



Institute of Atmospheric Pollution Research
National Research Council of Italy

**Acting in the
present to
improve the
future.**

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Knowing and understanding air quality to act towards decarbonisation and sustainable development to protect future generations.

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Acting in the present to improve the future

The mission of the CNR-IIA is part of a highly topical framework for the ecosystemic balance of the planet.



The issue of air quality and air pollution affects the world population as a whole and inevitably is the result of our habits and consumption, economic and productive activities and, last but not least, the policies of national and international decision makers.

The impact of air pollution has repercussions in everyday life and in the future will result in economic and health costs negatively effecting quality of life.

WITH THIS IN MIND, THE INSTITUTE ACTS TOWARDS THE ECOLOGICAL TRANSITION BY INTEGRATING SKILLS AND KNOWLEDGE, MONITORING AND STUDYING AIR QUALITY IN ORDER TO GUARANTEE PEOPLE'S HEALTH AND DIRECT SUSTAINABLE INDUSTRIAL POLICIES AND PRACTICES.

Of primary reference are the air matrix and studies on understanding and safeguarding the environment, climate and biodiversity. From an operational and methodological point of view, the Institute gathers within its offices the excellence of the researchers present in Italy, assisted by state-of-the-art laboratories, instruments and survey stations.

The research activity, conducted with high competence and scientific rigor, makes the most efficient path in terms of impact reduction available to policy makers and operators in the production sector.



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Story and organization

Established in the late 60s by Prof. Arnaldo Liberti, full professor of Analytical Chemistry at the La Sapienza University of Rome, the Institute on Atmospheric Pollution of the CNR immediately focused its mission on the development of methods and new innovative technologies for the determination of the concentrations of many organic and inorganic pollutants present in the atmosphere.

The intervention of the Institute in providing scientific advice to the then Ministry of the Environment on environmental problems due to air pollution from Dioxin in 1976 in Seveso, has promoted over time the strengthening of research activities in the sector of industrial monitoring and the characterization of emissions.

The Institute on Atmospheric Pollution of the National Research Council is currently divided into 4 offices that work together to broaden the knowledge of the multiple mechanisms of emission, transformation and transport of atmospheric pollutants by combining multidisciplinary skills in the development of new and innovative technologies and methodologies of investigation.



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MORE DETAILS | www.iia.cnr.it/organizzazione

Anthropogenic impacts on the atmosphere

Understanding the mechanisms that contribute to air pollution..

The aim of the research is the understanding of the mechanisms by which the different natural and anthropogenic processes contribute to air pollution.

To this end, new analytical methodologies are developed for the sampling and analysis of the different pollutants. In addition to regulated pollutants, emerging pollutants are also studied.

The research activities are aimed at both emissions and ambient air, taking into consideration indoor, industrial, urban and remote environments.

Through the determination of suitable tracers and the processing of data, the different sources of pollution are identified and the contribution to the state of air quality is quantified for each of them.

AVAILABLE ON THE SITE | www.iiacnr.it/macroarea-impatti-antropici



Research Areas

Ambient air



AREA SKILLS

The contents and actions of the sub-area are consistent with the challenges posed by the European Green Deal. In this context, in addition to the “zero pollution” objective for an environment free of toxic substances, the issue of air quality is also instrumental in achieving the objectives relating to accelerating the transition towards sustainable and intelligent mobility, guaranteeing a clean, affordable and secure energy supply, the mobilization of industry for a green and circular economy and the construction and renovation of energy and resource efficient buildings.

Polluting emissions



AREA SKILLS

In the current era based on the industrial economy, air pollution is an inevitable consequence that cannot be completely removed but can be reduced through both collective and individual contributions. There are multiple sources of anthropogenic emissions into the atmosphere, such as industries, fossil fuels used for domestic air conditioning or automotive. The improvement of combustion processes in industrial plants and engines, the sequestration of CO₂, energy efficiency, the control of diffuse gas emissions from agricultural crops and livestock, fuel conversions are important advances in the reduction of atmospheric pollutants.

Emerging pollutants



AREA SKILLS

Recently, with the development of new technologies and processes and with the improvement of the analytical sensitivity of the instruments, the interest of scientists and legislators has expanded not only to regulated pollutants and POPs, but also to new classes of substances. such as Emerging Contaminants (ECs), examples are plasticizers, new pesticides, products for cosmetics, cleaning and drugs which are often associated with effects such as carcinogenesis, mutagenesis, irritation, sensitization, and dysfunctions, of reproduction and metabolism as in the case of Endocrine Destructors (EDs).

