution, Poster presentation

Andersen, Ole Baltazar; Olesen, Arne Vestergaard; Forsberg, René; Strykowski, Gabriel; Cordua, Knud Skou; Zhang, X.
Ocean Dynamic Topography from GPS - Galathea-3 First results

Knudsen, Per; Andersen, Ole Baltazar
Ocean tides in GRACE monthly averaged gravity fields ; EGU2007 G9-1WE4O-004
Type: Talk / Oral presentation

Knudsen, Per; Andersen, Ole Baltazar; Knudsen, O.P.
Ocean tides in GRACE monthly averaged gravity fields II ; EGU2007 G3-1WE5P-0348
Type: Talk / Oral presentation

de Juan, Julia; Elosegui, P.; Nettles, M.; Davis, J. L.; Larsen, Tine B.; Ahlstrøm, Andreas P.; Andersen, M. L.; Ekstrom, G.; Forsberg, René; Hamilton, G. S.; Khan, Shfaqat Abbas; Schild, K. M.; Stearns, L. A.; Stenseng, Lars
Ocean tides modulation of flow at Helheim Glacier, East Greenland, observed using GPS
Presented at: EOS Trans. AGU, 2009, Article no. C11A-01 Type: Conference contribution, Conference abstract
Mioc, Darka; Anton, François; Gold, Christopher; Moulin, Bernard
On kinetic line Voronoi operations and finite fields
Presented at: Sixth International Symposium on Voronoi Diagrams, 2009. ISVD '09. DTU, 2009
In: Sixth International Symposium on Voronoi Diagrams, 2009. ISVD '09 : IEEE, 2009
(65-70 p.)Type: Conference paper published in book/proceeding Note

Arabelos, D.N.; Forsberg, René; Tscherning, C.C.
On the a priori estimation of collocation error covariance functions: a feasibility study

Vennerstrøm, Susanne; Christiansen, Freddy; Olsen, Nils; Moretto, T.
On the cause of IMF By related mid- and low latitude magnetic disturbances

Mioc, Darka; Gao, Sheng; Yi, Xiaolun; Anton, François; Boley, Harold; Oldfield, Eddie
Online mapping and querying health data
Presented at: Nordic Workshop on GIS and Health. Copenhagen, 2010 Type: Conference contribution, Conference abstract

Knudsen, Per; Andersen, Ole Baltazar; Andersson, Toke Bech
Optimal filtering of mean dynamic topography models

Strykowski, Gabriel
Outline of a New Space-Domain Method of Forward Modeling
In: Harita Dergisi (2007). Type: Journal article

Strykowski, Gabriel; Forsberg, René

Strykowski, Gabriel; Jacoby, W.; Grafarend, E.
Potential fields in Geostatics and Geodynamics - Papers from the potential fields in Geostatics and Geodynamics (GD 15) symposium of the European Geosciences Union General Assembly, held in Vienna, Austria, 24-29 April 2005 - Preface

Tocho, Claudia; Miranda, Silvia; Pacino, Maria Cristina; Forsberg, René
PRELIMINARY GEOID MODEL IN SAN JUAN PROVINCE: A CASE STUDY IN THE ANDES
Knudsen, Per  

Khan, Shfaqat Abbas; Wahr, J.; Dam, T.; Larson, K.M.; Francis, O.; Stearns, L.A.; Hamilton, G.S.  
Rapid uplift in Greenland due to ongoing ice mass changes  
Presented at: Geophysical Research Abstracts, 2008 Type: Conference contribution, Conference abstract  

Nielsen, Allan Aasbjerg; Andersen, Ole Baltazar; Knudsen, Per  
Recent sea level change analysed with kernel EOF  
Presented at: Danish Ocean Researchers' Meeting. Elsinore, Denmark, 2009  
In: 15. danske havforskermøde, p. 116 , 2009Type: Conference contribution, Conference abstract  

Andersen, Ole Baltazar; Knudsen, Per; Berry, P.; Kenyon, S.; Trimmer, R.  
Refining Global Marine Gravity Prediction from Satellite and Ships. DNSC06 Global Marine Gravity Field and Associated Bathymetry  

Olesen, Arne Vestergaard; Forsberg, René  
Regional airborne scalar gravimetry for geoid determination  
Presented at: IUGG XXIV General Assembly. Perugia, Italy, 2007 Type: Conference contribution, Poster presentation  

