Sylwester Arabas | Curriculum Vitae | June 2025

contact	e-mail: sylwester.arabas@agh.edu.pl (univ.) / slayoo@staszic.waw.pl (priv.) phone: +48502254779 (mobile)
public profiles	homepage: slayoo.github.io ORCID: orcid.org/0000-0003-2361-0082 GitHub: github.com/slayoo Google Scholar: scholar.google.com/citations?user=X1s5grkAAAAJ LinkedIn: linkedin.com/in/sylwester-arabas
highlights	· **numerical modelling** and data analysis in atmospheric physics · cloud physics, aerosol-cloud-precipitation interactions, particle-based μ-physics · research **software engineering** focused on reproducibility & maintainability · free and open-source software maintenance, dissemination and advocacy · scientific **data visualisation**, vector graphics and typesetting · public presentations, teaching sciences, organisation of meetings · building teams, **keeping things simple, done and documented** · international experience in academic, gov, corporate and startup realms

employment	2023.05–...: **AGH Univ. (Physics/Appl. CS), Kraków, Poland**
	    researcher at the Environmental Physics Group: zfs.agh.edu.pl
	2021.07–2022.06: **Univ. Illinois (Atmos. Sci.), Urbana, Illinois, USA**
	    postdoc at the group of Nicole Riemer: atmos.illinois.edu/~nriemer
	2018.10–2023.04: **Jagiellonian Univ. (Computer Sci.), Kraków, Poland**
	    open-source Python project leadership: PySDM, PyMPDATA, numba-mpi
	    mentorship for graduate students (computer science, physics)
	2017.10–2018.09: **AETHON, Athens, Greece**
	    urban transport modelling (EU's H2020 "Innovation Associate" programme)
	2015.11–2017.09: **Chatham Financial, Kraków, Poland**
	    financial models software development
	2013.12–2015.10: **University of Warsaw ([Geo]Physics), Poland**
	    leadership in open-source CFD-related projects: github.com/igfuw
	    lectureship (C++ for first-year undergraduate students)
	2005.10–2013.12: graduate studies (see below)
	2002.10–2005.12: **Mazovian Governor Office, Warsaw, Poland**
	    web/db developer
	2000–2009: **ITStudio.pl, Warsaw, Poland**
	    web/db developer

university education	2008–2013: **Faculty of Physics, University of Warsaw** – PhD in Physics
	    thesis: Elements of modern cloud modelling (in English)
	    supervisor: H. Pawłowska, degree obtained: 2013-12-16
	    referees: G. Feingold (NOAA), L. Łobocki (Warsaw Tech.)
	2002–2008: **Faculty of Physics, University of Warsaw** – MSc, 350 ECTS
	    thesis: Microphysical properties of shallow convective clouds (in Polish)
	    supervisor: H. Pawłowska; referee: K. Haman; degree obtained: 2008-06-25

coding skills	Python, C++, C#, C, IDL/GDL, Fortran, SQL, UNIX tools; multi-threaded, GPU and MPI parallelism; design patterns; test and packaging automation; typesetting in LaTeX/BibTeX, vector graphics;
language skills	fluent: **Polish**, **English**; basics: Russian, French, Spanish, Japanese

funding record	Poland's National Science Centre (ncn.gov.pl):
	    2022-24: PI in a SONATA project (ca. \$250 000)
	    2011-13: PI in a PRELUDIUM project (ca. \$15 000)
	Foundation for Polish Science (fnp.org.pl):
	    2018-21: PI in "Reintegration" grant (ca. \$200 000)
	    2014: Mentorship programme (mentor: prof. Harm Jonker, TU Delft)
	    2012-13: 2×START fellowship (incl. visit at NCAR, Boulder, CO)
	    2011: Conference award (SIAM GS11, Long Beach, California)
	European Facility for Airborne Research (eufar.net):
	    2008: PI in SEASALT student project (seasalt.igf.fuw.edu.pl) (ca. \$25 000)

