

## Sylwester Arabas | Curriculum Vitae | May 2023

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public profiles	homepage: <a href="https://slayoo.github.io">slayoo.github.io</a> ORCID: <a href="https://orcid.org/0000-0003-2361-0082">orcid.org/0000-0003-2361-0082</a> GitHub: <a href="https://github.com/slayoo">github.com/slayoo</a> Google Scholar: <a href="https://scholar.google.com/citations?user=X1s5grkAAAAJ">scholar.google.com/citations?user=X1s5grkAAAAJ</a> LinkedIn: <a href="https://linkedin.com/in/sylwester-arabas">linkedin.com/in/sylwester-arabas</a>
highlights	<ul style="list-style-type: none"><li>· <b>numerical modelling</b> and data analysis in atmospheric physics</li><li>· cloud physics, aerosol-cloud-precipitation interactions, particle-based <math>\mu</math>-physics</li><li>· research <b>software engineering</b> focused on reproducibility &amp; maintainability</li><li>· free and open-source software maintenance, dissemination and advocacy</li><li>· scientific <b>data visualisation</b>, vector graphics and typesetting</li><li>· public presentations, teaching sciences, organisation of meetings</li><li>· building teams, <b>keeping things simple, done and documented</b></li><li>· international experience in academic, gov, corporate and startup realms</li></ul>
employment	2023.05–...: <b>AGH Univ. (Physics/Appl. CS), Kraków, Poland</b> researcher at the Environmental Physics Group: <a href="https://rainbow.fis.agh.edu.pl">rainbow.fis.agh.edu.pl</a> 2021.07–2022.06: <b>Univ. Illinois (Atmos. Sci.), Urbana, Illinois, USA</b> postdoc at the group of Nicole Riemer: <a href="https://atmos.illinois.edu/~nriemer">atmos.illinois.edu/~nriemer</a> 2018.10–2023.04: <b>Jagiellonian Univ. (Computer Sci.), Kraków, Poland</b> open-source Python project leadership: PySDM, PyMPDATA, numba-mpi mentorship for graduate students (computer science, physics) 2017.10–2018.09: <b>AETHON, Athens, Greece</b> urban transport modelling (EU's H2020 "Innovation Associate" programme) 2015.11–2017.09: <b>Chatham Financial, Kraków, Poland</b> financial models software development 2013.12–2015.10: <b>University of Warsaw ([Geo]Physics), Poland</b> leadership in open-source CFD-related projects: <a href="https://github.com/igfuw">github.com/igfuw</a> lectureship (C++ for first-year undergraduate students) 2005.10–2013.12: graduate studies (see below) 2002.10–2005.12: <b>Mazovian Governor Office, Warsaw, Poland</b> web/db developer 2000–2009: <b>ITStudio.pl, Warsaw, Poland</b> web/db developer
university education	2008–2013: <b>Faculty of Physics, University of Warsaw</b> – PhD in Physics thesis: Elements of modern cloud modelling (in English) supervisor: H. Pawłowska, degree obtained: 2013-12-16 referees: G. Feingold (NOAA), L. Loboeki (Warsaw Tech.) 2002–2008: <b>Faculty of Physics, University of Warsaw</b> – MSc, 350 ECTS thesis: Microphysical properties of shallow convective clouds (in Polish) supervisor: H. Pawłowska; referee: K. Haman; degree obtained: 2008-06-25
study visits	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)
coding skills	Python, C++, C#, C, IDL/GDL, Fortran, SQL, UNIX tools, $\text{\LaTeX}$ / $\text{\BibTeX}$ ; multi-threaded, GPU and MPI parallelism; design patterns; test automation
language skills	fluent: <b>Polish, English</b> ; basics: Russian, French

