



Mateusz Rzeszutek

Research Assistant "AGH University"

- ▶ Krakow, Poland
- ▶ polish

Skills

Air quality modeling 14 years

Air quality monitoring 14 years

R for Data Science 10 years

Programming R 8 years

Geographic Information System 12 years

Project management 7 years

Data sharing in projects 12 years

Computer-Aided Design 10 years

Contact

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Summary

I am a scientist who wants to learn and discover the processes and phenomena of the earth's atmosphere. Air is one of the basic components of the environment, without which there is no life on earth. 5 minutes without oxygen causes irreversible changes in our brain, so I believe that my area of interest is very important. I hope that my work will contribute to the understanding of a small part of the surrounding world. It will allow to plan effective air protection engineering activities.

Major Research Topics:

- **Parameterization and accuracy assessment of air quality modeling systems** - My research will allow the effective use of these techniques for regulatory purposes.
- **Analysis of air quality monitoring system data** - I am developing and testing different methods to identify how individual factors determine air quality.
- **Air quality monitoring** - I am working on calibration algorithms for low-cost particulate matter sensors that will be robust to changing locations.
- **Creating tools for environmental engineers in R** - In my free time, I create the "mpsenvi" package that will perform accuracy assessment, data preparation, modeling, and visualization of results from air quality models.

Education

Ph.D.

08/03/2019

AGH University of Krakow; Faculty of Geo-Data Science, Geodesy and Environmental Engineering

Optimization of input settings of selected air pollution dispersion modeling systems in near-field.

M.Sc.

22/10/2013

AGH University of Krakow; Faculty of Geo-Data Science, Geodesy and Environmental Engineering

Air quality impact assessment of Industrial Plant of Thermic Waste Processing Technology in Kracow using mathematical dispersion model CALPUFF.

Eng.

31/01/2012

AGH University of Krakow; Faculty of Geo-Data Science, Geodesy and Environmental Engineering

Emitter geometry optimization (in a select range)

Employment

Research Assistant

10/2019 - present

AGH University of Krakow; Faculty of Geo-Data Science, Geodesy and Environmental Engineering

Assistant Professor

10/2015 - 09/2019

AGH University of Krakow; Faculty of Geo-Data Science, Geodesy and Environmental Engineering

Develop tools

- ▶ R
- ▶ RStudio
- ▶ Positron
- ▶ Quarto
- ▶ Git
- ▶ Fortran
- ▶ Overleaf

AQM tools

- ▶ CALMET/CALPUFF
- ▶ AERMET/AERMOD
- ▶ OSPM
- ▶ HYSPLIT
- ▶ CALINE
- ▶ COPERT

Tools

- ▶ ArcGIS
- ▶ AutoCAD
- ▶ MS Office 365 and Teams
- ▶ MS project and Visio
- ▶ GitKraken
- ▶ VS Code
- ▶ Python
- ▶ Inkscape
- ▶ Linux
- ▶ QGIS
- ▶ Mendeley

Hobby

- ▶ Active - Cycling, Mountain and photography
- ▶ Resting - Football, Movie, Serials, Theater

Internships

Research internship

September 2025

Instituto Politécnico de Tomar, Tomar, Portugal

Establishment of a research collaboration focused on the adaptation of machine learning algorithms to identify the impacts of wildfires on air quality at air quality monitoring station locations

Research internship

September 2024

University of Agriculture in Kraków, Kraków, Poland

Establishment of a research collaboration focused on the modeling and accuracy assessment of selected air quality modeling systems applied at the local scale in forested areas, as well as statistical analyses of measurement data on wet nitrogen deposition and nitrogen dioxide (NO) concentrations.

Research internship

August 2019

Municipal Cleaning Company in Krakow, Poland

Development of assumptions for research work on secondary dust emissions from roads. Recognition of existing street cleaning technologies. Optimization of the street cleaning process with relation to secondary dust pollutant levels.

Traineeship

april 2011

Environmental Protection Inspectorate in Krakow, Poland

Air quality monitoring, monitoring methods, maintenance and operation of measuring equipment, validation of measurement results.

Traineeship

July 2010

Emipro limited liability company, Poland

Measurement of air pollution emissions, performance of measurements in industrial plants, performance of determinations in the laboratory, preparation of documentation.

Scholarship

Scholarships for academic achievements

2008 - 2018

AGH University of Krakow

Basic, pro-quality and scientific scholarship for PhD students awarded annually; Scholarship for the best environmental engineering students awarded annually (European Social Fund); Scholarship for the best environmental engineering students awarded annually (Ministry of Science and Higher Education).

Scientific projects and grants

Team member

2023 - 2025

National Center for Research and Development

Energy Transformation Observatory as an instrument to support the socio-economic development of Poland - OTE. Grant no. GOSPOS-TRATEG9/000D/2022

Leader

2024 - 2025

Excellence Initiative Research University

Habilitation set: Parameterization and accuracy evaluation of selected modeling systems and applied machine learning methods at local and micro scales to support an air quality management system, Grant no. 8864

Team member

2020 - 2022

Excellence Initiative Research University

Analysis of the fractional and elemental composition of dusts in an urban agglomeration and suburban areas along roads - mobile, stationary and model studies. Grant application no. 67

Team member

2019 - 2022

National Center for Research and Development

Development of distributed energy in energy clusters - KlastER. Grant no. Gospostrateg1/385085/21/NCBR/19

Leader

2014 - 2017

Ministry of Science and Higher Education

Three small scientific projects on the optimization and accuracy assessment of selected modeling systems, Grant no. 15.11.150.277, 15.11.150.395, 15.11.150.462

R and fortran projects

I invite you to visit my profile **mrzeszutek** on the GitHub platform. There you can find my current scientific and teaching projects.

