

Timm Schoening

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Born: 13. September 1984, Bielefeld
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Research & Education

- 2021 GEOMAR PI of the HMC project FDO-5DI
- 2020 - Now **Research data manager in the MareHub (50%) for “Large research equipment (ROV, AUV) data publication workflows”.**
- 2020 - Now **Staff scientists at GEOMAR (50%) as PI for the Machine Learning work of the H2020 project *iAtlantic*.**
- 2019 - 2020 PostDoc at the GEOMAR Helmholtz-Centre for Ocean Research Kiel in the DeepSea Monitoring Group (Prof. Dr. Jens Greinert, Marine Geosystems). *Automated Image Analysis in the framework of the JPIOceans “MiningImpact2” Project*
- 2018-2019 PI in a Future Ocean excellence cluster PostDoc project at the GEOMAR Helmholtz-Centre for Ocean Research Kiel. *Rapid off-shore Analysis of Marine Imagery*
- 2018 PostDoc at Okeanos, University of the Azores, Horta, Portugal (DFG Research Fellowship). *Exploiting 3D information for an automated semantic analysis of underwater images*
- 2015 - 2017 PostDoc at the GEOMAR Helmholtz-Centre for Ocean Research Kiel in the DeepSea Monitoring Group (Prof. Dr. Jens Greinert, Marine Geosystems). *Automated Image Analysis in the framework of the JPIOceans “EcoMining” Project.*
- 2015 PostDoc in the Biodata Mining Group at Bielefeld University
- 2014 **PhD thesis: *Automated Detection in Benthic Images for Megafauna Classification and Marine Resource Exploration, Grade: 1.0 (with honors)*** Review committee: Prof. Dr. Tim W. Nattkemper (Bielefeld University), Prof. Dr. Rafael Garcia (University of Girona), Dr. Hanumant Singh (Woods Hole Oceanographic Institute)
Submitted: 27. July 2014, Defended: 14. February 2015
- 2010 - 2014 PhD student, Computer Science in the Natural Sciences, Bielefeld University
 - 2010 Master thesis: *Extensions of Ripley’s-K function and their Application to Spatial Patterns in Bioimage Datamining, Grade: 1.0*
Review committee: Prof. Dr. Tim W. Nattkemper and Christian Loyek
- 2008 - 2010 Master student, Computer Science in the Natural Sciences (Profile Chemistry), Bielefeld University, Grade: 1.3
 - 2008 Bachelor thesis: *Web 2.0 techniques for exploratory image database analysis, Grade: 1.0*
Review committee: Prof. Dr. Tim W. Nattkemper and Dr. Jörg Ontrup
- 2005 - 2008 Bachelor student, Computer Science in the Natural Sciences (Profile Chemistry), Bielefeld University, Grade: 1.5

Practical Experience

- 2021-Now Member of the GEOMAR 2030 strategy group on “Digital Twins”
- 2020-Now Member of the GEOMAR Digital Council as spokesperson of RD2 and as contact for machine learning and towards Helmholtz AI
- 2019-Now **Chair of the DAM/MareHub working group “Videos & Images”**

- 2019 Member of the PostDoc team to setup the PostDoc Academic Career Support Center (PACT) at GEOMAR
- 2019 Co-host of the 2019 “Image Analysis Days Schleswig-Holstein”
- 2019 Member of the Scientific Organizing Committee to conduct the third Marine Imaging Workshop at Ocean Networks Canada, Victoria, BC
- 2018-Now **Initiated & conducting the *Digital Science Monday* seminar series at GEOMAR to connect method expertise across RDs, in parallel setting up GEOMAR Knowledge Hubs for information exchange among team GEOMAR, crossing RD boundaries, since 2019 jointly conducted with the MarData research school.**
- 2018-Now Elected PostDoc speaker within the Future Ocean excellence cluster and at GEOMAR
- 2018 Research scholarship at Okeanos/Azores conducting 3D coral imaging in the lab and high-performance image analysis
- 2017 PostDoc Summer School: Project management, Academic teaching, Proposal writing, Leadership, Self-management, Agile Management
- 2016/17 **Chair of the scientific and local organizing committees to conduct the second Marine Imaging Workshop (February 2017 at GEOMAR)**
- 2013 - 2014 Co-chair of the scientific organizing committee that initiated and conducted the first Marine Imaging Workshop (held in April 2014 at the National Oceanographic Centre, UK) with three days of poster and technical presentations of 100 international participants.
- 2011 - Now Training of ca. 42 B.Sc. / M.Sc. / Ph.D. students and interns in software / research projects for underwater image analysis
- 2009 - 2010 Exchange semester to the Bioimage Analysis Lab at the University of Warwick, UK
- 2006 - 2010 Various student and research assistant positions in the Biodata Mining Group to develop software and conduct experiments