<b>organisation of meetings</b>	<p>“Probabilistic Particle-Based Methods in Aerosol-Cloud Microphysics Modeling” (AMS Symposium on Aerosol–Cloud–Climate Interactions, Denver, 2023)  <a href="https://annual.ametsoc.org/index.cfm/2023/program-events">https://annual.ametsoc.org/index.cfm/2023/program-events</a></p> <p>“Lagrangian cloud microphysics: progress and prospects” (EGU GA, 2020)  <a href="http://meetingorganizer.copernicus.org/EGU2020/session/36655">http://meetingorganizer.copernicus.org/EGU2020/session/36655</a></p> <p>“Eulerian/Lagrangian methods for cloud microphysics” (Kraków, 2019)  <a href="http://www.ii.uj.edu.pl/~arabas/workshop_2019/">http://www.ii.uj.edu.pl/~arabas/workshop_2019/</a></p> <p>“Eulerian/Lagrangian methods for cloud microphysics” (Warsaw, 2015)  <a href="http://goo.gl/1fj5H8">http://goo.gl/1fj5H8</a></p> <p>“FOSS for scientists” (Brussels, 2013, day-long conference session)  <a href="http://archive.fosdem.org/2013/schedule/track/foss_for_scientists/">http://archive.fosdem.org/2013/schedule/track/foss_for_scientists/</a></p>
<b>field campaigns</b>	<p>2011: (3 weeks) CARRIBA helicopter measurements campaign (Barbados)</p> <p>2008: (3 weeks) EUCAARI aircraft measurements campaign (Rotterdam)</p> <p>2008: (2 weeks) SEASALT aircraft measurements campaign (Austrian Alps)</p> <p>2006: (3 weeks) AMMA aircraft measurements campaign (Burkina Faso)</p>
<b>funding record</b>	<p>Poland’s National Science Centre (<a href="http://ncn.gov.pl">ncn.gov.pl</a>):</p> <p>2022-24: PI in a SONATA project (ca. \$250 000)</p> <p>2011-13: PI in a PRELUDIUM project (ca. \$15 000)</p> <p>Foundation for Polish Science (<a href="http://fnp.org.pl">fnp.org.pl</a>):</p> <p>2018-21: PI in “Reintegration” grant (ca. \$200 000)</p> <p>2014: Mentorship programme (mentor: prof. Harm Jonker, TU Delft)</p> <p>2012-13: 2×START fellowship (incl. visit at NCAR, Boulder, CO)</p> <p>2011: Conference award (SIAM GS11, Long Beach, California)</p> <p>European Facility for Airborne Research (<a href="http://eufar.net">eufar.net</a>):</p> <p>2008: PI in SEASALT student project (<a href="http://seasalt.igf.fuw.edu.pl">seasalt.igf.fuw.edu.pl</a>) (ca. \$25 000)</p>
<b>open-source software</b>	<p><a href="#">PyPartMC</a> (2021–...): ~ 500 C++/Fortran/Python commits, maintenance</p> <p><a href="#">numba-mpi</a> (2020–...): ~ 50 Python commits, maintenance</p> <p><a href="#">PyMPDATA &amp; PySDM</a> (2019–...): ~ 3000 Python commits, maintenance</p> <p><a href="#">libmpdata++</a>, <a href="#">libcloudph++</a> (2013–2015): ~1000 C++ commits</p> <p><a href="#">GNU Data Language</a> (2009–...): ~500 C++ commits, co-maintenance</p>
<b>extramural seminars</b>	<p>Institute for Atmospheric Physics, Univ. Mainz (2019, 2022 virtual)</p> <p>Environ. &amp; Climate Sci. Dept, Brookhaven National Lab, NY (2022)</p> <p>SoMAS, Stony Brook University, NY (2022)</p> <p>Dept. Environ. Sci. &amp; Engineering, Caltech (2022): <a href="https://youtu.be/OOJe-JFMDpU">youtu.be/OOJe-JFMDpU</a></p> <p>Dept. Atmospheric Sciences, Univ. Illinois at Urbana-Champaign (2021)</p> <p>Dept. Atmospheric and Oceanic Sciences, McGill University, Montreal (2019)</p> <p>National Center for Atmospheric Research, Boulder, Colorado (2019, ’14, ’12, ’10)</p> <p>Los Alamos National Laboratory (2019)</p> <p>Faculty of Sciences, University of Pécs, Hungary (2019)</p> <p>Department of Atmospheric Sciences, Yonsei University, Seoul (2019)</p> <p>Graduate School for Simulation Studies, University of Hyogo, Kobe (2019, ’15)</p> <p>Nanjing University of Information Science and Technology, China (2019)</p> <p>Lab. de mécanique des fluides et d’acoustique, École Centrale de Lyon (2019)</p> <p>Physics Seminar, Michigan Tech, Houghton, Michigan (2018)</p> <p>Dept. of Atmospheric Sciences, University of Wyoming, Laramie (2018, ’15)</p> <p>Complex Systems and Applications Group, Demokritos, Athens, Greece (2018)</p> <p>Chemical Engineering Department, University of Patras, Greece (2018)</p> <p>Faculty of Civil Engineering and Geosciences, TU Delft, The Netherlands (2015)</p> <p>National Atmospheric and Oceanic Administration, Boulder, Colorado (2012)</p> <p>Meteorological Research Institute, Tsukuba, Japan, (2010)</p> <p>Japan Agency for Marine-Earth Science and Technology, Yokohama (2010)</p>

**conference  
presentations**

American Meteorological Society Annual Meeting:  
'23 (Denver, chair & poster), '22 (Houston, virtual talk)  
FOSDEM (Free & Open Source Software Devs Euro Meeting, Brussels):  
'23 (talk), '21, '20, '19 & '18 (volunteer), '17, '16, '15, '14, '13 (chair), '12, '11 (talk), '10  
American Meteorological Society Cloud Physics Conference:  
'22 (Madison, poster), '18 (Vancouver, poster)  
International Conference on Clouds and Precipitation:  
'21 (virtual, 2 contris), '12 (Leipzig, talk), '08 (Cancún, talk)  
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**

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)

**mentorship**

– Piotr Bartman (MSc in CS, defended in 2020)  
– Oleksii Bulenok (MSc in CS, in progress)  
– Kacper Derlatka (MSc in CS, in progress)  
– Michael Olesik (MSc in physics, defended in 2020)

