CURRICULUM VITAE

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Date of birth:
3. April 1958

Nationality:
Danish

Married
with Liv Kirstin Kure

Children: Two sons

Education:
Ph.D. March 17 1993 in Meteorology, University of Copenhagen. (Master degree 11/9 1987 in Meteorology, University of Copenhagen)

Linguistics:

I am fluent in Danish and English (orally as well as written). Swedish: fluent in writing and understanding (I have owned a house Sweden for many years), however, in my spoken Swedish, which is also close to fluent, it is still (unfortunately) easily heard that I am a Dane. Similar for Norwegian (but not good at the gramma in "Nynorsk"). I understand, speak and read German and French to some degree.

Present positions:

Professor in Meteorology and Climate Dynamics at the Niels Bohr Institute, University of Copenhagen. (100% employment in the period 1/4 2006 – 28/2 2021, 10% since then)

Scientific leader of the National Center for Climate Research (NCKF) at DMI, (90% employment since 1/3 2021)

Previous employment's:

- 1983: student programmer in the Weather Service Department of the Danish Meteorological Institute (DMI).
- 1984: student programmer for Dr. Bennert Machenhauer at University of Copenhagen.
- 1/3 1985 - 31/3 1987: student assistant at the Nordic HIRLAM project located at the DMI.
- 1/4 1987 - 31/5 1989: Scientific employee at DMI. Together with Lars Isaksen (ECMWF) we had the scientific and partly technical responsibility for the operational Danish numerical forecasting system, DK-LAM at that time (it was a forerunner for the first HIRLAM system).
- 1986-1989: teaching assistant in meteorology in different shorter periods at the Geophysical Institute, University of Copenhagen.
- 1/6 1989 - 15/6 1992: Ph.D. student at University of Copenhagen. The work was carried out at DMI with a 7 month visit at National Center for Atmospheric Research, Boulder Colorado. The thesis titled "Ultra low-Frequency, Large scale flow Patterns and local Blocking of the westerlies in the Northern Winter Hemisphere" was finished in the autumn 1992.
- 15/6 1992 - 30/6 1998: Scientist at DMI.
- 1/7 1998-31/3 2006: Head of Climate Research Division at DMI.
- 2012 -2017: Head of Climate and Geophysics Section at NBI (alongside with my professor-duties).

National Projects/Centres:

Director of Centre for Energy Environment and Health (www.ceeh.dk), funded by the Danish Strategic Research Council, under the program for Energy and Environment. Period: 2007-2012.

Part time member of the scientific staff of the Centre for Ice and Climate (http://www.isogklima.nbi.ku.dk/). Period: 2007-2018

International Projects:

Co-ordinator of two international scientific projects supported by the EU-commission:

- Project On Tendency Evaluations using New Techniques to Improve Atmospheric Long-term Simulations (POTENTIALS). Institutions: DMI (Copenhagen, DK), CNRM/Meteo France (Toulouse, F), MPI for Meteorology (Hamburg, D), LMD/CNRS (Paris, F), CINECA (Bologna, I). **Period: 1998-2000**. Contract no.: ENV-CT97-497.
- STOrm, WAve and SUrge Scenarios for the 2100 Century (STOWASUS-2100). Institutions: DMI (Copenhagen, DK), Proudman Oceanographic Laboratory (Merseyside, UK), University of Padua (Padova, I), FISBAT-CNR (Bologna, I),GKSS (Geesthacht, D), RIKZ (Den Haag, NL), DNMI (Oslo, N). Period: **1998-2000**. Contract no.: ENV-CT97-498.

Work-package leader on "Hind-cast simulations of the climate evolution in the 20th Century" in the EU-project:

- ENSEMBLE-based Predictions of Climate Changes and their Impacts (ENSEMBLES). Period: Sept. **2004-2009**. Integrated project under the European Commission's 6th Framework Programme. ENSEMBLES had 73 participating institutions.