Technologies for monitoring and sharing data on air pollution

The aim of the research is the improvement of methodologies, technologies and infrastructures for monitoring air quality and for sharing geospatial data related to atmospheric pollution.

The activities take place across three main sectors.

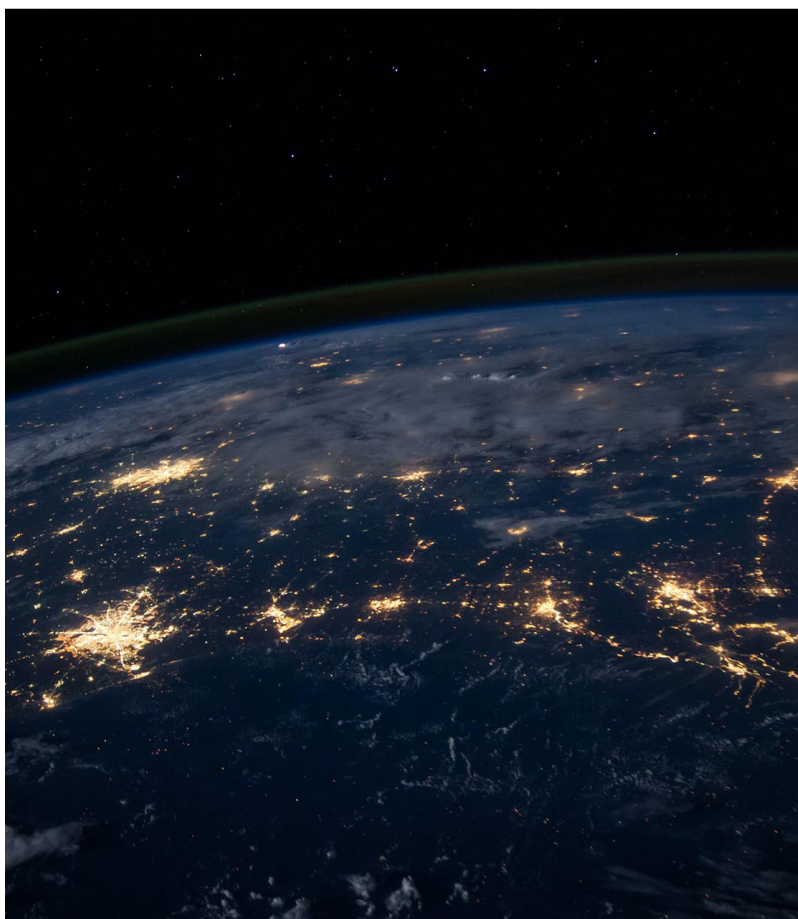
A first sector consists in the development and validation of low-cost, high-accuracy sensors for monitoring air pollution, using various methodologies including electrospinning.

A second sector is based on the application of remote sensing methodologies (satellite data) aimed at studying air quality, analyzing the impacts of pollution on vegetation, and land change use.

A third strand consists in the development of cyber-infrastructure for the management of environmental data and for the interoperability and integration of the different datasets currently available.

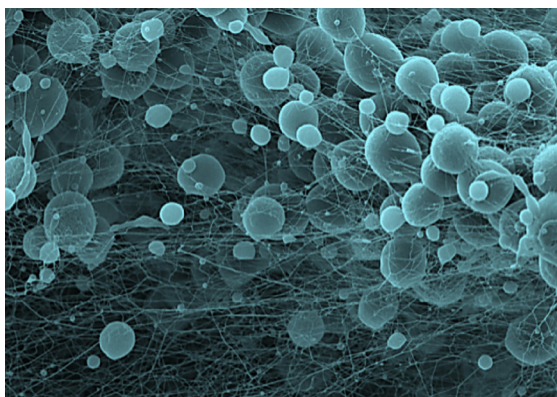
Methodologies, technologies and infrastructures for air quality monitoring.

AVAILABLE ON THE SITE | www.iaa.cnr.it/macroarea-tecnologie



Research Areas

Advanced sensors



AREA SKILLS

The need to have data to support European directives, international treaties and programs on atmospheric and environmental pollution together with the need to reduce the investment and operating costs of observation sites located even in remote and difficult to access locations, have made it indispensable studies aimed at developing efficient and low energy consumption monitoring devices. These characteristics are often achieved by making use of nanotechnologies.

