

# Scientific Resume of Prof. Dr. Arne Biastoch

**Objective** Physical Oceanographer with a strong interest to use numerical models to research the mesoscale and large-scale ocean circulation and to work interdisciplinary on solid earth and biological interactions.

## Employment History

Since October 2001: Scientist, GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany (before 2004 Institute for Marine Sciences, 2004-2011 IFM-GEOMAR), Research Unit Theoretical Oceanography

- Investigating the variability in the Agulhas system and its effect on the large-scale circulation (P. I. in DFG, BMBF and EU projects); Co-chair of the SCOR Working Group No. 136 “Climatic Importance of the Greater Agulhas System” (2010-2012)
- Studying the Atlantic Ocean circulation variability (P. I. in EU and BMBF projects, e.g. PalMod)
- Exploring the role of seafloor warming and the fate of Arctic gas hydrates (interdisciplinary collaboration within the Kiel Cluster of Excellence “Future Ocean”)
- Exploring the dispersal and Lagrangian connectivity of drifting organisms (glass eels, juvenile turtles, foraminifera, larvae, bacteria) and particles (MH<sub>370</sub>) (interdisciplinary collaboration with different research divisions at GEOMAR and European institutes)
- Simulating ocean and climate dynamics using a suite of global ocean/sea-ice models, also with high-resolution nests, based on the NEMO code (joint work in the European modelling initiative Drakkar and with Helmholtz partners in the ESM-project)
- Leading as chair of the GEOMAR Scientific Council and the member of the Consultatory Board of Directors
- Coordinating Earth system modelling within the Helmholtz framework program ESM
- Teaching of bachelor and master students; official advisor of PhD students; member of faculty board “Marine Sciences” and examination board for the MSc program “Climate Physics”
- Performing outreach at GEOMAR and the Kiel Cluster of Excellence “Future Ocean”

1999 to 2001: Postgraduate Researcher, Scripps Institution of Oceanography, La Jolla, U.S.A.

- Researched the physics of exchange over the Greenland Scotland Ridge and the circulation in the subpolar North Atlantic
- Studied the effectiveness of observing networks using high resolution regional and global models
- Organized a weekly department seminar series

January 1999: Guest Scientist, University of Cape Town, South Africa

- Installed Agulhas region model on a local computer and trained Ph.D. student
- Completed Agulhas analyses and wrote paper in collaboration with local scientists

1998 to 1999: Research Assistant, Institute for Marine Sciences Kiel

- Designed a model of the North Sea and Baltic Sea
- Studied the salt balance of the Gulf Stream in a regional model

1994 to 1998: Ph.D. Student, Institute for Marine Sciences Kiel, Dept. Theoretical Oceanography

- Designed an ocean general circulation model of the Agulhas region and researched the dynamics of the Agulhas Current system
- Programmed open boundary conditions for general use in the GFDL Modular Ocean Model (MOM<sub>2</sub> and MOM<sub>3</sub>)
- Collected real ocean data (CTD, drifter) in the Irminger Sea and the Baltic Sea
- Taught undergraduate students (exercises, talks)

1991 to 1992: Student Job, Institute for Marine Sciences Kiel, Dept. Marine Physics

- Rewrote program of water mass formation analysis for global use, first publication (Speer, Isemer, and Biastoch, 1995, *J. Phys. Oceanogr.*, **25**, 2444-2457)
- Collected real ocean data (CTD, moorings) in the South Atlantic

## University

March 2013: Adjunct (“außerplanmäßiger”) Professor, Christian-Albrechts-University Kiel

January 2009: *Venia legendi*, Christian-Albrechts-University Kiel

November 2008: Habilitation, Christian-Albrechts-University Kiel

- Thesis: “The Agulhas Leakage: Role of Mesoscale Processes and Impact on the Atlantic Meridional Overturning Circulation”

June 2000: WOCE Young Investigator Workshop, Boulder, U.S.A.

June 1998: Ph.D., Physical Oceanography, Christian-Albrechts-University Kiel

- Thesis (in German): “Circulation and Dynamics of the Agulhas Region According to a Numerical Model”, advisor: W. Krauß

February 1995: NATO ASI Workshop “Decadal Climate Variability”, Les Houches, France

August 1994: Diploma, Physical Oceanography, Christian-Albrechts-University Kiel

- Thesis (in German): “The Influence of Atmospheric Fresh Water Fluxes and the Large-scale Density Field on the Circulation in the North Atlantic”, advisor: W. Krauß

1988 to 1994: Study of Physical Oceanography, Christian-Albrechts-University Kiel

## Awards

October 2010: Golden Spike Award for High-Performance Computing at HLRS, Stuttgart

December 2009: IFM-GEOMAR publication price

## Committees and Memberships

Co-chair of SCOR Working Group No. 136 “Climatic Importance of the Greater Agulhas System” (2010-2012)

Member of the Kiel Cluster of Excellence “Future Ocean” and the DFG Sonderforschungsbereich 754 “Climate - Biogeochemistry Interactions in the Tropical Ocean”

Member of the American Geophysical Union (AGU) since 1995

## Scientific Output

As of today, 84 manuscripts in international journals and books were published (among 7 contributions to *Nature* journals). My current Web of Science based h-index is 26. My five most important publications were:

- Biastoch, A., C. W. Böning, F. U. Schwarzkopf, and J. R. E. Lutjeharms, 2009: Increase in Agulhas leakage due to poleward shift in the southern hemisphere westerlies, *Nature*, **462**, doi: 10.1038/nature08519, 495-498.
- Biastoch, A., J. V. Durgadoo, A. K. Morrison, E. van Sebille, W. Weijer, S. M. Griffies, 2015: Atlantic Multi-decadal Oscillation covaries with Agulhas leakage, *Nat. Commun.*, **6**:10082 doi: 10.1038/ncomms10082.