Scientific responsibility for DMI contribution in international projects on climate modelling and climate research:

- Impact of storms on waves and surges: Changing climate in the past 100 years and perspectives for the future (WASA). Co-ordinator: Dr. Hans von Storch (MPI & GKSS, D). Period: **1994-1997**. EU contract no. EV5V-CT94-0506.
- Annual to Decacal Variations In Climate in Europe (ADVICE). Co-ordinator: Dr. Trevor Davies (UEA, Norwich, UK) Period: **1996-1998** EU contract no. ENV4-CT95-0129.
- Nordic Climate Modelling Project (NOCLIMP). Co-ordinator: Dr. Erland Källen, (MISU, Stockholm, S). Period: **1993-1998**. NMR contract no. FS/HFj/X-03002.
- Numerical Simulation and Analysis of Climate Variability on Decadal and Centennial Time Scales (MILLENNIA). Co-ordinator: Dr. Hans von Storch, (MPI & GKSS, D), Period: **1996-1998**. EU contract no. ENV4-CT95-0101.
- A European Programme on Prediction of Climate Variations on Seasonal and Interannual Timescales (PROVOST). Co-ordinator: Dr. Timothy Palmer (ECMWF, UK). Period: **1996-1998**. EU contract no. ENV4-CT95-0109.
- A Concerted Action Towards the Improved Understanding and Application of Results from Climate Model Experiments in European Climate Change Impacts Research. Period: **1998-2001**. EU- contract no. ENV4-CT98-0734.
- Mechanisms and Predictability of Decadal Fluctuations in Atlantic-European Climate (PREDICATE). Period **2000-2003**. Contract number: EVK2-CT-1999-00020

Scientific responsibility for NBI contribution in international projects:

- **2011-2015**: Partner (in collaboration with DMI) in the EU-funded project: PEGASOS (Pan European Gas-Aerosols-Climate Interaction Study. Contract no.: No 265148).

- **2011-2015:** Participant (and member of the management board) of the EU FP7 Cost Action ES1004: European framework for online integrated air quality and meteorology modelling.
- **2014-2016:** Participant (in collaboration with DMI) in the NordForsk project CarboNord.
- **2014-2019:** PhD supervisor for two PhD projects on the ERC synergy grant project Ice2Ice.
- **2018 –** now: Scientific responsibility for Danish Innovation Foundation grants for 3 Industrial PhD's

Teaching activities:
When 100% at the NBI I developed and taught as main responsible the following "semester" courses:

1. Dynamical Meteorology (block 2 Nov-Jan). This is an undergraduate course introducing the various types of waves in the atmosphere, and, based on quasi-geostrophic theory, also the large-scale dynamical structures and instabilities of the atmosphere.
2. General circulation of the atmosphere (block 3 Feb-Apr). This is a graduate course analyzing the averaged global circulation and structure/state of the atmosphere. One main point is the identification of the role of the large-scale atmospheric waves. The course also covers balances of energy and angular momentum, dynamically coursed variability and meridional transports of, e.g., heat.
3. Dynamical models for climate and Numerical Weather Prediction (NWP) (block 4 Apr-Jun). This is graduate course on atmospheric dynamical modeling and data assimilation for use in climate research and numerical weather prediction (NWP).
4. Physics of the climate system. This was an undergraduate/graduate course on climate dynamics and climate change.
5. GFD. This was an undergraduate course in geophysical fluid dynamics.
6. Numerical methods in atmospheric and oceanographic models. This was a graduate course running every second year.
7. Satellite Geophysics. This was a graduate course running every second year.
8. Climate Models, Observations of the Past and the Present, and Projected Climate Change, including Sea Level Rise. This is a graduate course in the climate master education (CCIMA) at University of Copenhagen.

Currently, as of September 1st 2023, I supervise 2 PhD students as main supervisor, and two as external (assisting) supervisor. I have supervised and finalized (in total) since 2006: 12 PhD projects, 35 MSc projects and 28 BSc projects.

