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Hydrography at HafenCity University Hamburg (HCU)

Meeting of the
German Hydrographic Consultancy Pool
(GHyCOP)
Hafen Club, 01/11/2007

Volker Böder

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CV Volker Böder

- 1994: graduated in Geodesy from the University Hannover
- 1994-2003: Research Associate at Institut für Erdmessung, University of Hannover (Prof. G. Seeber)
- 2002: doctoral thesis
  - Precise Positioning and Attitude Determination in Marine Applications
- 2005: Assessor Degree
  - Government of the Federal State of Lower Saxonia
- Sept. 2005: Professor for Practical Geodesy and Hydrography at the HafenCity University, Hamburg

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Hydrographic Education in Hamburg -Past-

- 1985: Consecutive Studies “Hydrography”
  - Hamburg University of Applied Sciences (HUAS)
  - 6 semesters in Surveying, 3 sem. in Hydrography, 1 sem. practical training
  - Diploma in “Vermessungswesen und Hydrographie” (Surveying Engineering and Hydrography).
- 1990: Certification Category-A (Academic)
  - International Advisory Board (IAB) of the FIG/IHO
  - Recertification in 2001
- 2000: new curriculum
  - Geomatics (8 sem.), Master “Hydrography” (4 sem.)
    - Possible combination of courses: Master within 5 years

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Hydrographic Education in Hamburg -Today-

- January 2006: Department of Geomatics moved to the HafenCity University (HCU) Hamburg
  - new founded by the Federal State of Hamburg
  - well-established departments (architecture, civil engineering, geomatics, urban planning) from different universities
    - Technical University, University of Arts, University of Applied Sciences

only academic institution in Germany
offering a two-years postgraduate program
which is accredited according to the
“Standards of Competence of Hydrographic Surveyors”
by the IAB of FIG/IHO/ICA at Category A

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HafenCity Hamburg (2010?)

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M.Sc. Hydrography

- B.Sc. Geomatics: Hydrography I compulsory
  - 2 h: basic understanding/first insight
- Requirements for Master of Science course
  - language requirements:
    - foreign applicants whose first language is not English must provide proof of their language ability
    - TOEFL (550/220), IELTS (band 6), Cambridge Certificate (CAE, CPE).
    - German applicants: satisfying english notes in school
  - academic / other requirements:
    - Bachelor's degree in a related field
    - A good score on the Bachelor's exam
    - Applicants whose university qualification is from a country outside of the European Union have to take the Graduate Record Examination (GRE) general test
- offered in English language
  - students are well prepared to work abroad

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Curriculum

Sem.	A	CP	B	CP	C	CP	D	CP	Σ CP
M 4	**Project** Field of Marine Engineering Geomatics Project Management	9	**Elaboration of Master Thesis** 3 Months				**Final Examination**	21	30
M 3	**Marine Geology/Geophysics** Geology/Geomorphology Basics Subbottom Profiling Seismics Magnetics	8	**Fundamental Oceanography** Physical Oceanography Tides	7	**Marine Environment** Oceanography Marine Weather Legal Aspects	7	**Software Technology** Object-Oriented Programming Project: Digital Cartography	8	30
M 2	**GIS-Hydrography** Desktop Mapping GIS-Projects: e.g. Coastal Zone Management	7	**Hydrography III** Sonar Systems with Area Coverage Hybrid Hydrographic Measurements Digital Terrain Model (DTM)	9	**Navigation** Nautical Science Traffic Control Systems Electronic Chart Display Integrated Navigation	7	**Practice** Supplementary Field Training (3 Weeks) Quality Management	7	30
M 1	**Data Processing** Interface Technology Data Acquisition Basics on CARIS	6	**Higher Geodesy** Mathematical Geodesy Physical Geodesy Gravimetry	7	**Basics Hydrography** Remote Sensing Applied Mathematics II Hydrography I	8	**Hydrography II** Basics Underwater Acoustics Acoustic/Parametric Systems Determination of Position and Water Depths	9	30
Sem.	A	CP	B	CP	C	CP	D	CP	120

CP: Credit Points

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Equipment

- 2 survey craft
  - LEVEL-A
    - length 7.5 m
    - Width 2.5 m
    - Draught 0.35 m
    - best conditions for practical exercises
    - Optimized to operate in shallow water

  - LEVEL-L
    - length 3.5 m
    - Width 1.5 m
    - Draught 0.2 m

Located on the Ship and Buoy Yard in Wedel, belonging to the Water and Shipping Authority (WSA) Hamburg.

