

*Name* **Prof. Dr. Hans-Otto Pörtner**



**Candidate for Co-Chair IPCC WGII**

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### **Scientific Profile**

Hans-O. Pörtner studied at Münster and Düsseldorf Universities where he received his PhD and habilitated in Animal Physiology. As a Research and then Heisenberg Fellow of the German Research Council he worked at Dalhousie and Acadia Universities, Nova Scotia, Canada and at the Lovelace Medical Foundation, Albuquerque, NM. Currently he is Professor and Head of the Department of Integrative Ecophysiology at the Alfred Wegener Institute for Marine and Polar Research, Bremerhaven, Germany. He acts as an associate editor “Physiology” for Marine Biology and as a co-editor of the Journal of Thermal Biology and serves on several editorial boards.

Until the end of 2014 he served as a Coordinating Lead Author of **IPCC** WGII AR5, chapter 6, Ocean Systems, which included the production of various cross-chapter products. He was a member of the author teams for the WGII Technical Summary and Summary for Policymakers, as well as of the Core Writing Team for the IPCC AR5 Synthesis Report. Between 2003 and 2005, he contributed to the IPCC Special Report “Carbon dioxide capture and storage” as a Lead Author of chapter 6 on Ocean storage.

His research interests include the effects of climate warming, ocean acidification, and hypoxia on marine animals and ecosystems with a focus on the links between ecological, physiological, biochemical and molecular mechanisms limiting tolerance, supporting adaptation and shaping biogeography and ecosystem functioning.

His broader interests relate to the general principles of climate change impacts on ecosystems and human societies, from the challenges to biodiversity and the impacts on human physiology, health and livelihoods to the economic implications of climate change. This includes the options and limits to societal and ecosystem adaptation, the balance between adaptation and mitigation strategies as well as optimized strategies of communicating climate-related issues to media and relevant stakeholders. Informing the debate between science, policy, and society is much needed to overcome the present societal inertia in the development and implementation of solution strategies.

## Contributions to IPCC Products

- IPCC. 2014. Summary for Policymakers. In: *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 31 pp.
- IPCC. 2014. *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.
- IPCC. 2014. Summary for Policymakers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA, pp. 1-32.
- Field, C.B., V.R. Barros, K.J. Mach, M.D. Mastrandrea, and co-authors. 2014. Technical Summary. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom, and New York, NY, USA, pp. 35-94.
- Pörtner, H.-O., D.M. Karl, P.W. Boyd, W.L. Cheung, S.E. Lluch-Cota, Y. Nojiri, D.N. Schmidt, and P.O. Zavialov, 2014: Ocean systems. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 411-484.
- Boyd, P.W., S. Sundby, and H.-O. Pörtner, 2014: Cross-chapter box on net primary production in the ocean. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 133-136.
- Gattuso, J.-P., P.G. Brewer, O. Hoegh-Guldberg, J.A. Kleypas, H.-O. Pörtner, and D.N. Schmidt, 2014: Cross-chapter box on ocean acidification. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 129-131.
- Gattuso, J.-P., O. Hoegh-Guldberg, and H.-O. Pörtner, 2014: Cross-chapter box on coral reefs. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 97-100.

- Poloczanska, E.S., O. Hoegh-Guldberg, W. Cheung, H.-O. Pörtner, and M. Burrows, 2014: Cross-chapter box on observed global responses of marine biogeography, abundance, and phenology to climate change. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 123-127.
- Lluch-Cota, S.E., O. Hoegh-Guldberg, D. Karl, H.-O. Pörtner, S. Sundby, and J.-P. Gattuso, 2014: Cross-chapter box on uncertain trends in major upwelling ecosystems. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 149-151.
- Caldeira, K., Akai M., Brewer P., Chen B., Haugan P., Iwama T., Johnston P., Kheshgi H., Li Q., Ohsumi T., Pörtner H., Sabine C., Shirayama Y. Thomson J., Barry J., Hansen L. (2005) Ocean Storage. In: *IPCC Special Report on Carbon Dioxide Capture and Storage. Prepared by Working Group III of the Intergovernmental Panel on Climate Change* [Metz, B., O. Davidson, H. C. de Coninck, M. Loos, and L. A. Meyer (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 277-317.