- Biastoch, A., T. Treude, L. H. Rüpke, U. Riebesell, C. Roth, E. B. Burwicz, W. Park, C. W. Böning, M. Latif, G. Madec, and K. Wallmann, 2011: Rising Arctic Ocean temperatures cause gas hydrate destabilization and ocean acidification, *Geophys. Res. Lett.*, **38**, L08602, doi: 10.1029/2011GL047222.
- Biastoch, A., C. W. Böning, J. Getzlaff, J.-M. Molines, and G. Madec, 2008: Mechanisms of interannual - decadal variability in the meridional overturning circulation of the mid-latitude North Atlantic Ocean, *J. Climate*, **21**, 6599–6615, doi: 10.1175/2008JCLI2404.1.
- Böning, C. W., E. Behrens, A. Biastoch, K. Getzlaff, and J. L. Bamber, 2016: Emerging impact of Greenland meltwater on deepwater formation in the North Atlantic Ocean, *Nat. Geosci.*, **9**, 523-527, doi: 10.1038/ngeo2740.

Several (invited) talks and presentations were given at international conferences, workshops and institutes. Some examples: At the 2010 Ocean Sciences Meeting in Portland, a session in "The greater Agulhas Current System" was proposed and chaired. In 2012, a keynote presentation at the "10th International Conference on Southern Hemisphere Meteorology and Oceanography" in Noumea and a prestigious lecture on ocean and climate change at the College de France in Paris were held. As one of the leading conveners, an AGU Chapman Conference on "The Agulhas System and its Role in Changing Ocean Circulation, Climate, and Marine Ecosystems", was proposed, organized and held in October 2012 in the Western Cape, South Africa. Served on scientific planning committees of international conferences.

Review of scientific manuscripts for international journals (*Nature*, *Science*, topical journals) and proposals (U.S. NOAA and NSF, U.K., Sweden, The Netherlands, South Africa), external and internal examiner of Ph.D., MSc and BSc theses.

Conception, application and realization of scientific projects (DFG, BMBF, EU). Contribution to proposals of joint research activities (SFB, Cluster of Excellence).

## Teaching

Currently, three postdocs are supervised in ocean modelling (Franziska Schwarzkopf, BMBF-project SPACES-AGULHAS), paleo modelling (Torge Martin, BMBF-project PalMod) and atmosphere-ocean coupling (Jan Harlaß, Helmholtz-project ESM).

Since 2009 (officially allowed by the German Habilitation) the following PhD theses are/were supervised:

- Rene Schubert: Submesoscale Ocean Dynamics in Numerical Model Simulations (ongoing)
- Siren Rühls: Lagrangian Connectivity Studies in Ocean General Circulation Models, (ongoing)

- Christina Roth: Atlantic-Arctic Exchange (ongoing)
- Jonathan Durgadoo: Controls and impact of Agulhas leakage (finished September 2013)

Further PhD theses are/were co-supervised, currently five at GEOMAR, one at the national level, one in the U.S. National and international theses were reviewed, PhD committees were served as an examiner (Germany, The Netherlands) or opponent (U.K.). Theses from the bachelor and master programs at the Kiel University are regularly supervised and reviewed.

Since 2002 lectures and exercises at the Christian-Albrechts-Universität Kiel covering all aspects of Theoretical and Physical Oceanography and Ocean General Circulation Modelling were taught. These courses were part of the diploma, bachelor and master programs at Kiel University. Modules at international summer schools (e.g., WE-Heraeus Summer School on Physics of the Ocean) were designed and held.

## References

Prof. Dr. Claus Böning, Theory and Modelling, GEOMAR Helmholtz Centre for Ocean Research Kiel, Düsternbrooker Weg 20, 24105 Kiel, Germany, email: [cboening@geomar.de](mailto:cboening@geomar.de)

Prof. Dr. Susan Lozier, Nicholas School of the Environment, Duke University, Box 90227, Durham, NC, 27708-0227, U.S.A., email: [s.lozier@duke.edu](mailto:s.lozier@duke.edu)

Prof. Dr. Bernard Barnier, Laboratoire des écoulements géophysiques et industriels (LEGI), Université Joseph Fourier Grenoble I, BP53, 38041 Grenoble Cedex 9, France, email: [Bernard.Barnier@hmg.inpg.fr](mailto:Bernard.Barnier@hmg.inpg.fr)

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