

AERIS. Supporting air quality policy making

AERIS is a last-generation Integrated Assessment Modelling system to evaluate emission abatement strategies and ecosystem and health-related impacts



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Technological Offers type

Technological solutions

Research and innovation areas

- Climate, Energy and Mobility
- Digital Technologies, Artificial Intelligence, Cybersecurity, 5G, Robotics

ODS



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Where?

Environmental Technologies and Industrial Resources

Keywords: | [Air quality](#) | [analysis](#) | [quality](#)

Brief description of the technology solution and the added value it provides

AERIS is an integrated assessment model that allows the evaluation of emission abatement measures on the concentration of pollutants, deposition of atmospheric species, human health, ecosystems and crops. It is a simplified version of a cutting-edge supercomputing air quality model based on a parameterisation whose main advantage is its ability to provide immediate results for real-time decision making. AERIS is able to simulate the combined effect of abatement measures simultaneously applied and making possible the diagnosis of different indicators within a single, easy-to-use software platform. A fully operational beta version has been developed and applied for the Iberian Peninsula but the system can be applied for any region or city in need to solve air quality issues.

The model has been developed by the Environmental Technologies and Industrial Resources research group (Tecnologías Ambientales y Recursos Industriales), a team of researchers with more than 15 years of experience on atmospheric sciences and a comprehensive view of air quality issues and air quality management needs.

Description of the technological base

AERIS is a screening tool that relies on transfer matrices to simulate complex atmospheric phenomena (advection, diffusion, chemical reactions, deposition, etc) to assess changes in concentrations of air pollutants (including secondary pollutants such as particulate matter or ozone) as a function of emissions variations providing a comprehensive view of compliance with ambient air quality legal standards as well as health and ecosystem-related impacts.

Unlike complex deterministic air quality models, AERIS allows an immediate evaluation of potential abatement strategies that usually imply significant economic and social costs.

Its modular structure makes AERIS a suitable solution for any region or city by incorporating local expertise, methods and databases for consistent and comprehensive response.

AERIS runs in a friendly Matlab® interface which is simple and flexible, allowing rapid diagnostic capabilities for policy makers and environmental planners.

“An Integrated Assessment Modelling system based on location-specific atmospheric transfer matrices that allows a quick and comprehensive evaluation of emission abatement strategies”

Market demands

- Poor ambient air quality causes annually 3.7 million premature deaths worldwide according to the WHO. The EEA estimates direct economic costs of air pollution over 350 billion € each year only in Europe. According to OECD, market impacts of outdoor air pollution may grow up to 1% of global GDP by 2060.
- Public administrations and policy makers need support to develop meaningful and effective air quality improvement strategies based on emission abatement measures to prevent negative air pollution impacts on population and ecosystems and to meet the increasingly stringent air quality standards. Current deterministic air quality modelling systems are extremely expensive and time-consuming making unfeasible to simulate a wide range of abatement scenarios. In addition, it is difficult to link abatement strategies to comprehensive assessment of health and ecosystem-related impacts.
- AERIS may help decision makers and companies to:
 - Develop air quality strategies required by law, avoiding non-compliance situations and fines
 - Consistently integrate air quality and climate change mitigation policies on win-win mid and long term strategies
 - Air quality is a key concept for the development of smart cities
 - Identify cost-effective policies
 - Support participative processes

“AERIS offers immediate air quality diagnostics capabilities for policy makers, industry and the general public without incurring in long computation times, onerous infrastructure or high technical expertise”

Competitive advantages

- AERIS is the only model that provides immediate diagnostic capabilities of air pollution abatement measures using local data and expertise.
- Describes the full chain of events that come about with the application of an air pollution measure.
- Comparable performance and robustness to cutting-edge air quality models.
- It provides immediate responses and can be fully interrogated using common desktop applications and requires minimal user training.
- It can integrate official emission inventories, projections and local modelling tools.
- Highly modular: flexible and customizable solutions: from continental to the local scales.
- It reduces computing times from months to hours and minimizes costs, allowing the analysis of an unlimited number of scenarios and abatement strategies.

Previous references

- AERIS has been developed within the Environmental Technologies and Industrial Resources research group (Tecnologías Ambientales y Recursos Industriales). This group has been working on emission projection, scenario analysis and air quality modelling since 2000 and has collaborated with the Spanish Ministry of Environment, Comunidad de Madrid regional government and Madrid City Council (Plan A, emission inventory, etc.) among other administrations. We have also provided services and consultancy support to companies such as Repsol, Técnicas Reunidas, grupo cementos Portland Valderrivas, SICE, E.ON, Gas Natural, Inypsa, IDOM, etc with a revenue over 2.5 M€.

Development stage

- Concept
- R & D
- **Lab Prototype**
- Industrial Prototype
- Production

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