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# Curriculum Vitae

Anna Rutgersson

## Current position

**2011-present**

**Uppsala University**, Sweden

Department of Earth Sciences

• *Professor of Meteorology, 2011 – present*



## Academic Credits

**Ph.D., 2000** in meteorology, Uppsala University, Department of Earth Sciences. Thesis subject: Water and Heat Exchange Processes over the Baltic Sea

**B.Sc., 1995** in meteorology, Uppsala University, Department of Earth Sciences

## Positions of trust, 2013-2024

**Uppsala University**, Sweden

- Section dean, Earth Sciences, 2014-2020, 2023-
- Senior adviser to vice-chancellor, sustainability issues, 2016-2021
- Head of research program in Earth-water and landscape processes, 2013-2016

## Past positions

**2001-2011**

**Uppsala University**, Sweden

Department of Earth Sciences

- *Senior Lecturer* in Meteorology (lektor), 2010 January – 2011 December
- *Assistant Lecturer* in Meteorology (biträdande lektor), 2007-2010
- *Assistant professor* (forskarassistent)
- *Parental leave* 2001-2006 (total 22 months)

**2002-2003**

*Post-doc* at NCAR (National Centre for Atmospheric Research) in Boulder, USA, post-doctoral scholarship from STINT.

**2000-2001**

*Researcher* at the Rossby Centre at SMHI, working with climate research.

## Research visits (< 1 year)

Numerous extended research visits including NCAR, Boulder USA, First Oceanographic Institute, Qingdao, China, RSMAS, Miami, USA and FMI, Helsinki, Finland.

## Nature and scope of publications

More than 140 papers in peer-reviewed journals since 1998. Four chapters in textbooks. Lecture material. Numerous papers in conference proceedings. Most publications deal with air-sea interaction, Baltic Sea climate and boundary layer processes and extreme events.

## Positions of scientific expertise include

- Member of the Scientific Committee on Boundary Layer Processes and Surface Interactions for the EGU conference (2005-2010).
- Member of the board of IMI, International Meteorological Institute (2009-).

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- Member of the editorial board of the journal *Geophysica* (since 2011) and the *Journal of Climate* (since 2013) and *Nature Scientific Reports* (since 2017).
- Swedish representative in COST735 action and member of the management committee, 2006-2011.
- Board of the Finn Malmgren scholarship fund 2012-present.
- Chair of the Postbaltex group to plan the future BALTEX Baltic Sea research program (2011-2012).
- Co-chair of the Science Steering Committee for the Baltic Earth research program (2013-2018).
- Member of the Science Steering Committee for the Baltic Earth research program (2018-).
- Organiser of several international conferences and workshops (including Baltic Earth Workshop on Extreme Events 2015, 1<sup>st</sup> Baltic Earth conference 2016, ESA/Baltic Earth Earth Observation workshop 2017, SOLAS/SHEBA Ship-plumes workshop 2017).
- Chair of the Baltic Earth Grand Challenge focusing Extreme events 2013-.
- Member of the SMHI scientific council, 2014-, member of the SMHI board (insynsråd) 2018-.
- Member of the Scientific Advisory Board of the Finnish Centre of Excellence (CoE) in Atmospheric Science, led by Academy Professor Markku Kulmala (2014-2019).
- Member of the committee for Swedish SOLAS science (2013- ).
- Science Steering Committee of the international SOLAS (Surface Ocean Lower Atmosphere) program 2017-2023.
- Member of the HELCOM climate group (EN-CLIME), 2020-.
- Co-chair of WCRP (World Climate Research Program) Data Advisory Council's Flux Team (2018-2022).
- Evaluator of research applications: include Swedish Research Council (2009,2013-2014, 2016-2019) being vice chair 2014 and 2019, 2020, Danish Research Council 2011-, Estonian research council, German research projects, Croatia, EU Horizon 2020 (2023 and 2024).
- Solicited speaker or Keynote lecturer at several major conferences, including GWTS (Gas Transfer at Water Surfaces in Kyoto, European Meteorological Society, European Space Agency conference), Celsius-Linne symposium.
- Evaluator of Professor positions including UNIS 2012, University of Tartu 2012, Oslo, 2016, Helsinki 2014, 2017, 2018, and lecturer position at Lunds university 2013 and numerous promotions. Evaluator of GAC (Göteborg Air and Climate Center), 2018.
- Member of ESA ACEO since 2024.

## Awards

Awarded the Bergstedtska priset by the Royal Research Society in Uppsala, 2010.