<b>teaching</b>	<p>Faculty of Math. and CS, Jagiellonian University:</p> <ul style="list-style-type: none"> <li>2020: Modelling of Atmospheric Clouds (lecture + computer lab)</li> <li>2020: Programmer's Workshop (UNIX/L<sup>A</sup>T<sub>E</sub>X/git/...) (remote lab)</li> <li>2020: Programming 1 (C/C++) (remote lab)</li> <li>2018: Abstract programming (computer lab)</li> <li>2018: Design patterns (computer lab)</li> </ul> <p>Faculty of Physics, U. Warsaw:</p> <ul style="list-style-type: none"> <li>2015: Programming in C++ (lecture)</li> </ul> <p>U. Vigo in Ourense, Spain:</p> <ul style="list-style-type: none"> <li>2014: A short course on object-oriented numerics (<a href="http://ephyslab.uvigo.es/numeric">ephyslab.uvigo.es/numeric</a>)</li> </ul> <p>Institute of Geophysics, U. Warsaw:</p> <ul style="list-style-type: none"> <li>2011, '14: Numerical modelling in atmospheric physics</li> <li>2010: Physics of the atmospheric boundary layer</li> <li>2009, '10: Atmospheric thermodynamics and cloud physics</li> <li>2008, '09: Hands-on data processing in meteorology</li> </ul>
<b>peer-reviewed papers</b>	<p>de Jong et al., 2023</p> <p>New developments in PySDM and PySDM-examples v2: collisional breakup, immersion freezing, dry aerosol initialization, and adaptive time-stepping (J. Open Source Soft., doi: <a href="https://doi.org/10.21105/joss.04968">10.21105/joss.04968</a>)</p> <p>Hill, Lebo et al., 2023:</p> <p>Toward a numerical benchmark for warm rain processes (J. Atmos. Sci. doi: <a href="https://doi.org/10.1175/JAS-D-21-0275.1">10.1175/JAS-D-21-0275.1</a>)</p> <p>Park, Duvert, Coulais, Jung, Arabas et al. 2022:</p> <p>GNU Data Language 1.0: a free/libre and open-source drop-in replacement for IDL/PV-WAVE (J. Open Source Soft. doi: <a href="https://doi.org/10.21105/joss.04633">10.21105/joss.04633</a>)</p> <p>Bartman et al. 2022:</p> <p>PyMPDATA v1: Numba-accelerated implementation of MPDATA with examples in Python, Julia and Matlab (J. Open Source Soft. doi: <a href="https://doi.org/10.21105/joss.03896">10.21105/joss.03896</a>)</p> <p>Bartman et al. 2022:</p> <p>PySDM v1: particle-based cloud modelling package for warm-rain microphysics and aqueous chemistry (J. Open Source Soft. doi: <a href="https://doi.org/10.21105/joss.03219">10.21105/joss.03219</a>)</p> <p>Olesik et al. 2022:</p> <p>On numerical broadening of particle-size spectra: a condensational growth study using PyMPDATA 1.0 (Geosci. Model Dev. 15, doi: <a href="https://doi.org/10.5194/gmd-15-3879-2022">10.5194/gmd-15-3879-2022</a>)</p> <p>Bartman &amp; Arabas 2021:</p> <p>On the design of Monte-Carlo particle coagulation solver interface: a CPU/GPU Super-Droplet Method case study with PySDM (LNCS 12743, doi: <a href="https://doi.org/10.1007/978-3-030-77964-1_2">10.1007/978-3-030-77964-1_2</a>)</p> <p>Arabas &amp; Farhat 2020:</p> <p>Derivative Pricing as a Transport Problem: MPDATA solutions to Black-Scholes-type equations (J. Comput. Appl. Math. 373, doi: <a href="https://doi.org/10.1016/j.cam.2019.05.023">10.1016/j.cam.2019.05.023</a>)</p> <p>Arabas &amp; Shima 2017:</p> <p>On the CCN (de)activation nonlinearities (Nonlin. Proc. Geophys. 24, doi: <a href="https://doi.org/10.5194/npg-24-535-2017">10.5194/npg-24-535-2017</a>)</p>

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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/10.1175/JAS-D-12-0295.1))

Kulmala, Asmi, Lappalainen 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](https://doi.org/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](https://doi.org/10.5194/gmd-4-15-2011))

Cairo, Pommereau, Law 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](https://doi.org/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  
(Geosci. Res. Lett., doi: [10.1029/2009GL038257](https://doi.org/10.1029/2009GL038257))

**under review** de Jong, Mackay, Jaruga & Arabas, 2022:  
Breakups are Complicated: An Efficient Representation  
of Collisional Breakup in the Superdroplet Method  
(Geosci. Model Dev., doi: [10.5194/egusphere-2022-1243](https://doi.org/10.5194/egusphere-2022-1243))

**editorship** Geoscientific Model Development, topical editor since 2020 ([geoscientific-model-dev.net](https://www.geoscientific-model-dev.net))  
Polish ed. of “Short Course in Cloud Physics” (WUJ, 2023): initiative/typesetting