Larsen, T. B.; Andersen, M. L.; Nettles, M.; Elósegui, P.; Ahlström, A. P.; Davis, J. L.; Juan, J.; Ekström, G.; Forsberg, René; Hamilton, G. S.; Khan, Shfaqat Abbas; Stearns, L. A.; Stenseng, Lars  
Regional rumble: a seismological study of glacial earthquakes in Greenland  
Presented at: American Geophysical Union (AGU), Joint Assembly. San Francisco, USA, 2007 Type: Conference contribution, Poster presentation  

Joos, Gerhard  
Registrierungsdienste für Geoelemente unter besonderer Berücksichtigung von Datenqualitätsmaßen  
Type: Talk / Oral presentation  

Gascard, J-C.; Offermann, M.; Hanson, Susanne  
Report of 2007 deployment of ITPs, bouys, etc. from airborne deployment  
In: The Sixth Framework Programme (2002-2006) ; D8.4-05b Type: Report  

Hanson, Susanne  
Reportage fra TARA is lejer  
Type: TV Interview  

Olsen, Nils; Christiansen, Freddy; Jackson, A.  
Reprocessing of POGO Satellite Data : Preliminary Results of some Experiments
Presented at: GEOSPACE Meeting. Abingdon, 2008 Type: Conference contribution, Poster presentation

Results from the CERN pilot CLOUD experiment

Hvidegaard, Sine Munk; Forsberg, René; Keller, K.
Results of the CryoSat Validation Experiment – CryoVEx-2003
Type: Talk / Oral presentation

Hvidegaard, Sine Munk; Forsberg, René; Olsen, A.V.; Hass, C.; Pfaffling, A.; Goebell, S.
Results of the CryoSat Validation Experiment – CRYOVEX-2003
Type: Workshop / Seminar

Zhang, Xiaohong; Forsberg, René
Retrieval of Airborne Lidar Misalignments Based on the Stepwise Geometric Method

Andersen, Ole Baltazar; Berry, P.; Freeman, J.; Lemoine, F.G.; Lutsckhe, S.; Jakobsen, F.; Butts, M.
Satellite altimetry and GRACE gravimetry for studies of annual water storage variations in Bangladesh

Skourup, Henriette; Forsberg, René; Sørensen, L. S.; Hanson, Susanne; Stenseng, Lars; Hvidegaard, Sine Munk
Satellite and Airborne data for change detection in the Arctic Cryosphere.
Presented at: IPY GeoNorth Conference. Yellowknife, 2007 Type: Invited conference contribution, Poster presentation

Hasager, Charlotte Bay; Andersen, Ole Baltazar
Satellite Eye for Galathea : Hjemmeside om Remote sensing og Galathea-3 ekspeditionen Type: Multimedia Learning Object

Hasager, Charlotte Bay; Sørensen, Peter Brøgger; Pedersen, Leif Toudal; Høyer, Jacob L.; Jørgensen, Peter Viskum; Høyerslev, Niels Kristian; Rasmussen, Michael Schultz; Lichtenegger, Jürg; Andersen, Ole Baltazar; Christiansen, Merete Bruun; Nyborg, Lotte; Christensen, Karl-Erik; Jensen, Torben P.; Iversen, Karin; Nielsen, Rune Midjord; Saldo, Roberto; Møller, Rene

Hanson, Susanne; Forsberg, René
Schedule of arrangements for air transport and lodging of individual participants, airfreight of equipment from primary departure bases: Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006). - Copenhagen : DTU Space, 2008 (p. 10) Type: Report Note

Hvidegaard, Sine Munk; Forsberg, René; Hanson, Susanne; Skourup, Henriette; Pedersen, Leif Toudal
Sea Ice Conditions off NW and NE Greenland from Satellite Measurements, Airborne and In-situ data: Contract Report for Greenland Bureau of Minerals and Petroleum. - Copenhagen : DTU Space, 2008 Type: Report Note

Skourup, Henriette; Forsberg, René; Hanson, Susanne; Hvidegaard, Sine Munk; Stenseng, Lars
Sea Ice Freeboards and Snow Depths in the Arctic Based on Satellite Laser and Radar Altimetry Presented at: AGU Fall Meeting, 2007 Type: Conference contribution, Poster presentation

Skourup, Henriette; Forsberg, René; Hanson, Susanne; Pedersen, Rasmus; Toudal Pedersen, Leif