## Outreach and communication

Numerous Swedish media invitations including SVT morgonsoffan as climate expert, Swedish Vetenskapsradion as expert on climate, carbon cycle and meteorological extremes. BBC World Service climate expert, 2018-12-12. Organiser of the "väder och klimatdagen" at the Department of Earth Sciences with 160 visitors and sent by UR Samtid Kunskapskanalen, 2012. Organizer of the Celsius symposium 2022.

## Funded projects and grants / Experience from operating infrastructure

- Responsible of the micrometeorological field station Östergarnsholm since 2006 (ICOS Sweden Ocean station since 2015). Responsible for setting up and running a micrometeorological station on three lakes (Tämnaren 2010, Erssjön 2012 and Erken 2014). PI for research expeditions on RV Aranda 2003 and RV Skagerrack 2006. Leading annual field campaigns at the Östergarnsholm site since 2006.
- Acquired more than 7.6 MEUR research funding, of which 4.5 MEUR as a coordinator. This includes funding agencies Swedish research council, Formas, Swedish National Space agency, Swedish Energy Agency, Belmont Forum and EU. Presently I am the PI of two major international projects

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(ShipTRASE, Belmont forum focusing on multidisciplinary impacts of shipping and CoastalExtremes, Formas research network, oriented towards the impact of extreme events in the coastal zone and implications for society and infrastructures.). Three projects focus on ML and climate extremes (CoastalExtremes, Formas; MachineOcean, Norwegian Funding Agency; Atmospheric Rivers, Swedish Research Council). One EU project and one STINT project on Feedback mechanisms in the carbon cycle. One new project funded by Trafikverket in collaboration with C2B2 (Optimisation of shipping routes, evaluation of CO<sub>2</sub> emissions due to wind farms). EU-projects GreenFeedBack (Feedback processes in the Earth System), Horizon and FESPAN (Forecasting Electromagnetic Signal Propagation Anomalies) European Defence Fund.

### Teaching and educational experience

- **Supervised >11 Ph.D. students** to graduation in meteorology at Uppsala university
- **Co-supervised > 5 Ph.D. students** at different Uppsala and other Swedish universities
- **Supervised >9 post-Doc students**
- **Lectured** on a number of courses on Bachelor, master and PhD level at Uppsala University and other institutes.
- Member of over 20 PhD thesis evaluation committees, opponent/external expert on 7 PhD defenses/vivas. External expert assignments at DTU-Denmark, UniRostock-Germany, Jyväskylä-Finland, Galway-Ireland.

### University administration includes

- Faculty representative in the board of the SFO CNDS (Center for Natural Hazard and Disaster Science) since 2018.
- Partnership leader of the Partnership between Uppsala university and Uppsala kommun 2019-2021.
- University representative in the council for sustainability (by landshövdingen), 2018-2021.
- Member of the board of the SFO StandUp for Wind.
- Member of the recruitment committee for the Zennström professorship.
- Member of the board of the Department of Earth Sciences, 2004-2007 and 2010-2013.
- Responsible professor for PhD students in meteorology since 2011, Uppsala University.

### Administrative education

- U4 leadership course, 2018-2019.
- Leadership course for future university leaders, 2010.

### Membership in scientific societies

- Member of the Swedish National Committee for Geophysics of the Royal Swedish Academy of Sciences, November (2007-2019).
- Member of the AMS (American Meteorological Society) Boundary Layers and Turbulence Committee (2008-2010).
- Member of the Royal Research Society in Uppsala since 2016 (chair of the election committee 2019-present).
- Member of the Royal Swedish Academy of Sciences since 2022.

### Bibliography

140 peer-reviewed publications, 3577 citations, h-index 33 (Web of Science, October 2024); 5571 citations, h-index 39 (Google Scholar, October 2024).

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## Areas of expertise

Early studies focused on the importance of surface gravity waves on air-sea interaction, the extension of this work includes various aspects and methods to implement wave-impacts in models, also evaluating the importance. This is work done by myself, PhD students under my supervision and other members of my research group. I extended the research of air-sea interaction to air-water gas exchange (air-sea and air-lake) including describing the importance of convection for gas-exchange. Much of the research is based on field data from the Östergarnsholm station and several lake/fjord sites (I am PI for the micrometeorological ICOS station Östergarnsholm since 2003 and has been running several lake-sites). Parallel with the air-sea interaction interest is a general focus on climate processes, in particularly focusing on the Baltic Sea region (reflected in the strong engagement in several Baltic Sea scientific networks); also shown in publications on Baltic Sea climate (including BACC reports) and Baltic Sea carbon cycle. More recently the research has broadened to additional scientific questions of great importance for today's society including extreme events in the coastal zone (and the impact of climate change), including the implications for renewable energy. In addition, studies of the impact of shipping and emissions into the air and water has generated new and interesting results.