Prizes

- 2019 **Initiator of the GEOMAR Software Development Prize**
- 2017 **Briese Research PhD Award for Marine Science**
- 2006 Winner of the *Techniques of software project development* contest

Active Collaborations of past three years

... writing projects, publishing papers, analyzing data, conducting cruises, organizing workshops, etc.:

Ifremer – Brest, NOC – Southampton, Okeanos – Azores, JUB – Bremen, RBINS – Brussels, Marum – Bremen, AWI – Bremerhaven, NIOZ – Texel, BGR – Hannover, Ocean College – Zhejiang, DKRZ – Hamburg, HZDR – Dresden, Hereon – Geesthacht, Plymouth University, MBARI – Moss Landing, Ocean Networks Canada – Victoria

Grants – 600k€ acquired so far

- 2021 GEOMAR PI for the BMWi GAIA-X proposal “MARISPACE-X”
- 2021 Contributed to the MUSE infrastructure proposal
- 2020 **Helmholtz Metadata Collaboration (HMC) project *FAIR Digital Objects for 5D images (FDO-5DI)* with DLR**
- 2019 *iAtlantic* Project Co-Proponent (EU H2020)
- 2019 Co-Proponent of the “Deep Walls” project (Azores Government)

- 2018 **Contributed to setting up the Helmholtz Artificial Intelligence Cooperation Unit (HAICU) – now Helmholtz AI**
- 2018 **Contributed to the Helmholtz Image Computing initiative – now HIP**
- 2017 *“Exploiting 3D information for an automated semantic analysis of underwater images”* (DFG Research Fellowship)
- 2017 *“Rapid, offshore Analysis of Marine Imagery”* (Future Ocean Excellence Cluster – PostDoc Project Call)
- 2016 *“General Purpose Underwater Spectral Imaging”* (Future Ocean Excellence Cluster – Investment Call, proposal supporter)
- 2016 *“Multi-Spectral Image Capture”* (GEOMAR Seed Funding)

Cruises – 8.5 months at sea so far

- 2020 **PI for RV Maria S Merian cruise MSM96 “Metal geochemistry meets machine learning”**
- 2019 RV Sonne SO268-1&2: Manzanillo – Vancouver; Cruise Station Planning, AUV Operations, Optical and Acoustical Sensor Network Operation and Data Management, Automated Image Analysis, Manganese Nodule Measurements from BoxCores, Deployment Management in GIS
- 2018 **PI for RV Poseidon cruise POS526 “SeaSOM”: Bergen – Kiel; Semi-autonomous optical monitoring technologies for bubble release sites and cold water coral reefs**
- 2016 MIDAS demonstration cruise with RV Pelagia: Faial – Faial; ROV and towed camera operations, data management and image analysis
- 2015 RV Sonne SO242-1: Guayaquil – Guayaquil; AUV operation, image analysis and annotation
- 2015 RV Sonne SO239: Panama – Manzanillo; AUV operation, image analysis and annotation
- 2014 RV Sonne Testcruise: Kiel – Gran Canaria; ROV video analysis and annotation

Publications – Peer-Reviewed – H-Index: 15

- 2021 Daniel OB Jones *et al.* *Environment, ecology, and potential effectiveness of an area protected from deep-sea mining (Clarion Clipperton Zone, abyssal Pacific)* Progress in Oceanography
<https://doi.org/10.1016/j.pocean.2021.102653>
- 2021 Hongbo Liu, ..., Timm Schoening *Automated Activity Estimation of the Cold-Water Coral Lophelia pertusa by Multispectral Imaging and Computational Pixel Classification* Journal of Atmospheric and Oceanic Technology <https://doi.org/10.1175/JTECH-D-19-0139.1>
- 2020 Timm Schoening, Autun Purser, Daniel Langenkämper, Inken Suck, James Taylor, Daphne Cuvelier, Lidia Lins, Erik Simon-Lledó, Yann Marcon, Daniel OB Jones, Tim Nattkemper, Kevin Köser, Martin Zurowietz, Jose Gomes-Pereira, Jens Greinert *Megafauna community assessment of polymetallic nodule fields with cameras: Platform and methodology comparison – Biogeosciences*
<https://doi.org/10.5194/bg-17-3115-2020>
- 2019 Timm Schoening *SHiPCC-A Sea-going High-Performance Compute Cluster for Image Analysis - Frontiers in Marine Science*
<https://doi.org/10.3389/fmars.2019.00736>
- 2019 Florian Gausepohl, Anne Hennke, Timm Schoening, Kevin Köser, Jens Greinert *Scars in the Abyss: Reconstructing sequence, location and*

