

ANNUAL

2022

REPORT

CMCC Annual Report 2022

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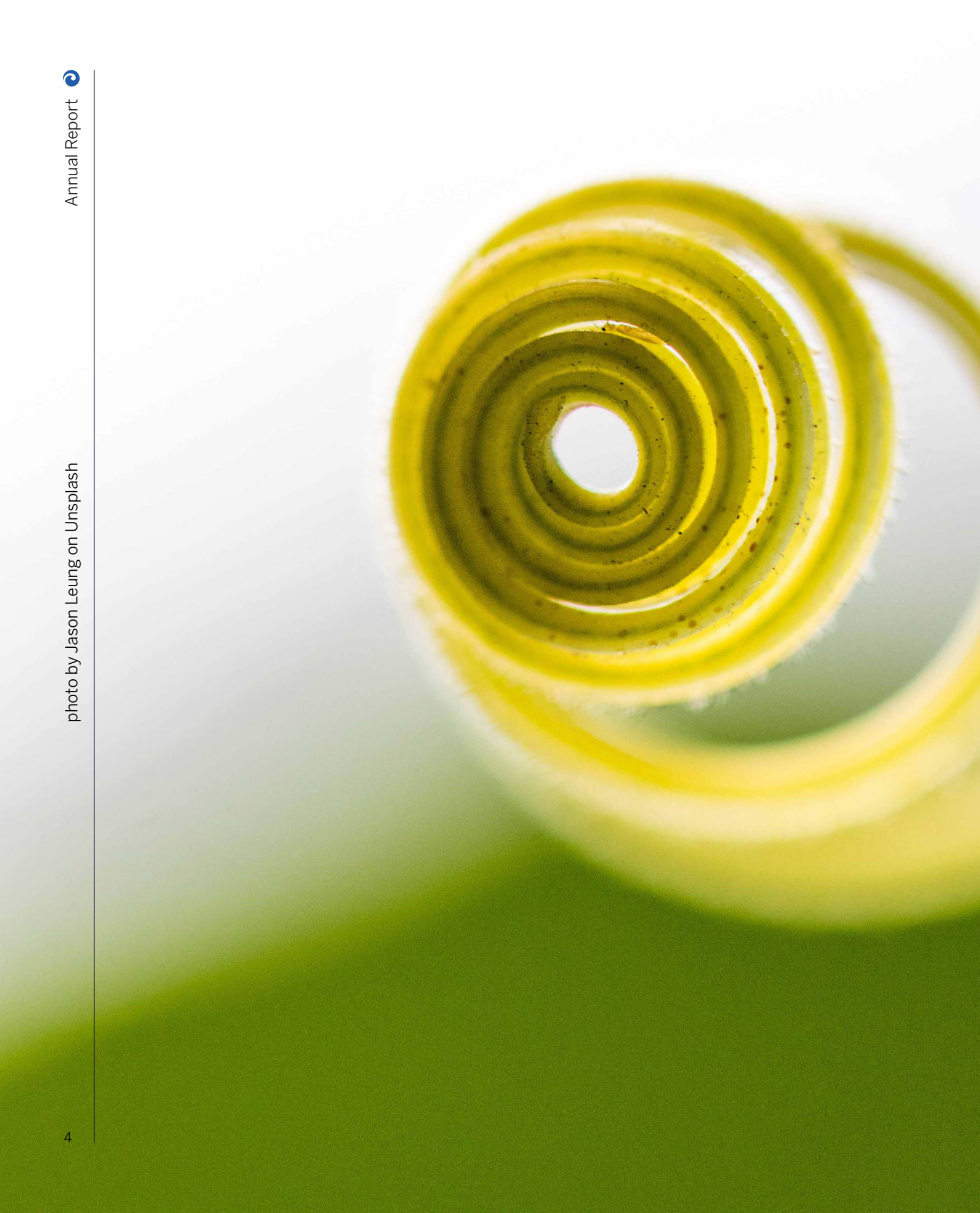
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The background of the image is a blurred photograph showing a hand holding a pen, poised to write on a document. The lighting is soft, with a warm yellowish-green glow on the left side, suggesting a desk lamp. The overall tone is professional and focused.