open-source software	PyPartMC (2021–...): ~ 500 C++/Fortran/Python commits, maintenance numba-mpi (2020–...): ~ 100 Python commits, maintenance PyMPDATA & PySDM (2019–...): ~ 3000 Python commits, maintenance libmpdata++, libcloudph++ (2013–2015): $\sim$1000 C++ commits GNU Data Language (2009–...): $\sim$500 C++ commits, co-maintenance

organisation of meetings	"Probabilistic Particle-Based Methods in Aerosol-Cloud Microphysics":
	    AMS Symposia on Cloud Physics & ACCI (joint), Baltimore, 2024:
	        https://annual.ametsoc.org/index.cfm/2024/program-events
	    AMS Symposium on Aerosol–Cloud–Climate Interactions, Denver, 2023:
	        https://annual.ametsoc.org/index.cfm/2023/program-events
	"Lagrangian cloud microphysics: progress and prospects" (EGU GA, 2020)
	    https://meetingorganizer.copernicus.org/EGU2020/session/36655
	"Eulerian/Lagrangian methods for cloud microphysics" (Kraków, 2019)
	    https://slayoo.github.io/workshop_2019/
	"Eulerian/Lagrangian methods for cloud microphysics" (Warsaw, 2015)
	    https://goo.gl/1fj5H8
	"FOSS for scientists" (Brussels, 2013, day-long conference session)
	    https://archive.fosdem.org/2013/schedule/track/foss_for_scientists/

study visits	2025: (3 weeks) Johannes Gutenberg-Universität Mainz (Germany) 2022: (2 weeks) California Institute of Technology (Pasadena, California) 2015: (4 weeks) University of Hyogo (Kobe, Japan) 2012: (4 weeks) National Center for Atmospheric Research (Boulder, Colorado) 2010: (4 weeks) JAMSTEC/The Earth Simulator Center (Yokohama, Japan)
field campaigns	2011: (3 weeks) CARRIBA helicopter measurements campaign (Barbados) 2008: (3 weeks) EUCAARI aircraft measurements campaign (Rotterdam) 2008: (2 weeks) SEASALT aircraft measurements campaign (Austrian Alps) 2006: (3 weeks) AMMA aircraft measurements campaign (Burkina Faso)
extramural seminars	Columbia University / LEAP STC (2024): youtu.be/PgLGlfSPE7E Institute for Atmopsheric Physics, Univ. Mainz (2019, 2022 virtual) Environ. & Climate Sci. Dept, Brookhaven National Lab, NY (2022) SoMAS, Stony Brook University, NY (2022) Dept. Environ. Sci. & Engineering, Caltech (2022): youtu.be/OOJe-JFMDpU Dept. Atmospheric Sciences, Univ. Illinois at Urbana-Champaign (2021) Dept. Atmospheric and Oceanic Sciences, McGill University, Montreal (2019) National Center for Atmospheric Research, Boulder, Colorado (2019,'14,'12,'10) Los Alamos National Laboratory (2019) Faculty of Sciences, University of Pécs, Hungary (2019) Department of Atmospheric Sciences, Yonsei University, Seoul (2019) Graduate School for Simulation Studies, University of Hyogo, Kobe (2019,'15)

Nanjing University of Information Science and Technology, China (2019)
Lab. de mécanique des fluides et d'acoustique, École Centrale de Lyon (2019)
Physics Seminar, Michigan Tech, Houghton, Michigan (2018)
Dept. of Atmospheric Sciences, University of Wyoming, Laramie (2018,'15)
Complex Systems and Applications Group, Demokritos, Athens, Greece (2018)
Chemical Engineering Department, University of Patras, Greece (2018)
Faculty of Civil Engineering and Geosciences, TU Delft, The Netherlands (2015)
National Atmospheric and Oceanic Administration, Boulder, Colorado (2012)
Meteorological Research Institute, Tsukuba, Japan, (2010)
Japan Agency for Marine-Earth Science and Technology, Yokohama (2010)