Geospatial artificial intelligence and information sharing



AREA SKILLS

The thematic area brings together the research activities of the Institute relating to the development and use of digital methodologies for the sharing and processing of geospatial resources (eg satellite and -situ) for Earth and Environmental Sciences applications. With respect to the strategic priorities identified by the European Commission for the period 2019-2024¹, the GAINS thematic area is in the direction of contributing to the development of the European Digital Strategy² - with particular reference to the sectors relevant to the Institute identified in the European Green Deal³. Among the main components of the European Digital Strategy we should note the actions on the European Data Strategy and the Excellence and Trust in Artificial Intelligence.

Earth observation



AREA SKILLS

Earth Observation (OT) consists in the collection of data, both remotely and in situ, from multiple sources and in their processing in order to extract useful information to generate knowledge about the physical, chemical and biological processes of the Earth (variables, indices, indicators), with the aim of monitoring their status and changes, both of natural and anthropogenic origin. The application fields of OT techniques fall within the climate sciences, in the definition and evaluation of new policies for the sustainable management of natural resources, in the protection of ecosystems, in the mitigation of risks and the protection of human health, as well as in the promotion of eco-sustainable growth in economic and social field.

Global changes and ecological transition

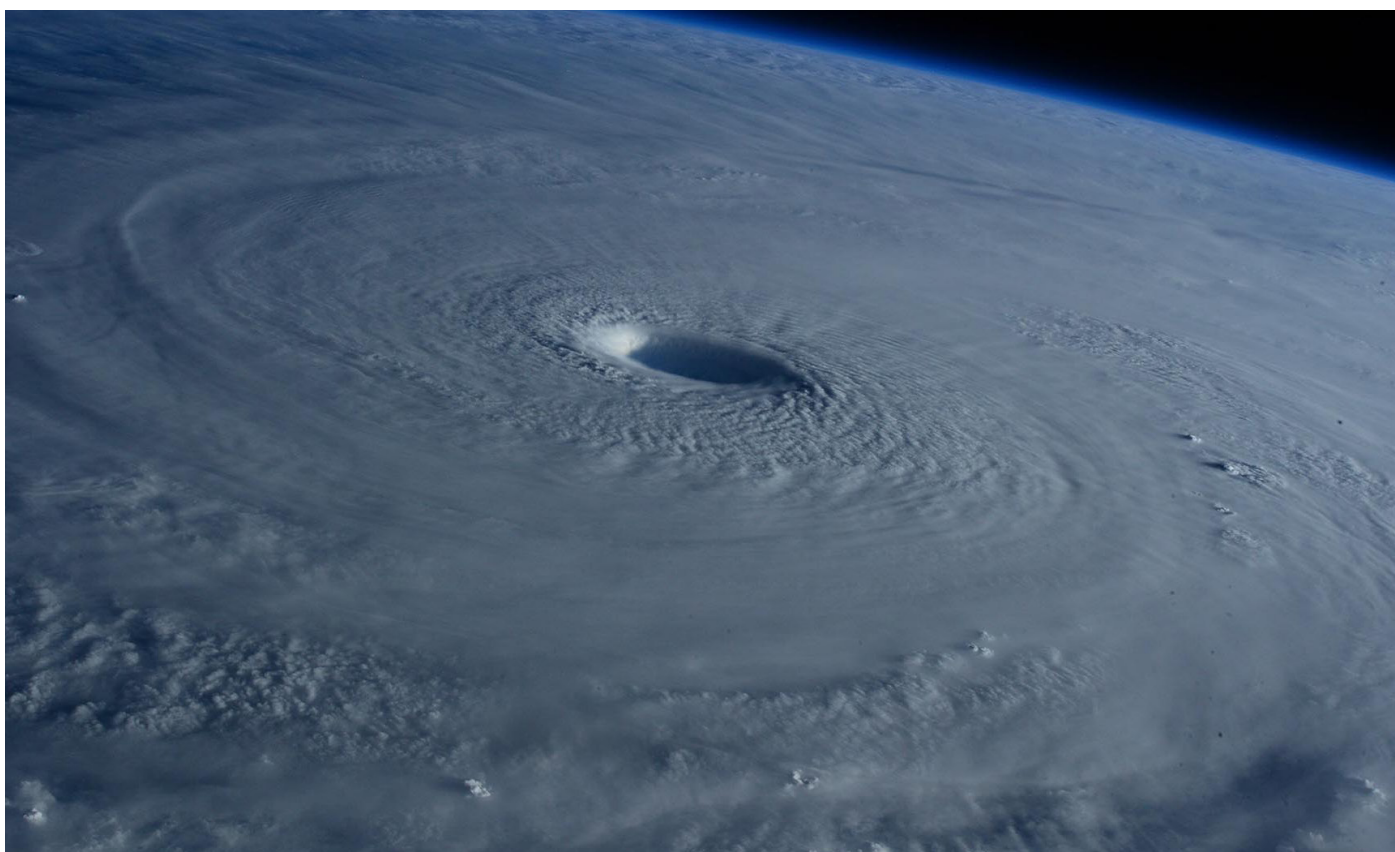
Understanding of atmospheric contaminants to support decision makers.

