

Section Strategy for Atmospheric Emissions and Modelling 2023-2026

1. Introduction

The [Section for Atmospheric Environment](#) consists of three groups: Atmospheric Measurements, Atmospheric Emissions and Atmospheric Modelling. The following strategy encompasses atmospheric emissions and modelling.

The group of atmospheric emissions is the sole responsible for estimating, managing and reporting the official national emissions and projections of air pollution and greenhouse gases from Danish sources. The group of atmospheric modelling has over many years developed air quality, exposure and deposition models together with integrated models for assessment of health effects and external cost of air pollution and applied these model tools in research, the national air quality monitoring program, and advisory projects for mainly public authorities. The group has also conducted research on how the global man-made activities affect the Arctic environment. In recent years, this has been extended to include research on the interaction between air pollution and climate in the Arctic and subsequently how the associated changes in the Arctic can affect the global climate. Furthermore, noise modelling for environmental epidemiology is advancing.

The group of atmospheric emissions includes a staff of 10 academics and researchers and the group of atmospheric modelling consist of 17 researchers including postdocs and PhDs.

2. Mission and Vision

Mission: to understand fundamental atmospheric processes and to provide, within the area of emission, air pollution and climate modelling as well as integrated impact assessment modelling, the highest capability in Denmark in terms of research, advisory activities and decision support for policy development contributing to green transition of society, talent development, teaching and public outreach.

Vision: to conduct interdisciplinary research within air pollution, noise and greenhouse gas emissions, and climate with focus on Arctic and in relation to health and social sciences. Furthermore, to exploit advances and new methods, enhance the synergy between basic and applied research, exploit both national and international resources and partnerships, and advise authorities through the application of our research to areas of benefits to society with focus on environment, climate, health and agriculture.

3. International position and strength

The emission and modelling group belongs to a limited number of research teams in Europe with a combined focus on both atmospheric emissions and modelling. The emission and modelling group is unique with respect to:

- 1) Atmospheric emissions and atmospheric modelling are integrated in the same group
- 2) including all scales in the same group from global, regional and national scales to urban background, urban street scales and point sources, and the capability to integrate all scales in the same air pollution model systems,
- 3) a close collaboration with the air quality monitoring group and the experimental scientists within the same department
- 4) a strong position within Arctic research with focus on climate modelling and modelling of transport of air contaminants to the Arctic
- 5) a strong position within integrated modelling; integrated high resolution health impact and external cost assessment; and impact assessment of policy measures
- 6) providing air quality guideline for regulation of industrial sources based on the air quality models developed and maintained in the section
- 7) a strong track record for collaboration with national and international institutions for interdisciplinary research.

4. Strategy and action plan

Focus area	Strategic goals	Action plan	Specific actions in 2023
Research and talent development			
- Process understanding and model development	<p>Higher/better spatial and temporal resolution in emissions and air quality (AQ) models</p> <p>Include new processes (e.g. aerosol-cloud interaction)</p> <p>Include new components (e.g. ultrafine particles, bioaerosols incl. pollen and fungal spore, soil dust)</p> <p>Develop linkages between aerosols, clouds, long-range transports and climate</p>	<p>More knowledge sharing between the emission and model groups</p> <p>Include goals in future project proposals</p> <p>Pursue projects focusing on aerosol-climate interactions and understanding of climate effects of combined long-range</p>	<p>Organise an EMMI-ATMO workshop on temporal profiles in emissions related to CAM2 (Camilla, Lise, Jesper)</p> <p>Group organizing technical and scientific presentations at EMMI-ATMO section meetings (Maher, Christopher, Thea, Zhuyun)</p> <p>External webinar on scientific issues (Ulas)</p> <p>Building relations with other research groups within ultrafine particles and dust (Lise, Ulas)</p>

	<p>Develop integrated assessment model system for effects on natural environment e.g. the terrestrial biosphere</p> <p>Develop integrated AQ and noise model system for environmental AQ and noise epidemiology</p> <p>Develop supporting tools for low-emission agriculture and land-use towards green transition</p>	<p>transports of atmospheric moisture and aerosols</p>	<p>NMR project on developing an EVA-Nature system (Lise)</p> <p>Make website about noise modelling on ENVS website and promote our noise modelling capability to collaborators (Jibran)</p>
- new methods	<p>Exploit advances and new methods within data science and remote sensing to improve model predictions and analysis</p>	<p>Improve expertise through courses</p> <p>Include in project proposals</p>	
- Talent development	<p>More master and PhD students to support model developments</p>	<p>Include more PhDs in project proposals</p>	
- International research leadership	<p>Take leadership in international research projects</p>	<p>Coordinate EU applications and act as WP leaders</p>	
- High pollution areas	<p>Support transition and low-income countries in AQ management</p>	<p>Explore potential funding sources and partners</p>	
- Digitalisation	<p>Improve research data management and work towards more open data and open access while taking competitive considerations</p>	<p>Systematic research data management and resource planning</p> <p>Implement FAIR data principles, and publish more open access articles</p> <p>Assess pros/cons for local versus central computing resources</p>	<p>Get to know Data Management Plans in EU projects and share knowledge (Steen)</p> <p>Get experience with using data storage facilities at ERDA/SIF/DEIC and share knowledge (Peter, Ulas)</p> <p>Explore opportunities for external computing and storage (Peter)</p>

Advisory services and industrial collaboration			
- national advisory services	Consolidate and expand advisory activities nationally within emission inventories, AQ assessment and management, assessment tools for effect on nature, and low emission agriculture		
- international advisory services	Expand advisory activities internationally within emission inventorying, AQ assessment and management	Engage in proposals for EU Commission, World Bank etc.	
- agriculture and land-use	Support low-emission agriculture and land-use	Develop decision-support tools	
Education			
- AU's bachelor and master programs	Contribute to bachelor and master courses	Develop AQ model course at TECH	
- continuing education	Contribute to continuing education outside the University	Continue OML-course Develop a course in AQ assessment and management for green transition targeting policy makers (together with ESGO) for national experts as well as experts from developing countries (Danida course)	
- PhD courses	Contribute to PhD courses	Develop iClimate course on climate change, modelling, adaptation and mitigation Conduct course on Air pollution – Science and management	Organise data science workshop at writing camp in 2023 (Jibran, Zhuyun). May develop into PhD course at a later stage.

		Advanced tools within atmospheric science (R, Python, machine learning)	
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Action plan for 2023			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Organise an EMMI-ATMO workshop on temporal profiles in emissions related to CAM2	Camilla, Lise, Jesper	Workshop held												
Group organizing technical and scientific presentations at EMMI-ATMO section meetings	Maher, Christopher, Thea, Zhuyun	Presentations at monthly section meetings												
External webinar on scientific issues	Ulas	1-2 webinars												
Building relations with other research groups within ultrafine particles and dust	Lise, Ulas	Meetings held												
NMR project on developing an EVA-Nature system	Lise	Proposals and projects												
Make website about noise modelling on ENV5 website and promote our noise modelling capability to	Jibrán	Website established and promotion meeting held												
Get to know Data Management Plans (DMP) in EU projects and share knowledge	Steen	Present example of DMP at section meeting												
Get experience with using data storage facilities at ERDA/SIF/DEIC and share knowledge	Peter, Ulas	Present experience about ERDA/SIF/DEIC at section meeting												
Explore opportunities for external computing and storage	Peter	Present opportunities at section meeting												
Organise data science workshop at writing camp in May 2023. May develop into PhD course at a later stage.	Jibrán, Zhuyun	Course held at writing camp												