Finalised PhD projects (Note that I was not permitted to be formal PhD supervisor prior to 2006, since I was not employed at a university):

1. Ulrik Smith Korsholm (in collaboration with DMI). Ulrik modelled the indirect effects of aerosol. Ulrik is co-developer of the ENVIRO-HIRLAM model at DMI. Finished March 2009.
2. Till Rasmussen. Till analysed and modelled the Sea Ice in the Naras Straight between Greenland and Canada (in collaboration with Nicolai Kliem, DMI). Finished Jan. 2010.
3. Ivana Cvijanović. Ivana studied the climate dynamics related to abrupt climate change with main focus on potential atmospheric re-organisations. Finished May 2012.

4. Ayoe Buus Hansen. Ayoe combined a locally mass conserving semi-Lagrangian transport scheme with the atmospheric chemical modules used at the National Environmental Research Institute. This project was part of CEEH (www.ceeh.dk). Finished Oct. 2012.
5. Brian Sørensen. Brian developed the Enviro-HIRLAM system further. The main emphasis was on improving the dynamical coupling between pollutants and dynamical core. This project was part of CEEH (www.ceeh.dk). Finished Jan. 2013.
6. Alexander Kurganskiy (2017) developed and tested a new module for simulation and forecasts of pollen concentration in the Enviro-HIRLAM model system. This project was a collaboration with DMI and the Russian State Hydrometeorological University, RSHU in St. Petersburg.
7. Martin Olesen (2019) uses the HIRHAM model to downscale past, present and future weather conditions over Greenland. Funded by the Ice2Ice project, and in collaboration with CIC and DMI.
8. Ida Margrethe Ringgaard (2019) studied the interaction between varying Arctic sea ice and the global climate system with special emphasis on changes in the Europe and the Northern Hemisphere. Funded by the Ice2Ice project and in collaboration with CIC and DMI.
9. Kasper Hintz (2019) was an industrial PhD partly funded by the Danish Innovation Foundation. From the beginning the project was in collaboration with the private company Vaavud. However, due to financial issues DMI took over after about one year. The idea in this project was to use unconventional crowd sourced data – mainly wind and pressure – to enhance the skill in nowcasting, i.e., forecasts with a lead time of a few hours.
10. Peter Ukkonen (2021). Project being part of the EU-project ESCAPE-2 (under "Horizon 2020"). Improving the trade-off between accuracy and efficiency of atmospheric radiative transfer computations by using machine learning and code optimization
11. Sissal Vágsheyg Erenbjerg (2021). Project in collaboration with the semi-private company Fiskaaling at the Faroe Islands. Title: Oceanography of the Faroe Shelf and Sundalagið Norður - A modeling approach.
12. Emy Alerskans (2022). This was an industrial PhD partly funded by the Danish Innovation Foundation and partly by the private company Fieldsense. Subject: Hyper-local forecasting system for agricultural applications.

Teaching at PhD schools:

1. COGCI PhD school in Copenhagen (2006 & 2009). Kaas: ”Forcing and Feedback in the climate system”.
2. TEMPUS PhD course on integrated modeling in Odessa, Ukraine (2011). Kaas: ”Different numerical approaches and numerical schemes for solving the governing equations .Special subject: numerical methods for solving continuity equations”, and ” Application of models to different integrated systems and studies An example: The optimization model in Centre for Energy, Environment and Health”.
3. PhD course in Earth Observation and Climate Change at GeoCentre, Copenhagen (2012). Kaas: “Radiative balance, the greenhouse effect, and the concept of radiative forcing.”
4. Eumetchem PhD course on integrated modeling in Aveiro, Portugal (2014). Kaas: ”Numerical transport schemes ... and related issues”.

Postdoc projects

Roman Nuterman: Integrated dynamic-chemical atmospheric modelling with emphasis on climate indirect radiative forcing (2011-2013)

Outreach

In the order of 200 interviews in Danish (and a few foreign) Radio channels and Danish Television about atmospheric physics, weather and climate research.