The aim of the research is to understand the cycle of atmospheric contaminants, aimed at providing scientific support to decision makers to promote the ecological transition.

To this end, the biogeochemical cycles of the various global contaminants and pollutants are studied.

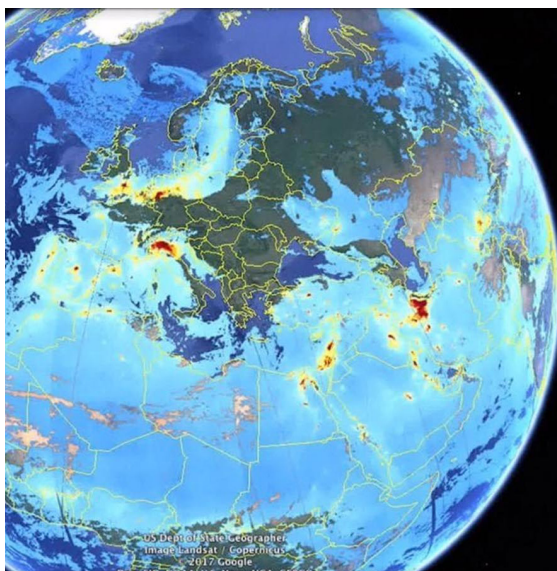
The analysis is conducted on a local and global scale. The findings are used to provide support to lawmakers and administrators in mitigating air pollution and climate change.

AVAILABLE ON THE SITE | www.iaa.cnr.it/macroarea-cambiamenti-globali-transizione-ecologica



Research Areas

Cycle of pollutants at different spatial scales also in relation to the effects of climate change



AREA SKILLS

Understanding the mechanisms of impact of the emissions of pollutants into the atmosphere from anthropogenic and natural sources on the quality and sustainability of ecosystems, as well as on the health of citizens, means knowing the cycle of pollutants that are divided between various ecosystems.

Within the framework of European regulations and international treaties, an important priority is the study of the cycle of persistent (long residence times in the atmosphere) and toxic pollutants present in the atmosphere. These include POPs (persistent organic pollutants) and Hg (mercury), which can be distributed among various ecosystems as the meteorological conditions and anthropogenic environmental pressures vary.