conference presentations	International Conference on Clouds and Precipitation:
	    '24 (Jeju, poster), '21 (e-poster), '12 (Leipzig, talk), '08 (Cancún, talk)
	American Meteorological Society Annual Meeting:
	    '24 (Baltimore, chair+talk), '23 (Denver, chair+poster), '22 (virtual, talk)
	FOSDEM (Free & Open Source Software Devs Euro Meeting, Brussels):
	    '25, '24 (PyPartMC talk), '23 (numba-mpi talk),'21,'20,'19, '18,'17,'16,'15,
	    '14,'13 (FOSS for Scientists devroom convener),'12,'11 (GDL talk),'10
	American Meteorological Society Cloud Physics Conference:
	    '22 (Madison, poster), '18 (Vancouver, poster)
	UCAR Software Engineering Assembly Conference (Boulder, Colorado):
	    '21,'13 (talk)
	European Geosciences Union General Assemblies (Vienna):
	    '20 (virtual, co-convener), '10 (poster), '09 (poster), '07 (poster)
	Numerical Analysis and Scientific Computation with Applications:
	    '18 (Kalamata, talk)
	Transportation Research Arena (Vienna):
	    '18 (poster)
	C++Now by Boost & Software Freedom Conservancy (Aspen, Colorado):
	    '15 (talk)
	SIAM Conference on Mathematical and Computational Issues in Geosciences:
	    '13 (Padua, talk), '11 (Long Beach, talk)
	American Geophysical Union Fall Meetings (San Francisco):
	    '12 (poster), '10 (poster)
	Metström: Multiple Scales in Fluid Mechanics and Meteorology (Berlin):
	    '11 (talk)

workshops, schools, courses	2024: Dynamics of complex particles in turbulence (IRPHE, Marseille) 2023: Clouds containing ice particles (Univ. Mainz) 2023: Complex Dynamics of Particles in Turbulence (INRIA, Sophia Antipolis) 2022: 2-nd QuIESCENT Workshop / Arctic Science Summit Week (virtual) 2022: 4-th International workshop on Cloud Turbulence (NITech, virtual) 2021: Software Carpentry instructor training (virtual) 2021: 10-th International Cloud Modelling Workshop (virtual) 2021: Advanced numerical methods for hyperbolic equations (U. Trento) 2019: Water Isotopes and Climate (NCAR) 2019: DYAMOND-ESiWACE Hackathon (Mainz) 2013: ITM COMPLETE Workshop (Warsaw) 2018: Particle-based modeling of cloud microphysics (U. Hyogo) 2018: Mathematics Applied in Transport and Traffic Systems (TUDelft) 2018: Innovation Management (A.T. Kearney, Dusseldorf/Berlin/Munich) 2017: Pedestrian Dynamics: Modelling, Validation and Calibr. (Brown Univ.)

	2017: Robust Mathematical Finance (ETH)
	2017: Quantitative Finance (U. Milano-Bicocca)
	2016: Numerical methods for Hamilton-Jacobi equations (RICAM, Linz)
	2014: IP, Licensing and Commercialisation (U. Oxford)
	2014: Global Cloud Resolving Modelling (RIKEN, Kobe)
	2014: Experim. Methodology in Comp. Sci. Research (U. St. Andrews)
	2012: 8-th International Cloud Modelling Workshop (U. Warsaw)
	2011: Atmospheric Water Vapour in the Climate System (Venice Int. Univ.)
	2008: Aerosols and Climate Change (U. L'Aquila)
	2008: Physics and chem. of air pollution and their effects (U. Helsinki)
	2007: Boundary-Layer Research with Airborne Instruments (EUFAR, Iasi)
	2007: Formation and growth of atmospheric aerosols (U. Helsinki)
	2006: Multi-spectral environmental satellites (IMiGW/U. Wisconsin, Kraków)

student mentorship

PhD (co-advised with Mirosław Zimnoch):
– Agnieszka Żaba (PhD in Physics @agh.edu.pl, ongoing)
MSc:
– Paweł Magnuszewski (MSc in Applied CS @agh.edu.pl, ongoing)
– Oleksii Bulenok (MSc in CS @uj.edu.pl, defended in 2023)
– Kacper Derlatka (MSc in CS @uj.edu.pl, defended in 2023)
– Michael Olesik (MSc in physics @uj.edu.pl, defended in 2020)
– Piotr Bartman (MSc in CS @uj.edu.pl, defended in 2020)
BEng:
– Michał Kowalczyk (BEng in Technical Physics @agh.edu.pl, defended in 2025)
Internships:
– Emma Ware (Erasmus+ @agh.edu.pl, 2024/2025, ongoing)
– Agnieszka Makulska (summer internship @agh.edu.pl in 2023)
– Zach D'Aquino (summer internship @illinois.edu in 2022)