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Equipment

- Hardware
  - ***Echo Sounder***
    - RESON: Multibeam Echosounder SeaBat 8101
    - Innomar SES-2000 FAN (parametric sediment echo sounder)
    - Fahrentholz: LituGraph (Single Beam)
      - 15 / 100 / 200 / 700 kHz
  - ***Positioning and Attitude Determination***
    - Leica: System 500 (RTK)
    - Javad: JAVAD 4 Gyro (PDGPS Positioning and Attitude System)
    - Trimble: NavBeacon (DGPS)
    - IXSEA: OCTANS III (fiberoptic IMU)
    - XSENS motion sensor
  - ***Additional Sensors***
    - Marine Magnetics: Mini Explorer
    - SVP Reson 15
    - Bubble-Pulse
  - and more

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Equipment

- Software packages
  - CARIS HIPS / SIPS / GIS
  - QPS: Qinsy / Qloud
  - PDS 2000
  - ISE for SES-2000
  - WinProfile
  - SURFER
  - Geo++ ® GNNET-RTK / GNATTI / GEONAP
- Main problem: Integration of the complementary sensors with the sonar systems with reference to timing and their relative locations to get reliable Digital Terrain Models (DTM)

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M.Sc. Hydrography

- Additionally: practical training in near-by institutions
  - Federal Maritime and Hydrographic Agency of Germany (BSH)
  - Alfred Wegener Institute (AWI, Bemerhaven)
  - Hamburg Port Authority (HPA)
  - Geomar
  - various companies

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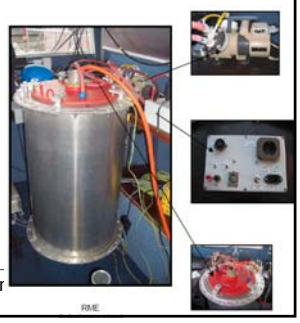
Current Diploma/Bachelor Thesis

- Investigation of Tube Measuring Unit for SBP
  (Arne Sauer, development of Prof. Andree)
  - Use of parametric subbottom profiler in extremely shallow water
  - heighten the column of water into the boat
  - Applications:
    - Archaelogy in shallow water
    - Sediments in shallow water



finished

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Current Diploma/Bachelor Thesis

- Optimization of Hydrographic Software for the Use at Hamburg Port Authority (HPA)
  (Thomas Thies, HPA)
  - Use of CARIS and QPS software
  - Investigation of cube algorithm
    - CARIS and Qloud
  - Optimized integration in the working process at HPA

finished

- Investigation of Motion Sensors in Various Environments
  (Michael Barth, Mario Röttger)
  - IXSEA OCTANS III
  - XSENS MTi
  - GPS-Attitude




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Current Diploma/Bachelor Thesis

- Use of Different Sensors in Hydrographic Applications, f.e.
  - Radiodetection for Sea Cables
    (Peter Mott, Nicola Engineering)
    - Telephone cable between Heligoland and main land
- Measuring of Quay Walls with Seabat 8101 and QPS-Software (Qinsy and Qloud)
  (Ronny Schinke)
- High Precision GPS for Height Control of Tide Gauges
  (Frank Borsutzki with WSA Hamburg)
- Results of the International Hydrography Summer Camp (IHSC)
  (Lars Engelhardt)

finished

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Practise on Ship

- Hydrography I
  - Demo with MBES
- Hydrography II
  - Single beam with different frequencies
  - Multi Beam
  - Comparision
- Hydrography III
  - Wreck Search with
    - MBES
    - SSS
    - SBP
    - Magnetometer
- Navigation
  - Excursion to BSH ships
  - Excursion: Lights at Night

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Hydrography I in SS2007 / WHD