## A selection of Publications in international journals with a referee system since 2014

Lin, T., A. Rutgersson, and L. Wu, 2024: Development of Polar Lows in Future Climate Scenarios over the Barents Sea. *J. Climate*, **37**, 4239–4255, <https://doi.org/10.1175/JCLI-D-24-0027.1>.

Dubois, K., Larsen, M. A. D., Drews, M., Nilsson, E., and Rutgersson, A.: Influence of data source and copula statistics on estimates of compound flood extremes in a river mouth environment, *Nat. Hazards Earth Syst. Sci.*, **24**, 3245–3265, <https://doi.org/10.5194/nhess-24-3245-2024>, 2024.

Larsén, X., Rutgersson, A., Karimi, F., Lange, B., Nilsson, E., Sile, T., Hahmann, A., Koivisto, M., Cutululis, N., Das, K., Fischereit, J., Wenau, S., Suo, C., & Badger, J. (2024, August 21). Climate Change and Offshore Wind Energy in the Baltic Sea. *Oxford Research Encyclopedia of Climate Science*. Retrieved 22 Aug. 2024, from <https://oxfordre.com/climatescience/view/10.1093/acrefore/9780190228620.001.0001/acrefore-9780190228620-e-910>.

Wu, L., E. Sahlée, E. Nilsson and A. Rutgersson, 2024. A review of surface swell waves and their role in air–sea interactions, *Ocean Modelling*, **190**, <https://doi.org/10.1016/j.ocemod.2024.102397>.

Lin, T., Spengler, T., Rutgersson, A. & Wu, L. (2024) Impact of sea spray-mediated heat fluxes on polar low development. *Quarterly Journal of the Royal Meteorological Society*, 1–15. Available from: <https://doi.org/10.1002/qj.4746>

Zinke, J., Nilsson, E. D., Markuszewski, P., Zieger, P., Mårtensson, E. M., Rutgersson, A., Nilsson, E., and Salter, M. E.: Sea spray emissions from the Baltic Sea: comparison of aerosol eddy covariance fluxes and chamber-simulated sea spray emissions, *Atmos. Chem. Phys.*, **24**, 1895–1918, <https://doi.org/10.5194/acp-24-1895-2024>, 2024.

Dubois, K., M. A. Dahl Larsen, M. Drews, E. Nilsson, and A. Rutgersson, 2024. Technical note: Extending sea level time series for extremes analysis with statistical methods and neighbouring station data, *Ocean Science*, **20**, 21–30. <https://doi.org/10.5194/os-20-21-2024>

Shi, Z., Sonja Endres, Anna Rutgersson, Shams Al-Hajjaji, Selma Brynolf, Dennis Booge, Ida-Maja Hassellöv, Christos Kontovas, Rohan Kumar, Huan Liu, Christa Marandino, Volker Matthias, Jana Moldanová, Kent Salo, Maxim Sebe, Wen Yi, Mingxi Yang, Chao Zhang, 2023. Perspectives on shipping emissions

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and their impacts on the surface ocean and lower atmosphere: An environmental-social-economic dimension. *Elem Sci Anth*, 11: 1. DOI: <https://doi.org/10.1525/elementa.2023.00052>

Thandlam, V., Rahaman, H., Rutgersson, A. *et al.* Quantifying the role of antecedent Southwestern Indian Ocean capacitance on the summer monsoon rainfall variability over homogeneous regions of India. *Sci Rep* **13**, 5553 (2023). <https://doi.org/10.1038/s41598-023-32840-w>

Janzon, E., J. Arnqvist, M. Shapkalijeovski, H. Körnich, and A. Rutgersson, 2023: Modeling the Flow Response to Surface Heterogeneity during a Semi-Idealized Diurnal Cycle. *J. Appl. Meteor. Climatol.*, **62**, 511–527, <https://doi.org/10.1175/JAMC-D-22-0063.1>.