Skourup, Henriette; Forsberg, René
Sea-ice freeboard heights in the Arctic Ocean from ICESat and airborne lidar – a comparison Type: Talk / Oral presentation

Barbosa, S. M.; Andersen, Ole Baltazar; Knudsen, Per
Sea surface temperature and sea-level variability from T/P and JASON-1 Presented at: EGU 2007. Vienna, Austria, 2007 Type: Conference contribution, Poster presentation

Nicolaus, M.; Gerland, S.; Hudson, S.; Haapala, J.; Hanson, Susanne; Palo, T.; Perovich, D.K.
Seasonality of Spectral Albedo and Transmission of Sea Ice in the Transpolar Drift, Arctic Ocean Presented at: American Geophysical Union. San Francisco, USA, 2008 Type: Conference contribution, Conference abstract

Nettles, M.; Larsen, T. B.; Elósegui, P.; Ahlstrøm, A. P.; Davis, J. L.; Juan, J.; Ekström, G.; Forsberg, René; Hamilton, G. S.; Khan, Shfaqat Abbas; Andersen, M. L.; Stearns, L. A.; Stenseng, Lars
Short-time-scale variations in flow speed and behavior, Helheim Glacier, East Greenland Presented at: American Geophysical Union (AGU), Joint Assembly. San Francisco, USA, 2007 Type: Conference contribution, Poster presentation

Strykowski, Gabriel
Some practical applications of the horizontal gradients Txz and Tyz of the gravitational field. Presented at: European Geosciences Union General Assembly. Vienna, Austria, 2009 Type: Conference contribution, Poster presentation
Vennerstrøm, Susanne; Christiansen, Freddy; Asikainen, Timo; Mursula, Kalevi; Crespon, François; Tátrallyay, M.; Kecskeméty, K.; Németh, Z.; Kuzin, S. V.; Slemzin, V. A.; Ulyanov, A. S.; Bogachev, S. A.; Sylwester, J.; Podgorski, P.; Kowalinski, M.; Verigin, M. I.

Svensmark, Henrik; Christiansen, Freddy; Vennerstrøm, Susanne; Pedersen, Jens Olaf Pepke
Spaceweather and climate
Type: TV Interview

Andersen, M. L.; Larsen, T. B.; Nettles, M.; Elosegui, P.; van As, D.; Hamilton, G. S.; Stearns, L. A.; Davis, J. L.; Ahlstrøm, A. P.; de Juan, J.; Ekström, G.; Stenseng, Lars; Khan, Shfaqat Abbas; Forsberg, René; Dahl-Jensen, D.
Spatial and temporal melt variability at Helheim Glacier, East Greenland, and its effect on ice dynamics
In: Journal of Geophysical Research, vol: 115 (2010). American Geophysical UnionType: Journal article

Khan, Shfaqat Abbas; Wahr, John; Bevis, Michael; Velicogna, Isabella; Kendrick, Eric
Spread of ice mass loss into northwest Greenland observed by GRACE and GPS
In: Geophysical Research Letters, vol: 37, Article no. L06501 (2010). American Geophysical UnionType: Journal article

Skourup, Henriette; Forsberg, René; Sørensen, Sofie Louise Sandberg; Andersen, C.J.; Schäfer, U.; Libsch, G.; Schirmer, U.
Strengthening the vertical reference in the southern Baltic Sea by airborne gravimetry
Presented at: IUGG General Assembly. Perugia, 2007

Skourup, Henriette; Forsberg, René; Sørensen, Sofie Louise Sandberg; Andersen, Christian Jermiin; Schäfer, U.; Liebsch, G.; Ihde, J.; Schirmer, U.
Strengthening the vertical reference in the southern Baltic Sea by airborne gravimetry
Presented at: IUGG Perugia. Italy, 2007 Type: Conference contribution, Poster presentation

Doble, M.; Haapala, J.; Hanson, Susanne
TARA/Borneo/Alert campaigns field report, comprising result/activities by DAMTP, DNSC, FIRM and others. - DNSC, 2007
In: The Sixth Framework Programme (2002-2006) ; D1.1-03 Type: Report

Andersen, Ole Baltazar; Freeman, J.; Bauer-Gottwein, Peter; Butts, M.; LeMoine, F.
Terrestrial Water Storage Monitoring from GRACE and Satellite Altimetry in Bangladesh and the Okawango Delta (Botswana)
Type: Talk / Oral presentation