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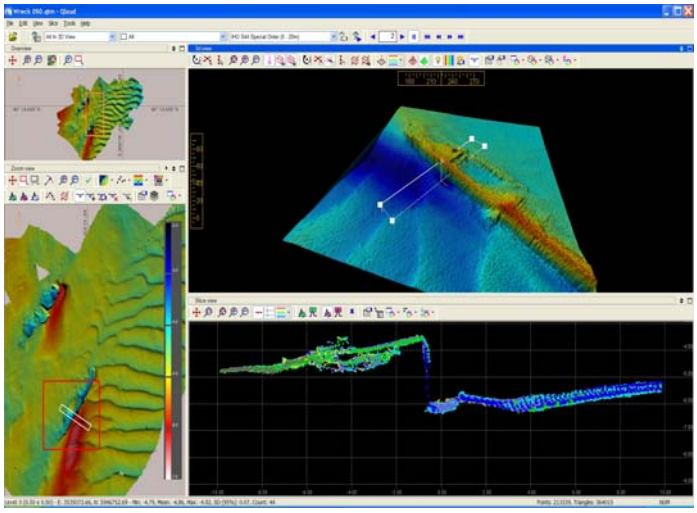
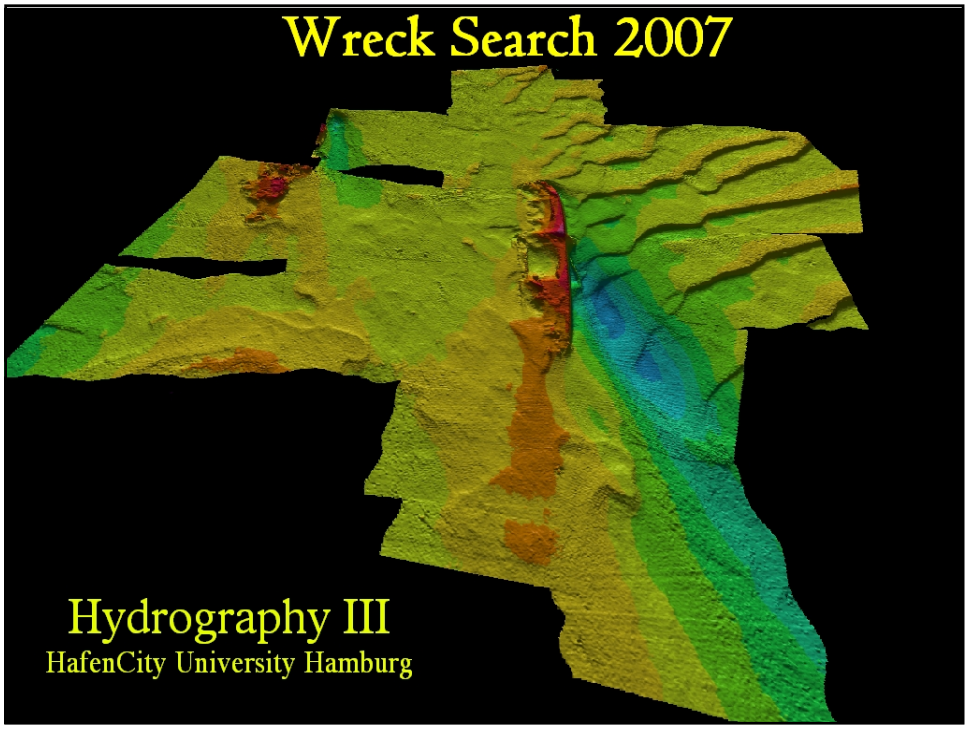
Hydrography III in WS2006/2007





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M.Sc. Hydrography

- Approx. 100 courses in Hydrography, Nautical Charting, and Marine Sciences worldwide
  - lasting from one week to five years
  - 1/3: Category A or Category B courses

rising need vs. stagnating budgets

Approx. 800 Hydrographers/Geophysics … are searched worldwide (Boskalis, FUGRO, …)

NIAH

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NIAH

- Northern Institute of Advanced Hydrographics
  - NIAH founded as a public-private partnership (70% HCU, 30% private companies) in January 2006
    - f.e. INNOMAR
  - To guarantee
    - sustainable operation,
    - continuous maintenance and
    - regular upgrades of the equipment and
    - for a greater independence of the public budget,.