Transfer of scientific technical knowledge for the ecological transition



AREA SKILLS

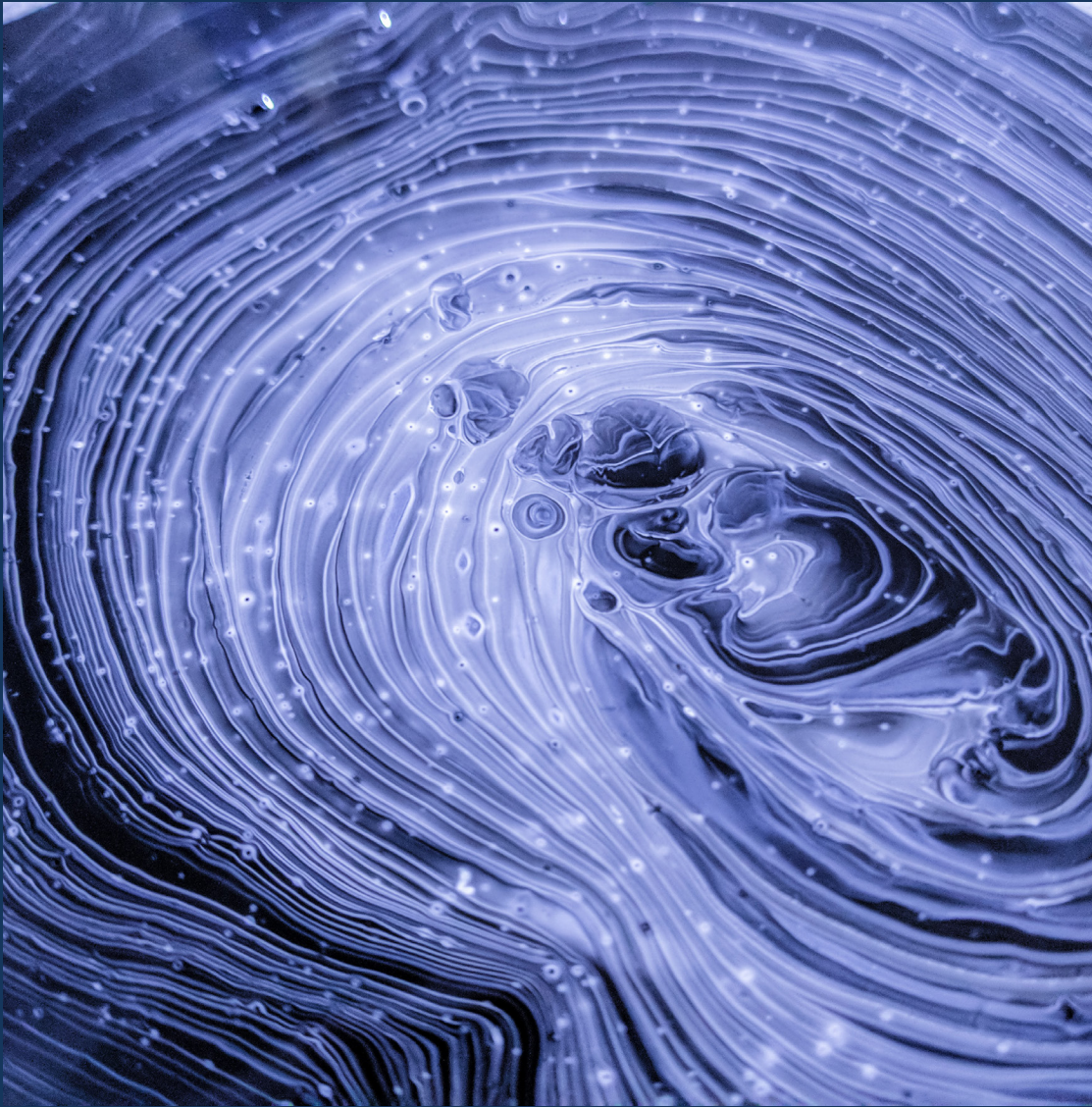
The “Transfer of technical-scientific knowledge for the ecological transition” Area (TCTSTE) is, by its very nature, a link between the scientific world and that of politics, it fulfills this objective regardless of the themes of the individual researches and in any case in the in the context of the “Ecological Transition, that is, it pursues the transfer of technical-scientific knowledge from” research “to policy decision makers, creating an organic flow of elements useful for the definition and improvement of environmental policies and strategies in order to reduce or eliminate those effects negative that the “ecological transition” aims to overcome.

The objective is the transfer of know-how to public administrations and companies and the support to the bodies responsible for environmental control in the preparation and implementation of environmental legislation both at national, community and international level.

Technology transfer

Parallel to the research activities, the CNR-IIA is active on the front of technology transfer aimed at the various companies in the industrial and environmental services sectors.





MORE INFORMATION CAN
BE FOUND AT:
[WWW.IIA.CNR.IT/
DIVULGAZIONE-
SCIENTIFICA](http://WWW.IIA.CNR.IT/DIVULGAZIONE-SCIENTIFICA)

OR ON SOCIAL CHANNELS:

[f](#) [t](#) [in](#) [v](#) [y](#) @IIACNR

Scientific disclosure

Scientific activity is developed through dissemination activities and projects to give the opportunity to a wide audience to learn about the topic of air pollution and access academic theory and research in an accessible and easy-to-understand form.



International programs and scientific cooperation

The international activity in which the CNR-IIA is involved is becoming increasingly important through extra-European research programs and the establishment of a unit for international scientific cooperation.