university teaching

Faculty of Physics and Applied CS, AGH University of Krakow:
    2025: Modelling of physical systems (lab)
    2024: Modelling of flow systems (lab)
    2024: Linux operating system (lab)
    2024: C++ for technical physics (lab)
    2024: Fundamentals of Computer Science (lab)
    2023, '24: Fundamentals of programming (C/Python/Julia/R lab)
Faculty of Math. and CS, Jagiellonian University:
    2020: Modelling of Atmospheric Clouds (lecture + computer lab)
    2020: Programmer's Workshop (UNIX/LaTeX/git/...) (remote lab)
    2020: Programming 1 (C/C++) (remote lab)
    2018: Abstract programming (computer lab)
    2018: Design patterns (computer lab)
Faculty of Physics, U. Warsaw:
    2015: Programming in C++ (lecture)
U. Vigo in Ourense, Spain:
    2014: A short course on object-oriented numerics (ephyslab.uvigo.es/numeric)
Institute of Geophysics, U. Warsaw:
    2011, '14: Numerical modelling in atmospheric physics
    2010: Physics of the atmospheric boundary layer
    2009, '10: Atmospheric thermodynamics and cloud physics
    2008, '09: Hands-on data processing in meteorology

peer-reviewed papers

Arabas, Curtis, Silber, Fridlind, Knopf, West & Riemer 2025:
Immersion freezing in particle-based aerosol-cloud microphysics:
a probabilistic perspective on singular and time-dependent models
(JAMES, doi: 10.1029/2024MS004770)

Derlatka, Manna, Bulenok, Zwicker & Arabas 2024:
Numba-MPI v1.0: Enabling MPI communication within Numba/LLVM
JIT-compiled Python code
(SoftwareX, doi: 10.1016/j.softx.2024.101897)

Azimi, Jaruga, de Jong, Arabas & Schneider 2023:
Training warm-rain bulk microphysics schemes using super-droplet simulations
(JAMES, doi: 10.1029/2023MS004028)

D'Aquino, Arabas, Curtis, Vaishnav, Riemer & West 2023:
PyPartMC: A Pythonic interface to a particle-resolved,
Monte Carlo aerosol simulation framework
(SoftwareX, doi: 10.1016/j.softx.2023.101613)

de Jong, Mackay, Bulenok, Jaruga & Arabas, 2023:
Breakups are Complicated: An Efficient Representation
of Collisional Breakup in the Superdroplet Method
(Geosci. Model Dev., doi: 10.5194/gmd-16-4193-2023)

de Jong et al., 2023
New developments in PySDM and PySDM-examples v2:
collisional breakup, immersion freezing, dry aerosol initialization,
and adaptive time-stepping
(J. Open Source Soft., doi: 10.21105/joss.04968)

Hill, Lebo, Andrejczuk, Arabas, Dziekan, Field, Gettelman, Hoffmann et al., 2023:
Toward a numerical benchmark for warm rain processes
(J. Atmos. Sci. doi: 10.1175/JAS-D-21-0275.1)

Park, Duvert, Coulais, Jung, Arabas et al. 2022:
GNU Data Language 1.0: a free/libre and open-source
drop-in replacement for IDL/PV-WAVE
(J. Open Source Soft. doi: 10.21105/joss.04633)

Bartman et al. 2022:
PyMPDATA v1: Numba-accelerated implementation of MPDATA
with examples in Python, Julia and Matlab
(J. Open Source Soft. doi: 10.21105/joss.03896)

Bartman et al. 2022:
PySDM v1: particle-based cloud modelling package
for warm-rain microphysics and aqueous chemistry
(J. Open Source Soft. doi: 10.21105/joss.03219)