#### **Relevant Memberships**

**Core writing team member:** Fifth Assessment Report (AR5) of IPCC, Synthesis Report (2012 - 2015)

**Coordinating lead author:** Fifth Assessment Report (AR5) of IPCC WGII, Chapter 6: Ocean Systems (2010 - 2014)

**Author teams:** AR5 WGII Technical Summary and Summary for Policymakers

**Lead Author:** Special report of IPCC, Carbon Dioxide Capture and Storage, Chapter 6: Ocean storage (2003 - 2005)

**Member,** OSPAR intersessional correspondence group: Ocean acidification (2005 - )

**Member,** ESF Scientific Programme: Thermal adaptation in ectotherms: Linking life history, physiology, behaviour and genetics; COST Action: Conservation physiology of marine fishes (Management team).

#### **Media Contacts (selected)**

ARD Tagesthemen, Globus (TV), ZDF heute, Agence France Press, Bayerischer Rundfunk, BBC Radio (4), Berliner Zeitung, Bloomberg Newsroom, Deutsche Welle TV, Deutschlandfunk, DeStandaard, Der Spiegel, Die Welt, dpa, Einstein-Kanal (TV), Frankfurter Rundschau, Geo, Geo Wissen, Hamburger Abendblatt, Hessischer Rundfunk, Märkische Allgemeine, Nature News, NDR Fernsehen (TV), New Scientist, Nordseezeitung, Nordwestradio, ORF, Polish Radio, Popular Science Magazine, Preetext Wien, Radio Bremen 1, Radio Bremen 4, Sat3 Nano (TV), ScienceNews, Scitizen, Salzburger Nachrichten, Scientific American, Science\_online, Süddeutsche Zeitung, SWR Radio, Weserkurier.

#### **Contribution to Meeting Reports and Expertises**

OSPAR ocean acidification 2006,

**IPCC workshops:** Food security (Dublin, 2015), Joint meeting GCOS IPCC UNFCCC (Bonn, 2015), Geoengineering (Lima, 2011), Ocean acidification (Okinawa, 2011).

Expertise „German advisory council on global change“ of the Federal Government: Effects of CO<sub>2</sub> and temperature on the marine biosphere. 2006.