The Institute is involved in many international programs, including as a national representative, relating to air pollution and environmental sustainability, the development of strategies and technologies aimed at controlling and mitigating impacts as well as the transfer of knowledge to policy makers and stakeholders in the preparation and implementation of environmental legislation. As a national representative for European directives (ie, IED-IPPC, REACH, GPP) and international treaties (ie, UNECE-CLRTAP, Minamata, Stockholm, Basel) on air pollution, it ensures, also through the coordination of specific groups of work, the transfer of knowledge to political decision-makers on the various inherent aspects, just to name a few, the emissions of pollutants from anthropogenic and natural sources, technologies and methodologies for abatement of emissions and monitoring of air quality, the development of technologies innovative solutions for data quality control and information sharing.

The leadership position held by many researchers and technologists in the context of European and international programs and projects allows the Institute to guide future strategic choices in the various sectors of environmental research. As part of the Group on Earth Observation (GEO) aimed at developing GEOSS (Global Earth Observation System of Systems), the researchers and technologists of the Institute play a key role both in relation to the development of observational systems on a global scale and in the definition of strategies and technologies aimed at ensuring the sharing of geospatial information on environmental quality and sustainability. In this context, the GMOS system (Global Mercury Observation System - www.gmos.eu) which is a global-scale observation system for monitoring mercury pollution.

The Institute actively participates in major international programs aimed at developing cyber (e) infrastructure for the sharing of environmental information, the development of thesauri in the various domains of the Earth Observation, the extraction of information in relation to various issues relating to pollution, atmospheric and environmental as well as the complex process of preparing and implementing environmental policies. These include the programs of NSF-Earth Cube (BCube project), Research Data Alliance (Brokering Governance), Belmont Forum (e-Infrastructure and Data Management), INSPIRE (metadata), Open Geospatial Consortium (Earth System Science for netCDF); moreover, it contributes to many European initiatives and projects aimed at the design and development of digital infrastructures for inter and cross disciplinary research in the field of Earth and Space Sciences.

The overall objective of the Institute is to contribute to scientific progress and technological innovation by actively participating in the European Research Area and strengthening the ability to transfer research results to large sectors of the Public Administration (national and international) and to Companies in order to rewrite a new paradigm of socio-economic development by combining the protection of quality and environmental sustainability with an advanced model of knowledge sharing and green economy for the benefit of future generations.

INTERNATIONAL INSTITUTE PROGRAMS

GEO

The GEO Work Plan 2012-2015 includes the Health Task on Tracking Pollutants (HE-02)

GEO ITALY

The GEO Work Plan 2012-2015 includes the Health Task on Tracking Pollutants (HE-02)

UNECE-HTAP

The Task Force on Hemispheric Transport of Air Pollution (TF HTAP).

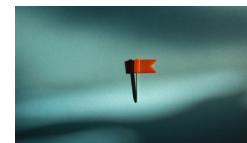
UNECE-LTRAP

The Institute provides scientific support within the UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP).

UNEP

UNEP Mercury Air Transport and Fate Research Partnership (UNEP F&T) – Advancing the Objectives of the 25th UNEP Governing Council



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Headquarters of the CNR Institute on Atmospheric Pollution, the structure located within the Roma1 Research Area of Monterotondo / Montelibretti represents, with its 50 staff units (including researchers, technologists, technicians and administrators), the historic headquarters of the CNR-IIA.

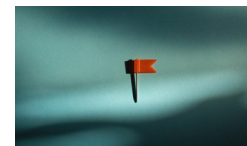
Chemistry has always acted as the “core-business” of the Montelibretti headquarters, with researchers engaged in the study of air quality and atmospheric pollution in urban and industrial areas, of emerging pollutants in emissions and in ambient air, side by side over time by colleagues who are experts in atmospheric modeling and advanced sensors.

In addition to the standard and official measurement methods, the activities of CNR-IIA also concern the development and validation of new methodologies to measure air quality parameters and define the sources of pollution, through automatic detection systems, remote sensors or sensor network. The institute also carries out evaluation of chemical processes and pollutant abatement systems.

All with the fundamental support of the laboratory structures, fundamental for the analysis and development of prototypes.