Olesik et al. 2022:
On numerical broadening of particle-size spectra:
a condensational growth study using PyMPDATA 1.0
(Geosci. Model Dev. 15, doi: 10.5194/gmd-15-3879-2022)

Bartman & Arabas 2021:
On the design of Monte-Carlo particle coagulation solver interface:
a CPU/GPU Super-Droplet Method case study with PySDM
(LNCS 12743, doi: 10.1007/978-3-030-77964-1_2)

Arabas & Farhat 2020:
Derivative Pricing as a Transport Problem:
MPDATA solutions to Black-Scholes-type equations
(J. Comput. Appl. Math. 373, doi: 10.1016/j.cam.2019.05.023)

Arabas & Shima 2017:
: On the CCN (de)activation nonlinearities
(Nonlin. Proc. Geophys. 24, doi: 10.5194/npg-24-535-2017)

Arabas, Jaruga, Pawlowska & Grabowski, 2015:
: libcloudph++ 1.0: a single-moment bulk, double-moment bulk, and
particle-based warm-rain microphysics library in C++
(Geosci. Model Dev. 8, doi: 10.5194/gmd-8-1677-2015)

Jaruga, Arabas, Jarecka, Pawlowska, Smolarkiewicz & Waruszewski, 2015:
: libmpdata++ 1.0: a library of parallel MPDATA solvers
for systems of generalised transport equations
(Geosci. Model Dev. 8, doi: 10.5194/gmd-8-1005-2015)

Arabas, Jarecka, Jaruga & Fijałkowski, 2014:
: Formula Translation in Blitz++, NumPy and Modern Fortran:
A Case Study of the Language Choice Tradeoffs
(Sci. Prog. 22, doi: 10.3233/SPR-140379)

Arabas & Shima, 2013:
: Large-Eddy Simulations of Trade Wind Cumuli
Using Particle-Based Microphysics with Monte Carlo Coalescence
(J. Atmos. Sci., doi: 10.1175/JAS-D-12-0295.1)

Kulmala et al., 2011:
: General overview: European Integrated project on Aerosol Cloud Climate
and Air Quality interactions (EUCAARI):
integrating aerosol research from nano to global scales
(Atmos. Chem. Phys., doi: 10.5194/acp-11-13061-2011)

Arabas & Pawlowska, 2011:
: Adaptive method of lines for multi-component aerosol
condensational growth and CCN activation
(Geosci. Model Dev., doi: 10.5194/gmd-4-15-2011)

Cairo et al., 2010:
: An introduction to the SCOUT-AMMA stratospheric aircraft, balloons
and sondes campaign in West Africa, August 2006: rationale and roadmap
(Atmos. Chem. Phys., doi: 10.5194/acp-10-2237-2010)

Arabas, Pawlowska & Grabowski, 2009:
: Effective radius and droplet spectral width
from in-situ aircraft observations in trade-wind cumuli during RICO
(Geophys. Res. Lett., doi: 10.1029/2009GL038257)

paper reviews
: Atmos. Chem. Phys. (EGU); Geosci. Model Dev. (EGU); Geophys. Res. Lett. (AGU);
J. Adv. Model. Earth Sys. (AGU); SoftwareX; J. Geophys. Res. Atmos (AGU);
J. Atmos. Sci. (AMS); J. Fluid Mech. (Cambridge); J. Open Source Soft.

proposal reviews
: – Fulbright Poland
– National Research, Development and Innovation Office of Hungary
– Dutch Research Council (NWO)

editorship
: Geoscientific Model Development (EGU public-peer-review journal):
– 2020-...:topical editor (geoscientific-model-development.net/editorial_board.html)
– 2021-...:"Particle-based methods for simulating atmospheric aerosol and clouds"
special-issue coordinator (gmd.copernicus.org/articles/special_issue1164.html)
Jagiellonian University Press:
– ...-2023: Polish edition of "Short Course in Cloud Physics" by Rogers & Yau
(project coordination, LaTeX typesetting) wuj.pl/ksiazka/zarys-fizyki-chmur