Approximately 500 interviews in popular articles in newspapers and other media on climate change and variability, and on physics of the atmosphere.

Blogger (2008-2009) on climate change at ing.dk.

Review activities

Reviewer on numerous scientific articles in the areas of large-scale atmospheric dynamics, statistical climate downscaling and in numerical techniques for the journals “Journal of Atmospheric Science, “Tellus”, “Atmosphere and Ocean”, “Atmospheric Research”, “Climate Research”, “The Atmosphere - Ocean System”, “Journal of Geophysical Research”, “Geophysical Research Letters”, “Geoscientific Model Development (GMD)” and “Climate Dynamics”.

Committees, councils and duties

- Member of the review board for the international scientific journal "Climate Research" (1999-2007).
- Member of the Danish National Committee for the International Polar Year.
- Member of the Ph.D. committee of the Copenhagen Global Change Initiative (COGCI) (2000-2006).
- Member of the Danish National Committee for Climate Research (2001-2011).
- Member of the Climate Panel at University of Copenhagen (2008-2010).
- Chairman (president) of the Danish Meteorological Society. (2007 - 2017). Currently, I have resigned as co-chair.
- Member of the Danish IUGG committee (IAMAS representative) (2008- …)
- Member of the Scientific Advisory Board of the Oxford Res. Encyclopedia of Climate Science (2014…)
- Appointed member of the Scientific Advisory Committee (SAC) for the European Centre for Medium Range Weather Forecasting (ECMWF) (2014 -…)
- Chairman for the “BFI”-gruppe 28: Geofag og Klima (geofysik, geologi, naturgeografi, meteorologi, geoinformation og jordobservation, landinspektørvidenskab, GIS, polarforskning) (2018- …).

Reviewed scientific articles:

1. Kaas, E. and G. Branstator, 1993: The relationship between a zonal index and blocking activity. *J. Atmos. Sci*., **50**, No. 18, pages 3061-3077.
2. Jóhanneson, T., T. Jónsson, E. Källén and E. Kaas, 1995: Climate change scenarios for the Nordic countries. *Clim. Res*., 5, 181-195.
3. Kaas, E. and P. Frich, 1995: Diurnal temperature range and cloud cover in the Nordic countries: observed trends and estimates for the future. *Atm. Res*., **37**, 211-228.
4. Kaas, E., A. Guldberg and P. Lopez, 1995: A full "Particle-In-Cell" numerical integration method tested for the shallow water equations. Page 31-38 in "Modern Dynamical Meteorology, Procedings from the Wiin Nielsen Symposium" (221pp), edited by Peter Ditlevsen. Available from Niels Bohr Institute, Geophysical Department, University of Copenhagen.
5. Kaas, E., T.-S. Li and T. Schmith, 1996: Statistical hindcast of wind climatology in the North Atlantic and northwestern European Region. *Climate Research*, **7**, 97-110.
6. Kaas, E., A. Guldberg and P. Lopez, 1997: A Lagrangian advection scheme using tracer points. In "Numerical Methods in Atmospheric and Oceanic Modelling. The André J. Robert Memorial Volume. (C. Lin, R. Laprise, H. Ritchie, Eds.), Canadian Meteorological and Oceanographic Society, Ottawa, Canada (Companion volume to *Atmosphere-Ocean*), 171-194.
7. Beersma, J. K. Rider, G. Komen, E. Kaas and V. Kharin, 1997: An analysis of extra-tropical storms in the North Atlantic region as simulated in a control and $2\times CO_2$ time-slice experiment with a high resolution atmospheric model. *Tellus*, **49A**, 347-361
8. Schmith, T., E. Kaas and T.-S. Li, 1998: Northeast Atlantic storminess re-analysed: No trend during past 100 year period. *Climate Dynamics*, **14**, 529-536.
9. WASA, 1998: Changing waves and storms in the Northeast Atlantic?, *Bull. Amer. Met. Soc.* 79, p 741-760. This article was written by the participating staff (including E. Kaas) in the EU-project WASA.
10. Jones, P.D., T.D. Davies, D.H. Lister, V. Slonosky, T. Jónsson, L. Bärring, P. Jönsson, P. Maheras, F. Kolyva-Machera, M. Barriendos, J. Martin-Vide, R. Rodriguez, M.J. Alcoforado, H. Wanner, C. Pfister, J. Luterbacher, R. Rickli, E. Schuepbach, E. Kaas, T. Schmith, J. Jacobeit and C. Bech ,1999: "Monthly mean pressure reconstructions for Europe for the 1780-1995 period. Int. J. Climatolog., *Int. J. Climatology*, **19**, 347-364.
11. Kaas, E., A. Guldberg, W. May and M. Déqué, 1999: Using tendency errors to tune the parameterisation of unresolved dynamical scale interactions in atmospheric general circulation models, *Tellus*, **51A**, 612-629.
12. Lopez, P., T. Schmith and E. Kaas, 2000: Sensitivity of the northern hemisphere circulation to North Atlantic SSTs in the ARPEGE climate AGCM, *Clim. Dyn*., **16**, no. 7, pp. 535-547.
13. Luterbacher, J., R. Rickli, C. Tinguely, E. Xoplaki, E. Schuepbach, D. Dietrich, J. Hüsler, M. Ambühl, C. Pfister, P. Beeli, U. Dietrich, A. Dannecker, T. D. Davies, P.D. Jones, V. Slonosky, A.E.J Ogilvie, P. Maheras, F. Kolyva-Mahera, J. Martin-Vide, M. Barriendos, M.J. Alcoforado, M.F. Nunez, T. Jonsson, R. Glaser, J. Jacobeit, C. Beck, A. Philipp, U. Beyer, E. Kaas, T. Schmith, Bärring, P. Jönsson, H. Wanner, 2000: Reconstruction of