Larsén XG, Staneva J, Rutgersson A and Lundquist J (2023), Editorial: Offshore wind energy: Modeling and measurements. *Front. Energy Res.* 11:1146071. doi: 10.3389/fenrg.2023.1146071

Thandlam V, Rutgersson A, Rahaman H, Yabaku M, Kaagita V, Sakirevupalli VR. Quantifying Uncertainties in CERES/MODIS Downwelling Radiation Fluxes in the Global Tropical Oceans. *Ocean-LandAtmos. Res.* 2023;2:Article 0003. <https://doi.org/10.34133/olar.0003>

Golub et al., 2023 Diel, seasonal, and inter-annual variation in carbon dioxide effluxes from lakes and reservoirs, *Environ. Res. Lett.* 18 034046, <https://doi.org/10.1088/1748-9326/acb834>

Guseva, S., Armani, F., Desai, A.R., Dias, N.L., Friberg, T., Iwata, H., Jansen, J., Lüko, G., Mammarella, I., Repina, I., Rutgersson, A., Sachs, T., Scholz, K., Spank, U., Stepaneko, V., Torma, P., Vesala, T., Lorke, A., 2023. Bulk Transfer Coefficients Estimated from Eddy-Covariance Measurements over Lakes and Reservoirs. *J Geophys Res.-Atmospheres*, 128, e2022JD037219, doi:10.1029/2022JD037219. <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2022JD037219>

Gutiérrez-Loza, L., E. Nilsson, M. B. Wallin, E. Sahlée, and A. Rutgersson. On physical mechanisms enhancing air-sea CO<sub>2</sub> exchange. *Biogeosciences*, 19, 5645–5665, 2022. <https://doi.org/10.5194/bg-19-5645-2022>

Emmanuel, G. V., A. Rutgersson and L. Wu. Role of source terms in parameterizing wave decay in the marginal ice zones. *Ocean Modelling*, Volume 180, December 2022, 102125, <https://doi.org/10.1016/j.ocemod.2022.102125>

Zhang, S., L. Wu, J. Arnqvist, C. Hallgren and A. Rutgersson. Mapping coastal upwelling in the Baltic Sea from 2002 to 2020 using remote sensing data. *Int. J. of Appl. Earth Observation and Geoinformatics*, Volume 114, November 2022, 103061, <https://doi.org/10.1016/j.jag.2022.103061>

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Rutgersson, A., Kjellström, E., Haapala, J., Stendel, M., Danilovich, I., Drews, M., Jylhä, K., Kujala, P., Larsén, X. G., Halsnæs, K., Lehtonen, I., Luomaranta, A., Nilsson, E., Olsson, T., Särkkä, J., Tuomi, L., and Wasmund, N.: Natural hazards and extreme events in the Baltic Sea region, *Earth Syst. Dynam.*, 13, 251–301, <https://doi.org/10.5194/esd-13-251-2022>, 2022.

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Qiao, W., Wu, L., Song, J., Li, X., Qiao, F., & Rutgersson, A. (2021). Momentum flux balance at the air-sea interface. *Journal of Geophysical Research: Oceans*, *126*, e2020JC016563. <https://doi.org/10.1029/2020JC016563>

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Zhang, S.; Rutgersson, A.; Philipson, P.; Wallin, M.B. Remote Sensing Supported Sea Surface pCO<sub>2</sub> Estimation and Variable Analysis in the Baltic Sea. *Remote Sens.* 2021, *13*, 259. <https://doi.org/10.3390/rs13020259>

Wrang, L.; Katsidoniotaki, E.; Nilsson, E.; Rutgersson, A.; Rydén, J.; Götteman, M. Comparative Analysis of Environmental Contour Approaches to Estimating Extreme Waves for Offshore Installations for the Baltic Sea and the North Sea. *J. Mar. Sci. Eng.* 2021, *9*, 96. <https://doi.org/10.3390/jmse9010096>

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Chen, D., H. Rodhe, K. Emanuel, S. I. Seneviratne, P. Zhai, B. Allard, P. Berg, S. Björck, I. A. Brown, L. Barring, L. Chafik, K. Deng, M.-J. Gaillard-Lemdahl, M. Hieronymus, E. Kjellström, H. W. Linderholm, W. May, J.-O. Näslund, T. Ou, A. Rutgersson, E. Sahlee, F. Schenk, J. Sjolte, M. K. Sporre, A. Stigebrandt, G. A. Weyhenmeyer, P. Zhang & Q. Zhang (2020) Summary of a workshop on extreme weather events in a warming world organized by the Royal Swedish Academy of Sciences, *Tellus B: Chemical and Physical Meteorology*, 72:1, 1-13, DOI: 10.1080/16000889.2020.1794236

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