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NIAH

- Advantages of NIAH
  - highly educated and permanently trained staff,
  - state of the art survey equipment,
  - specialized exercises and intensive practical training for the students,
  - flexible operation and application-oriented research.

- NIAH will offer this platform for
  - student education in hydrography
  - the use in national and international scientific projects in hydrography
  - geophysical, environmental, archaeological or biological investigations.

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Example: Redesign of Level-A

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HafenCity University Hamburg

Hydrography Summer Camp 2007
at
Hemmelsdorfer See (Lake Hemmelsdorf)

27.08. – 07.09.2007
(optional 1 or 2 weeks)

Searching the Deepest Point in Germany

More Information under
http://www.hcu-hamburg.de/geomatik/veranst/menue_ver.htm
Study Course M.Sc. Hydrography
http://www.hcu-hamburg.de/geomatik/studium/msc-hydro.htm
Laboratory Hydrography
http://www.hcu-hamburg.de/geomatik/department/inst/hydrographie/lab_h.htm
or simply
Prof. Dr. Volker Böder; Email: volker.boeder@hcu-hamburg.de; Tel. 040-428 27 5393

Hydrography Summer Camp 2007
Hemmelsdorfer See (Lake Hemmelsdorf)

How deep is the deepest point in Germany?
Are there any archaeological sites on the bottom of the lake?
What about the sedimentation in the lake?

These questions shall be worked out in Hydrography Summer Camp 2007
from August, 27th till September, 7th 2007
at the Hemmelsdorfer See.

The course is addressed to all students dealing with geodesy/geomatics and related disciplines, preferential students from the 2nd study year and above. The number of participants is limited. The course will be held in English and German.

Lake Hemmelsdorf is located 15 km northwest from Luebeck and 5 km south from Timmendorfer Strand at the Baltic Sea. The sea offers interesting aspects:

- **deepest point in Germany**
- **possibly archaeological sites (Slavonic settlement)**
- **nature reserve.**

For leisure time you will find beaches and bathing facilities and some interesting tourist attractions.

The measurements will take place onboard the survey craft **Level-A** from the HafenCity University Hamburg (HCU, Dep. Geomatik). The Level-A is well equipped with modern technique and software.

The equipment is used in especial for the education in the national accredited and international certified (FIG/IHO/ICA Cat A) study program **M.Sc. Hydrography**. The demand for qualified hydrographers is still increasing.

Costs for food and accommodation must be paid by each participant. A vacation flat for 4 persons costs round about 15 Euros per night and person and is reserved for the participants. The course itself is free of charge.

If you are interested in the Summer Camp or Study Program please send an email to

Prof. Dr. Volker Böder
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Hebebrandstr. 1, 22297 Hamburg, Germany
Email: volker.boeder@hcu-hamburg.de
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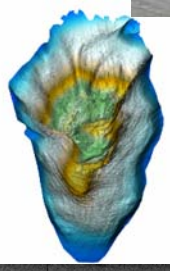
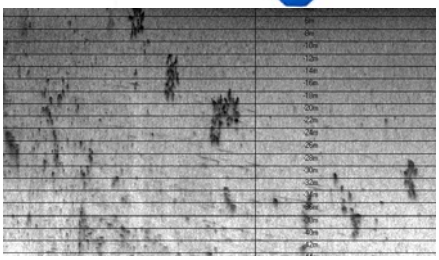
1st IHSC 2007



- Found and marked out the deepest point in Germany (mainland)
- Interesting structures (archaeology?)
- Get in contact with Hydrography



- Bac thesis: Lars Engelhardt

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Summary

- > 20 years professional education in Hamburg
- M.Sc. Hydrography
- FIG/IHO/ICA Category A
- New founded university
  - HafenCity University Hamburg, HCU
- New founded institute
  - Northern Institute of Advanced Hydrographics (NIAH)
  - supporting education and research

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Some of the beginners 2007

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Thank you for your attention