Monthly Mean Sea Level Pressure over Europe for the late Maunder minimum period (1675-1715) based on Canonical Correlation Analysis, *Int. J. Climatology*, **20**, no. 10, pp. 1049-1066.

14. Andersen, U., E. Kaas and P. Alpert, 2001: Using analysis increments to estimate atmospheric heating rates following volcanic eruptions, *Geophys. Res. Lett*. Vol. **28** , No. 6 , p. 991-994.
15. Kristjánsson, J. E., A. Staple, J. Kristiansen and E. Kaas, 2002: A new look at possible connections between solar activity, clouds and climate, *Geophys. Res. Lett*., Vol. **29**, No. 23, 2107, dec, 2002.
16. Björck, S., Bennike, O., Rosén, P., Andresen, C. S., Bohncke, S., Kaas, E. & Conley, D. 2002: Anomalously mild Younger Dryas summer conditions in southern Greenland. *Geology* **30** (5), 427-430.
17. Schrøder, T., Leroy, S., M. Stendel, E. Kaas, 2003: Validating the microwave sounding unit stratospheric record using GPS occultation, *Geophys. Res. Lett*., Vol. **30**, No. **14**, 1734.
18. Kristjánsson, J. E., J. Kristiansen, and E. Kaas, 2004: "Solar activity, cosmic rays, clouds and climate - an update". DOI: 10.1016/j.asr.2003.02.040 *Adv. Space Res*., **34** (2), 407-415.
19. Gleisner, H., P. Thejll, M. Stendel, E. Kaas and B. Machenhauer, 2005: Solar signals in tropospheric re-analysis data: comparing NCEP/NCAR and ERA40. *Journal of Atmospheric and Solar-Terrestrial Physics.* **67**, 785–791
20. Guldberg, A., E. Kaas, M. Dequé, S. Yang and S. V. Thorsen, 2005: Reduced systematic errors by empirical model corrections; impact on seasonal prediction skill. *Tellus*, **57A**, 575-588.
21. Lauritzen, P.H., E. Kaas, B. Machenhauer, 2006: A mass-conservative semi-implicit, semi-Lagrangian limited-area shallow water model on the sphere. *Mon. Wea. Rev.*, **134** (4), 1196–1212.
22. Lauritzen, P.H., E. Kaas, B. Machenhauer and K. Lindberg, 2008: A mass-conservative version of the semi-implicit semi-Lagrangian HIRLAM. *Quart. J. Roy. Meteor. Soc.*: **Vol. 134,** Issue 635, pp. 1583–1595, [Abstract], Pdf-version.
23. Kaas, E., 2008: A simple and efficient locally mass conserving semi-Lagrangian transport scheme. *Tellus*, **60A**, 305-320.
24. Kaas, E., 2009: "Menneskeskabte klimaændringer". Ugeskrift for læger, **171/44**, 3165-3168. (in Danish.