- temporal change of the 78 plough tracks of the 1989 DISCOL deep sea disturbance experiment in the Peru Basin* - Biogeosciences Discussions
- 2019 Erik Simon-Lledó, Brian J Bett, Veerle AI Huvenne, Timm Schoening, Noëlie MA Benoist, Daniel OB Jones *Ecology of a polymetallic nodule occurrence gradient: implications for deep-sea mining* - Limnology and Oceanography
- 2019 Erik Simon-Lledó, Brian J Bett, Veerle AI Huvenne, Timm Schoening, Noëlie MA Benoist, Rachel M Jeffreys, Jennifer M Durden, Daniel OB Jones *Megafaunal variation in the abyssal landscape of the Clarion Clipperton Zone* - Progress in Oceanography
- 2019 Erik Simon-Lledó, Brian J Bett, Veerle AI Huvenne, Kevin Köser, Timm Schoening, Jens Greinert, Daniel OB Jones *Biological effects 26 years after simulated deep-sea mining*- Scientific reports
- 2018 **Timm Schoening, Kevin Köser, Jens Greinert. *An acquisition, curation and management workflow for sustainable, terabyte-scale marine image analysis. Scientific Data***
<https://doi.org/10.1038/sdata.2018.181>
- 2018 Hongbo Liu, Jan Sticklus, Kevin Köser, Henk-Jan Hoving, Hong Song, Ying Chen, Jens Greinert, Timm Schoening. *TuLUMIS - A tunable LED-based underwater multispectral imaging system*. Optics Express
- 2018 Iason Gazis, Timm Schoening, Evangelos Alevizos, Jens Greinert *Quantitative mapping and predictive modeling of Mn nodules' distribution from hydroacoustic and optical AUV data linked by random forests machine learning* - Biogeosciences
- 2018 Alevizos, E., Schoening, T., Köser, K., Snellen, M., & Greinert, J. *Quantification of the fine-scale distribution of Mn-nodules: insights from AUV multi-beam and optical imagery data fusion*. Biogeosciences Discussions
- 2018 Peukert, A., Schoening, T., Alevizos, E., Köser, K., Kwasnitschka, T., & Greinert, J. *Understanding Mn-nodule distribution and related deep-sea mining impacts using AUV-based hydroacoustic sensing and optical observations*. Biogeosciences Discussions
- 2017 **Timm Schoening, Daniel Jones, Jens Greinert *Compact Morphology based Delineation of Poly-Metallic Nodules (Nature Scientific Reports)***
<https://doi.org/10.1038/s41598-017-13335-x>
- 2017 Daniel Langenkämper, Martin Zurowietz, Timm Schoening, Tim W. Nattkemper *BIIGLE 2.0 - Browsing and Annotating Large Marine Image Collections* (Frontiers in Marine Science)
<https://doi.org/10.3389/fmars.2017.00083>
- 2016 Jose Nuno Gomes Pereira et al. *Current and Future Trends in Marine Image Annotation Software* (Progress in Oceanography)
<https://doi.org/10.1016/j.pocean.2016.07.005>
- 2016 **Timm Schoening, Thomas Kuhn, Daniel OB Jones, Erik Simon-Lledo, Tim W Nattkemper *Fully automated image segmentation for benthic resource assessment of poly-metallic nodules (Methods in Oceanography)***
<https://doi.org/10.1016/j.mio.2016.04.002>
- 2016 Timm Schoening, Jonas Osterloff, Tim W Nattkemper *RecoMIA - Recommendations for Marine Image Annotation: Lessons Learned and Future Directions* (Frontiers in Marine Science)
<https://doi.org/10.3389/fmars.2016.00059>