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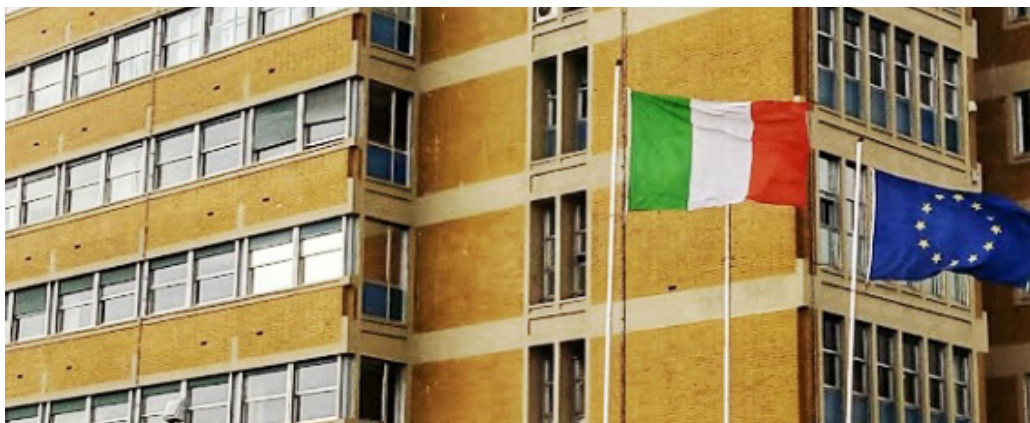
Secondary office in Florence

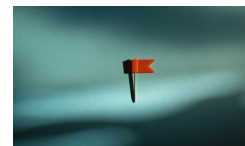
RESPONSIBLE: PAOLO MAZZETTI

Carries out research activities mainly in the field of the integration of information sciences and technologies with the sciences and technologies of the Earth and environmental systems.

Through its Earth Space Science Informatics Laboratory (ESSI-Lab) the site has specific expertise in the design and development of advanced solutions and infrastructures for the interoperability of Earth science data and models. The Secondary Office develops and maintains the Discovery and Access Broker (DAB), a data mediation framework adopted by the Group on Earth Observation (GEO) for the Global Earth Observation System of Systems (GEOSS) and by the WMO for the WMO Hydrological Observing System (WHOS). The headquarters also develops and maintains the Virtual Earth Laboratory (VLab) a framework for sharing and running computational models on a multcloud environment.

The secondary office also carries out specific activities for the development and maintenance of environmental monitoring applications, through ground and satellite observations, with particular reference to the estimation of snow cover in polar areas (Arctic and Antarctic) and in alpine areas. The integration of different types of observational data is based on multi-sensor and multi-platform time series obtained through remote sensing, terrestrial photography (SnowCam) and continuous multispectral measurements (CReM).



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RESPONSIBLE: ANTONELLO FARDELLI

The secondary office in Rome was formally established with a provision of the president of the CNR n. 26 - prot. n. 0021832 of 15/04/2013, amending the Ordinance Decree no. 15787 of 12 February 2001 for the establishment of the Institute.

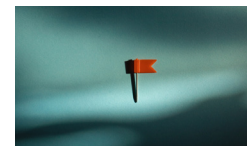
All the activities carried out over the years have always had the purpose of ensuring a continuous exchange between the technical-scientific world and that of the "policy makers", which is essential for the development of effective strategies for the reduction of atmospheric pollution and the protection of environment.

The commitment of the office is focused on various issues:

- Environmental assessments and authorizations (VIA and AIA), of national competence;
- Air quality and atmospheric emissions (international and European negotiations, strategies for reducing atmospheric pollution, assessment and management of air quality on the national territory, with particular reference to the most critical areas and sources);
- Waste cycle;
- Electric, magnetic and electromagnetic fields and noise (Physical Agents);
- Ozone-depleting substances and climate change (international negotiations on the development and transfer of technologies, participation in the work of adopting European sectoral policies and legislation);
- International environmental cooperation and negotiation processes such as G7 and G20;
- Group on Earth Observation (GEO);
- Circular Economy (Minimum Environmental Criteria, GPP, PNPR, PNGR, etc.);
- Registration, evaluation, authorization and restriction of chemicals (REACH regulation).

The staff of the office ensures an active, effective and attentive presence both to national and international interests in the offices where the cognitive tools are developed and the documents, programs and activities on the topics mentioned are developed..



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RESPONSIBLE: FRANCESCA SPROVIERI

It carries out research and technological development activities in the field of air pollution on a regional and global scale and has a leadership role in the context of international, European and national projects and programs.