- giosmport - **R package** - Data import package from the air quality monitoring system in Poland.,
- animeTraj - **R function** - Tutorial on creating trajectory animations from the Hysplit model.
- Scripted Data Processing - **Course** - A course on effective data processing and basic programming in R - R, Rstudio, Quarto, Tidyverse.
- Remote Repositories and Version Control Systems for Machine Learning projects - **Course** - Course for the best students of AGH University of Krakow.
- Fortran - Several data preparation programs for CALMET/CALPUFF (test versions). A simple implementation of the reference methodology for assessing the impact on air quality (Gaussian plume model).

Other projects

- Report for Zinc smelter in a Silesian town, 2021 - 2022, Monitoring size and dynamics of the deposition pollutants in the forest ecosystem in the plant zone. Report no. CI-UR/U/7/2020.
- Report for the Municipal Cleaning Company in Krakow, 2016, Determination of the emission factors of PM10 and PM2.5 dust suspended in the air from selected streets in Krakow. Report no. 5.5.150.370.
- Report for SGL Carbon Poland, 2014, Preparation of an integrated application permit for SGL Carbon Poland. Report no. 5.5.150.213.
- Report for the Office City of Zielona Gora, 09/2023 - 12/2023, Expert opinion on the spread of a cloud of pollution from a fire of hazardous waste stored in a hall in Zielona Gora. Report no. 25.25.150.682.

- Report for the Office City of Krakow, 07/2019 - 12/2019, Assessment of the impact of repair activities on air quality in Krakow. Report no. 25.25.150.561.
- Report for the Office City of Krakow, 07/2019 - 12/2019, Assessment of the effects of improving air quality in Krakow by introducing changes in traffic organization on the example of selected street canyons - preliminary studies. Report no. 25.25.150.571.

Certificated courses and training

R programming and data science

2018 - 2019 (160h)

LabMasters

Fundamentals of mathematical statistics in R; Data analysis and visualization in R; Machine Learning Workshops in R

R development and deep Learning

2025 (90h)

FACH

Time series analysis and forecasting in R; Deep Learning in R; R development; Interactive web applications in R (Shiny)

ArcGIS Desktop

2012 (16h)

Esri Polska Sp. z o.o.

Introduction to ArcGIS Desktop; ArcGIS Desktop - spatial analyses

AutoCad

2010 - 2011 (90h)

CAD Consult - authorized training center Autodesk

AutoCad 2011 Beginning no. certificate: 1RRIOWPDCU ; AutoCad 2011 advanced no. certificate: 1530886753; AutoCad 2011 3D models no. certificate: 1935NEUWFO;

Calculations on supercomputers

2015 - 2016 (20h)

Academic Computer Centre CYFRONET AGH

Linux Basics Workshop; Workshops on the efficient use of the Zeus supercomputer

Introduction to LaTeX in Overleaf

19/11/2023 (14h)

FACH Sp. z o.o. - organized by the Center of IT Promotion

CFD in ANSYS

23/09/2022 (96h)

MESco Sp. z o.o. - ANSYS Certified Elite Channel Partner

Auditor

08/03/2013 (30h)

MDG Doradztwo Gospodarcze sp. z o.o.

Auditor ISO 9001:2009, ISO14001:2005, PN-N-18001:2004, OHAS 18001:2007, registry number: MDG-Z-2013/03/51

Project management

23/11/2011 (8h)

PM sp. z o.o.

Project management basics no. certificate: 2011-11-65

Prizes and awards

Scientific achievements

2019, 2020, 2021

AGH University of Krakow

One individual award of the first degree and twice of the third degree of the Rector of the AGH University of Krakow for scientific achievements.

Educational achievements

2018, 2022

AGH University of Krakow

Two team awards for educational achievements - development and preparation of a new educational program.

Organizational achievements

2019

AGH University of Krakow

Team 3rd degree Rector's Award for organizational achievements

Distinctions a master's thesis

2014

Krakow City Awards

Distinction of master's thesis by the mayor of Kraków; First place for the best master's thesis on environmental protection awarded by the Good Network Foundation; Winner of 3rd place in the competition for the best master's theses (without division into categories) defended at AGH University of Krakow (AGH Diamonds, XV edition)

Publications

You can find a full list of my scientific publications at **ORCID** and **BPP AGH**. I encourage you to browse my profile on **researchgate** and **Scopus**.

Conferences

I participated in 25 national and international scientific conferences. Inter alia:

- International Conference on the Sustainable Energy and Environmental Development (**SEED**)
- Advances in energy Systems and Environmental Engineering (**ASEE**)
- Scientific Conference Air Protection in Theory and Practice
- Central European Conference (**ECOpole**)
- International Conference of Science and Technology" (**INFRAEKO**)
- Symposium Air quality and health

Reviewer

He regularly reviews scientific articles for international scientific journals indexed in the scopus database: Applied sciences, Atmosphere, Archives of Environmental Protection Environmental science, Environments, Geomatics and Environmental Engineering, Science of the total environment, Sustainability, Toxics, Urban science, Environmental Sciences Europe.

Teaching and training

I teach or have taught in 4 academic courses, i.e. Environmental Engineering and Monitoring, Geoinformatics, Geospatial Informatics and Industrial Process Engineering and Management. I have taught more than 25 different courses. I am currently teaching:

- Air Protection Engineering (P)
- Scripted Data Processing (P)
- Time Series (P)
- Data mining (P)
- Remote Repositories and Version Control Systems in Machine Learning Projects (P).