- 2016 Tom Kwasnitschka, Kevin Köser, Jan Sticklus, Marcel Rothenbeck, Tim Weiß, Emanuel Wenzlaff, Timm Schoening, Lars Triebe, Anja Steinführer, Colin Devey, Jens Greinert *DeepSurveyCam - A Deep Ocean Optical Mapping System* (Sensors)
<http://dx.doi.org/10.3390/s16020164>
- 2016 Jennifer M Durden, Brian J Bett, Timm Schoening, Kirsty J Morris, Tim W Nattkemper, Henry A Ruhl *Comparison of image annotation data generated by multiple investigators for benthic ecology* (Marine Ecology Progress Series)
<http://dx.doi.org/10.3354/meps11775>
- 2015 Timm Schoening, Thomas Kuhn, Melanie Bergmann, Tim W Nattkemper *DELPHI - fast and adaptive computational laser point detection and visual footprint quantification for arbitrary underwater image collections* (Frontiers in Marine Science)
<https://doi.org/10.3389/fmars.2015.00020>
- 2014 Timm Schoening, Thomas Kuhn, Tim W Nattkemper *Seabed classification using a bag-of-prototypes feature representation* (International Conference on Pattern Recognition)
<https://doi.org/10.1109/CVAUI.2014.9>
- 2014 Tim W Nattkemper, Timm Schoening, Daniel Brün *Image-based Marine Resource Exploration and Biodiversity Assessment with MAMAS (Marine data Asset Management and Analysis System)* (UMI)
- 2013 Timm Schoening, Björn Steinbrink, Daniel Brün, Thomas Kuhn, Tim W Nattkemper *Ultra-fast segmentation and quantification of poly-metallic nodule coverage in high resolution digital images* (UMI)
- 2013 Autun Purser, Jörg Ontrup, Timm Schoening, Laurenz Thomsen, Tim W Nattkemper *Microhabitat and shrimp abundance within a Norwegian cold-water coral ecosystem* (Biogeosciences)
<https://doi.org/10.5194/bg-10-5779-2013>
- 2012 Timm Schoening, Melanie Bergmann, Tim W. Nattkemper *Investigation of hidden parameters influencing the automated object detection in images from the deep seafloor of the HAUSGARTEN observatory* (OCEANS)
- 2012 Timm Schoening, Thomas Kuhn, Tim W. Nattkemper *Estimation of poly-metallic nodule coverage in benthic images* (Underwater Mining Institute)
- 2012 **Timm Schoening, Melanie Bergmann, Jörg Ontrup, James Taylor, Jennifer Dannheim, Julian Gutt, Autun Purser, Tim W. Nattkemper** *Semi-Automated Image Analysis for the Assessment of Megafaunal Densities at the Arctic Deep-Sea Observatory HAUSGARTEN* (PLoS ONE)
<https://doi.org/10.1371/journal.pone.0038179>
- 2011 Timm Schoening, Volkmar Hans, Tim W. Nattkemper *Towards improved epilepsy diagnosis by unsupervised segmentation of neuropathological tissue sections using Ripley's-L features* (Bildverarbeitung für die Medizin)
- 2009 Timm Schoening, Nils Ehnert, Jörg Ontrup, Tim W. Nattkemper *Biigle Tools – A Web 2.0 approach for Visual Bioimage Database Mining* (Information Visualization)

Publications – Data

- 2021 **Schoening, Timm (2021): Results of nodule detection along OFOS tracks of RV SONNE cruise SO268**

- 2021 Schoening, Timm; Schlundt, M (2021): Continuous thermosalinograph oceanography along Maria S. Merian cruise MSM96
- 2021 Schoening, T; Paul, SAL (2021): CTD raw data files from Maria S. Merian cruise MSM96
- 2021 Mohrmann, J; Gazis, I-Z; Schoening, T et al. (2021): Multibeam bathymetry raw data (Kongsberg EM 122 entire dataset) of RV MARIA S. MERIAN during cruise MSM96
- 2020 Schoening, T; Kopte, R; Mohrmann, J et al. (2020): ADCP current measurements (75 kHz) during Maria S. Merian cruise MSM96
- 2019 Schoening, Timm; Gazis, Iason-Zois (2019): Summary of sizes, weights, counts and coverage of poly-metallic nodules from box cores taken during SONNE cruises SO268/1 and SO268/2. <https://doi.pangaea.de/10.1594/PANGAEA.904967>
- 2019 Schoening, Timm; Gazis, Iason-Zois (2019): Sizes, weights and volumes of poly-metallic nodules from box cores taken during SONNE cruises SO268/1 and SO268/2. <https://doi.pangaea.de/10.1594/PANGAEA.904962>
- 2018 **Schoening, Timm (2017): Results of nodule detection along AUV tracks during SONNE cruises SO239 and SO242/1. <https://doi.pangaea.de/10.1594/PANGAEA.883838>**
- 2018 Schoening, Timm (2017): Source code for the Compact Morphology-based Nodule Delineation (CoMoNoD) algorithm. <https://doi.org/10.1594/PANGAEA.875070>
- 2017 **Greinert, Jens; Schoening, Timm; Köser, Kevin; Rothenbeck, Marcel (2017): Seafloor images and raw context data along AUV tracks during SONNE cruises SO239 and SO242/1. <https://doi.org/10.1594/PANGAEA.882349>**
- 2017 Schoening, Timm; Schütt, Andrea (2017): Simulated Hierarchical Benchmark Dataset to assess dendro-classification methods (hierarchical classification). <https://doi.org/10.1594/PANGAEA.884173>