Strykowski, Gabriel; Forsberg, René
Testing EGM2008 on Leveling Data from Scandinavia, adjacent Baltic areas, and Greenland.
Strykowski, Gabriel; Forsberg, René
Testing EGM08 on Leveling Data from Scandinavia, Adjacent Baltic Areas, and Greenland.
(505-509 p.)
Type: Conference paper published in book/proceeding

Andersen, Ole Baltazar; Seneviratne, S.; Hinderer, J.
The 2003 European heat wave observed by GRACE
Type: Talk / Oral presentation

Andersen, Ole Baltazar; Knudsen, Per
The DNSC05 high resolution global marine gravity field, mean sea surface and bathymetry
Type: Talk / Oral presentation

Andersen, Ole Baltazar; Knudsen, Per; Pavlis, N.; Kenyon, S.
The DNSC07 global marine gravity field
Type: Talk / Oral presentation

Andersen, Ole Baltazar; Knudsen, Per; Berry, P.A.M.
The DNSC08GRA global marine gravity field from double retracked satellite altimetry
Type: Journal article

Mäkinen, J.; Engfeld, A.; Harson, B. G.; Ruotsaleinen, H.; Strykowski, Gabriel; Oja, T.; Wolf, D.
The Fennoscandian land uplift gravity lines 1966-2006.

Yuan, Y.; Tscherning, C.C.; Knudsen, Per; Xu, G.; Ou, J.
The ionospheric eclipse factor method (IEFM) and its application to determining the ionospheric delay for GPS
Type: Journal article

Hasager, Charlotte Bay; Andersen, Ole Baltazar; Christiansen, Merete Bruun; Højerslev, N.K.; Hoyer, J.L.; Jørgensen, P.V.; Lichtenegger, J.; Pedersen, Leif Toudal; Rasmussen, M.S.; Sørensen, P.B.
The world expedition Galathea 3 seen from Satellite Eye ; EGU2007-ES3-1TH4O-001
Type: Talk / Oral presentation

Pavlis, N. K.; Andersen, Ole Baltazar
Towards the next generation EGM, Progress in high order spherical harmonic expansion of the geopotential field
Type: Talk / Oral presentation

Andersen, Ole Baltazar; Knudsen, Per; Trimmer, R.; Toohey, J.
Towards the next generation EGM; Progress in satellite altimetry
Type: Talk / Oral presentation

Gao, S.; Mioc, Darka; Yi, X.L.; Anton, François; Oldfield, E.; Coleman, D. J.
Towards Web-based representation and processing of health information
Type: Journal article

Engsager, Karsten Enggaard
Transformation of map information from one datum to another
Type: Conference contribution, Poster presentation

Canty, M.; Jasani, B.; Lingenfelder, I.; Nielsen, Allan Aasbjerg; Niemeyer, I.; Nussbaum, S.; Schlittenhardt, J.; Shimoni, M.; Skriver, Henning
Treaty Monitoring
Type: Book chapter

Barbosa, S.M.; Andersen, Ole Baltazar
Trend patterns in global sea surface temperature
Type: Journal article

Knudsen, Thomas
Using Covariance Descriptors for Image Based Change Detection and Revision of GIS Data :
"Kortdage 2007"
Type: Talk / Oral presentation

Cong, Xiaoying; Schlittenhart, Jörg; Gutjahr, Karlheinz; Soergel, Uwe; Canty, Morton John; Nielsen, Allan Aasbjerg
Using differential SAR interferometry for the measurement of surface displacement caused by underground nuclear explosions and comparison with optical change detection results
Type: Book chapter

Renganathan, V.; Braun, A.; Skourup, Henriette; Forsberg, René
Validation of ICESat sea ice elevations near Churchill, Manitoba
Type: Conference contribution, Conference abstract

Hasager, Charlotte Bay; Andersen, Ole Baltazar
Virtuel Galathea-3. Ekspeditionen fortsætter : Hjemmeside og Viden-om udsendelse
Type: Multimedia Learning Object

Engsager, Karsten Enggaard
Which accuracy do we need in GIS?
Wadhams, P.; Haas, C.; Hanson, Susanne; Gerland, S.; Laxon, S.
Work package progress during the second period
In: The Sixth Framework Programme (2002-2006) Type: Report