## Further information:

<i>www</i>	<a href="http://www.awi.de/ueber-uns/organisation/mitarbeiter/hans-otto-poertner.html">http://www.awi.de/ueber-uns/organisation/mitarbeiter/hans-otto-poertner.html</a> <a href="http://scholar.google.com/citations?hl=en&amp;user=r6SaxmsAAAAJ">http://scholar.google.com/citations?hl=en&amp;user=r6SaxmsAAAAJ</a> <a href="https://www.researchgate.net/profile/Hans_Otto_Poertner2">https://www.researchgate.net/profile/Hans_Otto_Poertner2</a> <a href="http://orcid.org/0000-0001-6535-6575">http://orcid.org/0000-0001-6535-6575</a>														
<i>Position</i>	Full Professor of polar sciences / animal ecophysiology														
<i>Scientific vita</i>	<table><tr><td>2005 –</td><td>Professor (W3) and Section Head in Integrative Ecophysiology at AWI and Bremen University.</td></tr><tr><td>1995-2005</td><td>Professor (C3) and Head of Research Group / Section in Integrative Ecophysiology at AWI and Bremen University</td></tr><tr><td>1992-1995</td><td>Heisenberg fellow at Lovelace Medical Foundation, Albuquerque, New Mexico, and AWI</td></tr><tr><td>1990</td><td>Habilitation in Zoology at Heinrich Heine University Düsseldorf</td></tr><tr><td>1985-1987</td><td>Max-Planck- and DFG (German Research Council)-Research associate at Max-Planck-Institute for experimental Medicine, Göttingen; Acadia University, Wolfville; and Dalhousie University, Halifax, Nova Scotia, Canada.</td></tr><tr><td>1983 - 1985</td><td>Assistant professor phase 1, HHU Düsseldorf</td></tr><tr><td>1983</td><td>PhD in Zoology – Westfälische Wilhelms University Münster; Heinrich Heine University Düsseldorf</td></tr></table>	2005 –	Professor (W3) and Section Head in Integrative Ecophysiology at AWI and Bremen University.	1995-2005	Professor (C3) and Head of Research Group / Section in Integrative Ecophysiology at AWI and Bremen University	1992-1995	Heisenberg fellow at Lovelace Medical Foundation, Albuquerque, New Mexico, and AWI	1990	Habilitation in Zoology at Heinrich Heine University Düsseldorf	1985-1987	Max-Planck- and DFG (German Research Council)-Research associate at Max-Planck-Institute for experimental Medicine, Göttingen; Acadia University, Wolfville; and Dalhousie University, Halifax, Nova Scotia, Canada.	1983 - 1985	Assistant professor phase 1, HHU Düsseldorf	1983	PhD in Zoology – Westfälische Wilhelms University Münster; Heinrich Heine University Düsseldorf
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1983 - 1985	Assistant professor phase 1, HHU Düsseldorf														
1983	PhD in Zoology – Westfälische Wilhelms University Münster; Heinrich Heine University Düsseldorf														
<i>Fields of interest</i>	Effects of climate change on marine and terrestrial animals and ecosystems: <ol style="list-style-type: none"><li>1. Tolerance limits and underlying physiological, biochemical and molecular mechanisms defining biogeography and vulnerability to climate change in animals.</li><li>2. Animal adaptations to life in various climate regimes. Molecular mechanisms of adaptation and limitation. Mechanisms shaping biodiversity.</li><li>3. Mechanisms shaping the combined effects of warming, acidification, oxygen loss on marine animals and ecosystems.</li><li>4. Evolutionary history of animals and ecosystems in different climate zones.</li></ol>														
<i>Awards, patents, etc.</i>	28. November 2013: 27 <sup>th</sup> Plymouth Marine Lecture and silver medal 2013: Science Board Best Presentation Award, PICES conference, Nanaimo, Canada 2012: W.F. James Professor of Pure and Applied Sciences at St. Francis Xavier University, Antigonish, Nova Scotia 2010: Offer of appointment Personal Chair and Director Marine Alliance for Science and Technology for Scotland 2007: Peter Hochachka Memorial Lecture, University of British Columbia 2006 - 2013: Honorary International Associate of the Society of Integrative and Comparative Biology, USA 1992: Heisenberg-Fellowship of the German Research Council (DFG) Numerous invited contributions and keynotes														
<i>Editorships</i>	<i>Biogeosciences</i> : "Oceans in a high CO <sub>2</sub> world" (Guest Editor): 2009, 2013 <i>J. Geophys. Res.- Oceans</i> (Guest Editor): 2005 <i>Faculty of 1000</i> , editorial board member (Ecological physiology): 2009 –														

*Journal of Thermal Biology* (Co-Editor): 2012 –  
*Marine Biology* (Associate Editor Physiology): 2007 –  
Member of various editorial boards

<i>Scientific advisory boards and committees</i>	2014-2015: Science committee: Our common future under climate change, Paris 2014-present: International Advisory Board, CCMAR, Faro, Portugal 2012-present: Elected Member, Board of referees: Physics, Chemistry and Biology of the Oceans, DFG 2012-2015: International Advisory Board, Micro-B3, EU 7FP Large Scale Research program 2009-2014: Steering committee member, European Marine Biological Resources Center (European Strategy Forum on Research Infrastructures) 2009-present: BMBF program BIOACID. Biological impact of ocean acidification (co-coordinator) 2005-2010: Convenor, Thermal Biology Group, Society for Experimental Biology
<i>Organizing activities</i>	2004, 2008, 2012: Co-organizer “Oceans in a high CO <sub>2</sub> World” IOC/SCOR conference series 2004-2010: Co-organization of annual meetings, Society for experimental Biology