Publications – Other

- 2019 Greinert, Jens and Schoening, Timm *RV POSEIDON Fahrtbericht / Cruise Report POS526 - SeASOM: Semi-Autonomous Subsurface Optical Monitoring for methane seepage and cold-water coral studies in the North Sea* DOI 10.3289/geomar_rep_ns_51_2019.
- 2017 Timm Schoening et al. „Report on the Marine Imaging Workshop 2017” (Research Ideas and Outcomes) <https://doi.org/10.3897/rio.3.e13820>
- 2016 Ian Stewart et al. MIDAS Deliverable 10.5: “Report on the appropriateness of the testing of the protocols and standards developed in WP8”
- 2016 **Jen Durden, Timm Schoening et al. *Visual imaging for marine biological and ecological research (Oceanography and Marine Biology: An Annual Review)***
- 2016 Ann Vanreusel et al. MIDAS Deliverable 10.4: “Tools for Rapid Biodiversity Assessment”
- 2015 JPIO “Ecological Aspects of Deep-Sea Mining” Progress Report 2015 – Section Work Package 1
- 2015 Jens Greinert et al. “RV Sonne Cruise Report SO242-1” http://dx.doi.org/10.3289/GEOMAR_REP_NS_26_2015
- 2015 Lenaïck Menot et al. MIDAS Deliverable 10.2: “Integrative Habitat Mapping Technologies”

- 2015 Pedro Martinez Arbizu et al. “RV Sonne Cruise Report SO239”
http://dx.doi.org/10.3289/GEOMAR_REP_NS_25_2015
- 2015 Jan Schulz et al. *Aquatische Optische Technologien* (Marine Science Reports)

Invited Talks

- 2019 MarData Kickoff “*Marine Image Analysis*”
- 2018 Digital Kiel Week “*Machine Learning Methods for the Analysis of Deep Sea Imagery*”
- 2018 Image Analysis Days Schleswig-Holstein, Kiel, Germany “*Pattern Recognition and Machine Learning for Deepsea Imagery*”
- 2018 Ifremer Imagery Working Group, Brest, France “*Multi-task automated benthic image analysis*”

Conference presentations

- 2020 Timm Schoening *Megafauna community assessment with cameras: Platform, annotator and methodology comparison (OSM)*
- 2019 Timm Schoening *An acquisition, curation and management workflow for sustainable marine image analysis* (Marine Imaging Workshop)
- 2017 Timm Schoening *Natural heterogeneity of manganese nodule abundance, determined by automated image analysis* (Goldschmidt)
- 2017 Timm Schoening *Quality of optical image based manages nodule abundance assessment* (Geohab)
- 2017 Timm Schoening *Comparison of automated nodule detection strategies* (Marine Imaging Workshop)
- 2016 Timm Schoening *Rapid assessment of manganese nodule abundance* (Geohab)
- 2014 Timm Schoening *A machine-learning system for the automated detection of megafauna and its applicability to unseen footage* (Geohab)
- 2014 Timm Schoening, Thomas Kuhn, Tim W Nattkemper *Seabed classification using a bag-of-prototypes feature representation* (Computer Vision for Analysis of Underwater Imagery)
- 2014 Timm Schoening, Jennifer Durden, Henry Ruhl, Tim W. Nattkemper *Automating megafauna detection in the Porcupine Abyssal Plain* (Marine Imaging Workshop)
- 2012 Timm Schoening, Melanie Bergmann, Autun Purser, Julian Gutt, et al. *The impact of human expert knowledge on automated object detection in benthic images* (Deep Sea Biology Symposium)

Reviewing: PLoS One, MDPI Sensors, Scientific Reports, Journal of Ocean Engineering, Computer Vision for the Analysis of Underwater Images, Journal of Sea Research, MDPI Imaging, Marine Ecology Progress Series, Belmont Forum, Project Management Jülich (PTJ), Marine Geology, Progress in Oceanography, Swiss National Science Foundation, Journal of Field Robotics, BioVis, Applied Soft Computing, Journal of Sea Research, Geoscientific Instr. Methods and Data Systems