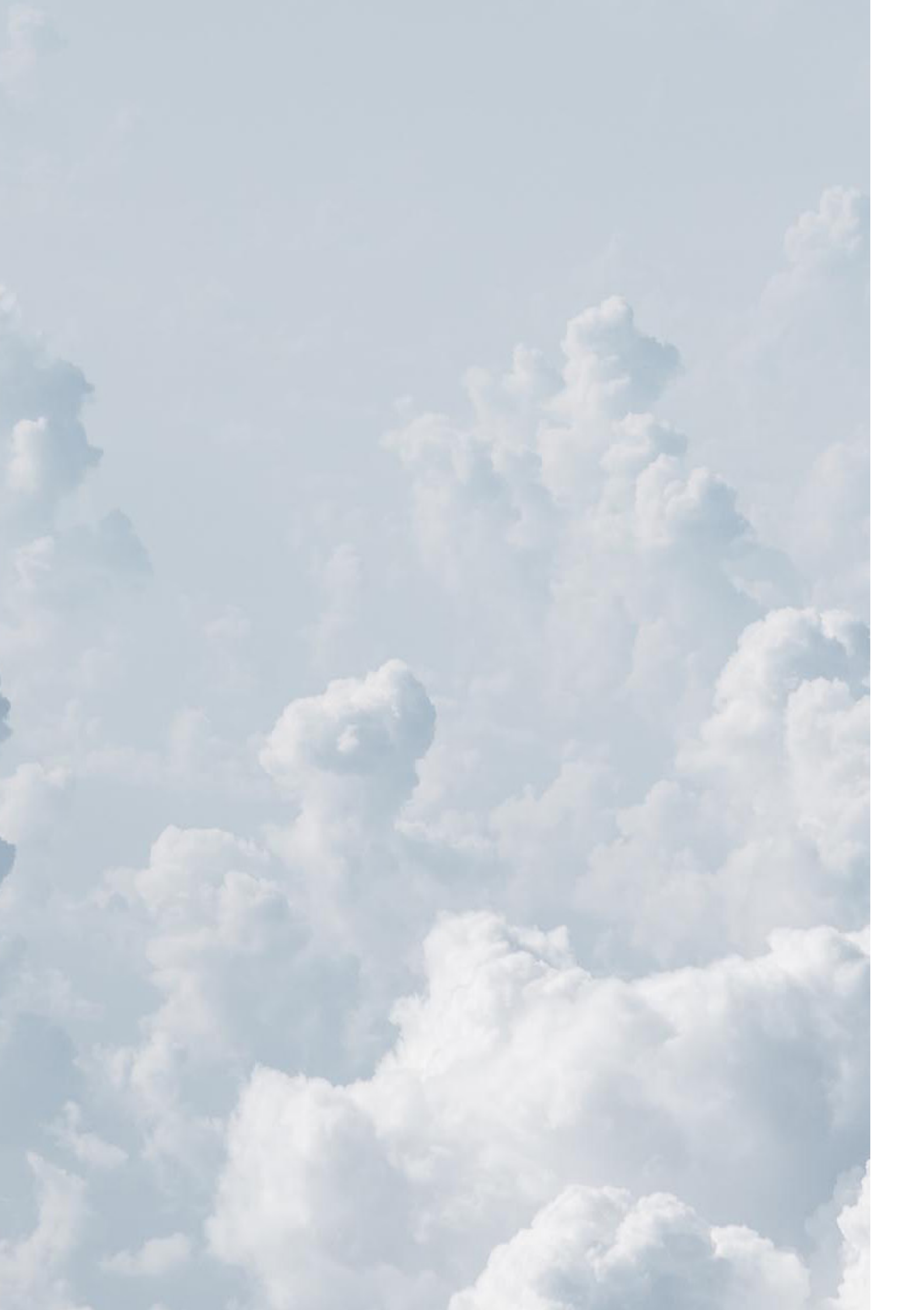
It works in partnership with major institutes and universities in Europe, Australia, the East, North and South America.

Coordinates: in the current HORIZON 2020 Framework Program, the ERAPLANET program and the iGOSP project; the GMOS program and the GOS4M Flagship; the National Mercury Reference Center.

Participate in MercOx, SI-Hg, I-seed, E-SHAPE projects; to the UNEP F&T Partnership; to the activity of the GEO.

He has prepared: for the European Commission, the European Directive on Mercury; for the UNEP, for many years, technical reports on the Global Mercury Assessment.

It carries out technical-scientific support activities for European and international organizations on behalf of the MATTM, collaborating in the drafting of laws and regulations. He developed ECHMERIT, a global model of the chemistry of mercury in the atmosphere.



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