## **Publications**

More than 300 publications in peer reviewed journals, multiple invited contributions.

h-citation index

ISI: 55, about 11200 lifetime citations  
Google scholar: 69; 51 since 2010, 17570 lifetime citations

Selected publications related to climate change

1. Deutsch, C., Ferrel, A., Seibel, B., Pörtner, H.O., Huey, R.B. (2015) A metabolic constraint on marine habitat and its climatic changes. *Science* 348, 1132-1135.
2. Gattuso J.-P., Magnan A., Billé R., Cheung W. W. L., Howes E. L., Joos F., Allemand D., Bopp L., Cooley S., Eakin C. M., Hoegh-Guldberg O., Kelly R. P., Pörtner H.-O., Rogers A. D., Baxter J. M., Laffoley D., Osborn D., Rankovic A., Rochette J., Sumaila U. R., Treyer S. & Turley C. (2015). Contrasting futures for ocean and society from different anthropogenic CO<sub>2</sub> emissions scenarios. *Science* 349, aac4722 DOI: 10.1126/science.aac4722
3. Storch D., Menzel L., Frickenhaus S., Pörtner H.O. (2014) Climate sensitivity across the domains of life: Limits to evolutionary adaptation shape species interactions. *Global Change Biology* 20, 3059-3067 DOI: 10.1111/gcb.12645
4. Dupont, S., Pörtner, H.O. (2013) Get ready for ocean acidification. *Nature* 498, 429.
5. Wittmann, A. C., and Pörtner, H. O., 2013, Sensitivities of extant animal taxa to ocean acidification: *Nature Climate Change* 3, 995–1001, DOI: 10.1038/NCLIMATE1982.
6. Pörtner H.O. (2012) Integrating climate-related stressor effects on marine organisms: unifying principles linking molecule to ecosystem-level changes. *Mar Ecol Progr Ser* 470: 273-290.
7. Pörtner H.O. (2010) Oxygen and capacity limitation of thermal tolerance: a matrix for integrating climate related stressors in marine ecosystems. *J. Exp. Biol.* 213, 881-893.
8. Pörtner H.O. (2008) Ecosystem effects of ocean acidification in times of ocean warming: a physiologist's view. *Mar. Ecol. Progr. Ser.* 373, 203-217
9. Pörtner H.O., Farrell A.P. (2008) Physiology and climate change. *Science* 322, 690-692.
10. Pörtner, H.O., Knust R. (2007) Climate change affects marine fishes through the oxygen limitation of thermal tolerance. *Science* 315, 95 - 97.

### **Edited volumes**

- Riebesell U., Gattuso J.-P., Pörtner H.O., Schmidt D. et al. (2013) Oceans in a high CO<sub>2</sub> world. Special Issue Biogeosciences.
- Orr, J., Pantoja, S., Pörtner, H.O., Riebesell U. (2009) Oceans in a high CO<sub>2</sub> world. Special Issue Biogeosciences.
- Sokolova, I., Pörtner H.O. J. (2007) The role of thermal environment in stress adaptation and tolerance: Integration of multiple stressors. Special Issue J. Thermal Biology.
- Orr, J., Pantoja, S., Pörtner, H.O. (2005) Oceans in a high CO<sub>2</sub> world. Special Issue J. Geophys. Res.- Oceans, (2005), <http://www.agu.org/journals/ss/HIGHCO2/>.
- Pörtner, H.O., Playle, R. (1998) Cold Ocean Physiology. Cambridge University Press, 489 pp.
- Pörtner, H.O., O'Dor, R.K., Macmillan, D.L. (1994) Physiology of cephalopod molluscs: lifestyle and performance adaptations. Gordon und Breach, Basel, 214 pp.