25. Kaas, E., and J. R. Nielsen (2010): A mass conserving quasi-monotonic filter for use in semi-Lagrangian models. *Monthly Weather Review*, **138**, No. 5.
26. Rasmussen, T. A. S, N. Kliem , E. Kaas (2010) Modelling the sea ice in the Nares Strait. *Ocean Modelling*, **35**, No. 3, 2010, 161-172.
27. Rasmussen, T. A. S, N. Kliem , E. Kaas (2011) The effect of climate change on the sea ice and the hydrography in the Nares Strait. *Atmosphere-Ocean.* doi:10.1080/07055900.2011.604404
28. Cvijanovic, I , Langen, PL, and Kaas, E (2011), ' Weakened atmospheric energy transport feedback in cold glacial climates ', Climate of the Past , vol 7, pp. 1061-1073.

29. B. Hansen, J. Brandt, J. H. Christensen, and E. Kaas (2011): Semi-Lagrangian methods in air pollution models, Geosci. Model Dev., 4, 511-541, doi:10.5194/gmd-4-511-2011.

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33. Rathmann, N. M., S. Yang and E. Kaas (2013): Tropical cyclones in enhanced resolution CMIP5 experiments. *Clim Dyn*, DOI 10.1007/s00382-013-1818-5.

34. Krueger, O., F. Feser, L. Bärring, E.Kaas, T. Schmith, H. Tuomenvirta and H. von Storch, 2013: Comment on "Trends and low frequency variability of extra-tropical cyclone activity in the ensemble of Twentieth Century Reanalysis" by Xiaolan L. Wang, Y. Feng, G. P. Compo, V. R. Swail, F. W. Zwiers, R. J. Allan, and P.D. Sardeshmukh, *Climate Dynamics*, published online, DOI 10.1007/s00382-013-1814-9

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39. Baklanov, A., K. H. Schluenzen, P. Suppan, J. Baldasano, D. Brunner, S. Aksoyoglu, G. Carmichael, J. Douros, J. Flemming, R. Forkel, S. Galmarini, M. Gauss, G. Grell, M. Hirtl, S. Joffre, O. Jorba, E. Kaas, M. Kaasik, G. Kallos, X. Kong, U. Korsholm, A. Kurganskiy, J. Kushta, U. Lohmann, A. Mahura, A. Manders-Groot, A. Maurizi, N. Moussiopoulos, S. T. Rao, N. Savage, C. Seigneur, R. Sokhi, E. Solazzo, S. Solomos, B. Sørensen, G. Tsegas, E. Vignati, B. Vogel, and Y. Zhang, (2014): Online coupled regional meteorology-chemistry models in Europe: current status and prospects. *Atmos. Chem. Phys.*, 14, 317–398, doi:10.5194/acp-14-317-2014

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42. Lang, A., S. Yang, and E. Kaas (2017), Sea ice thickness and recent Arctic warming, Geophys. Res. Lett., 44, 409–418, doi:10.1002/2016GL071274.

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