THE CMCC FOUNDATION

Mission

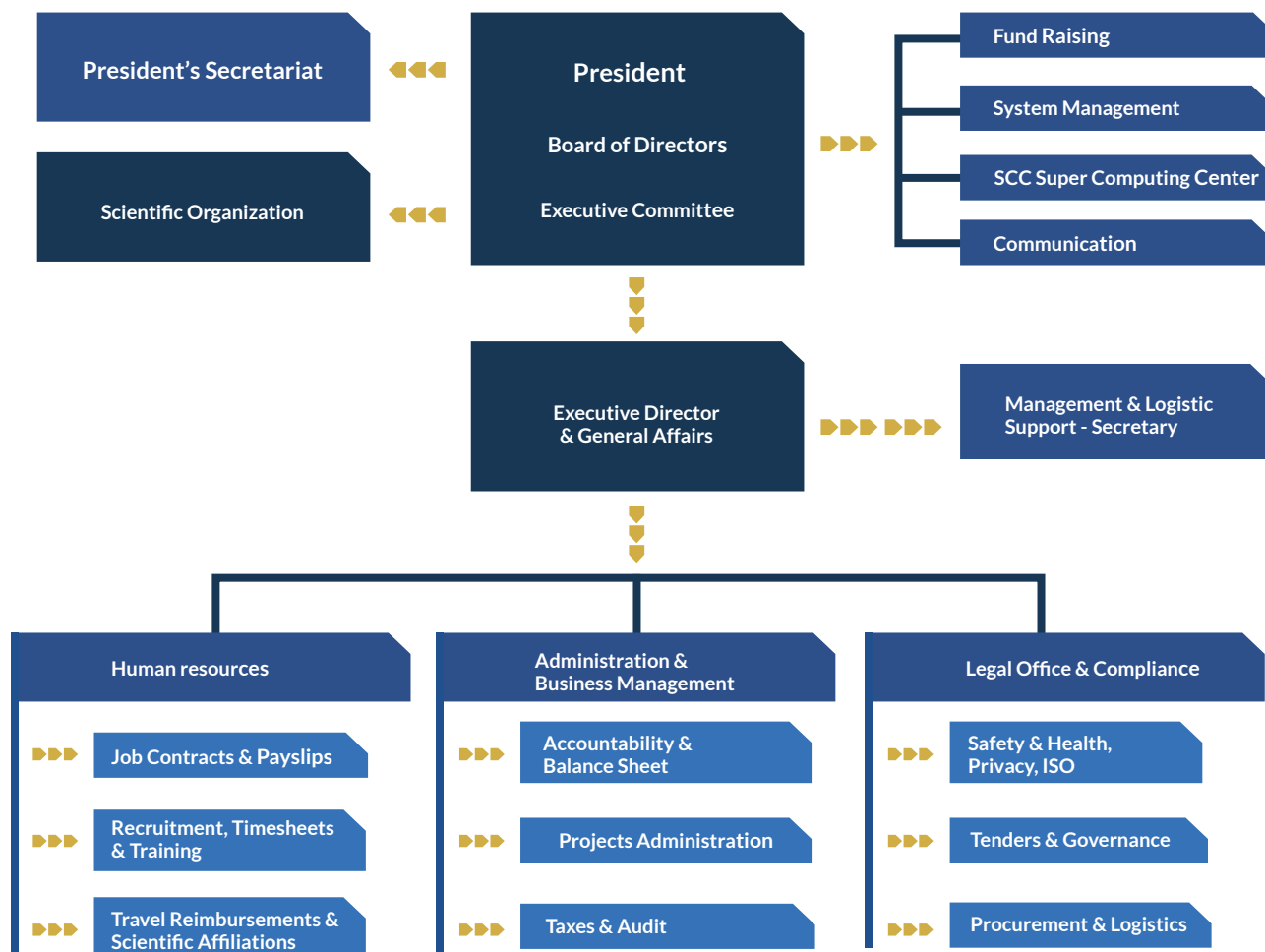
“

To investigate and model our climate system and its interactions with society to provide reliable, rigorous, and timely scientific results to stimulate sustainable growth, protect the environment and develop science driven adaptation and mitigation policies in a changing climate.

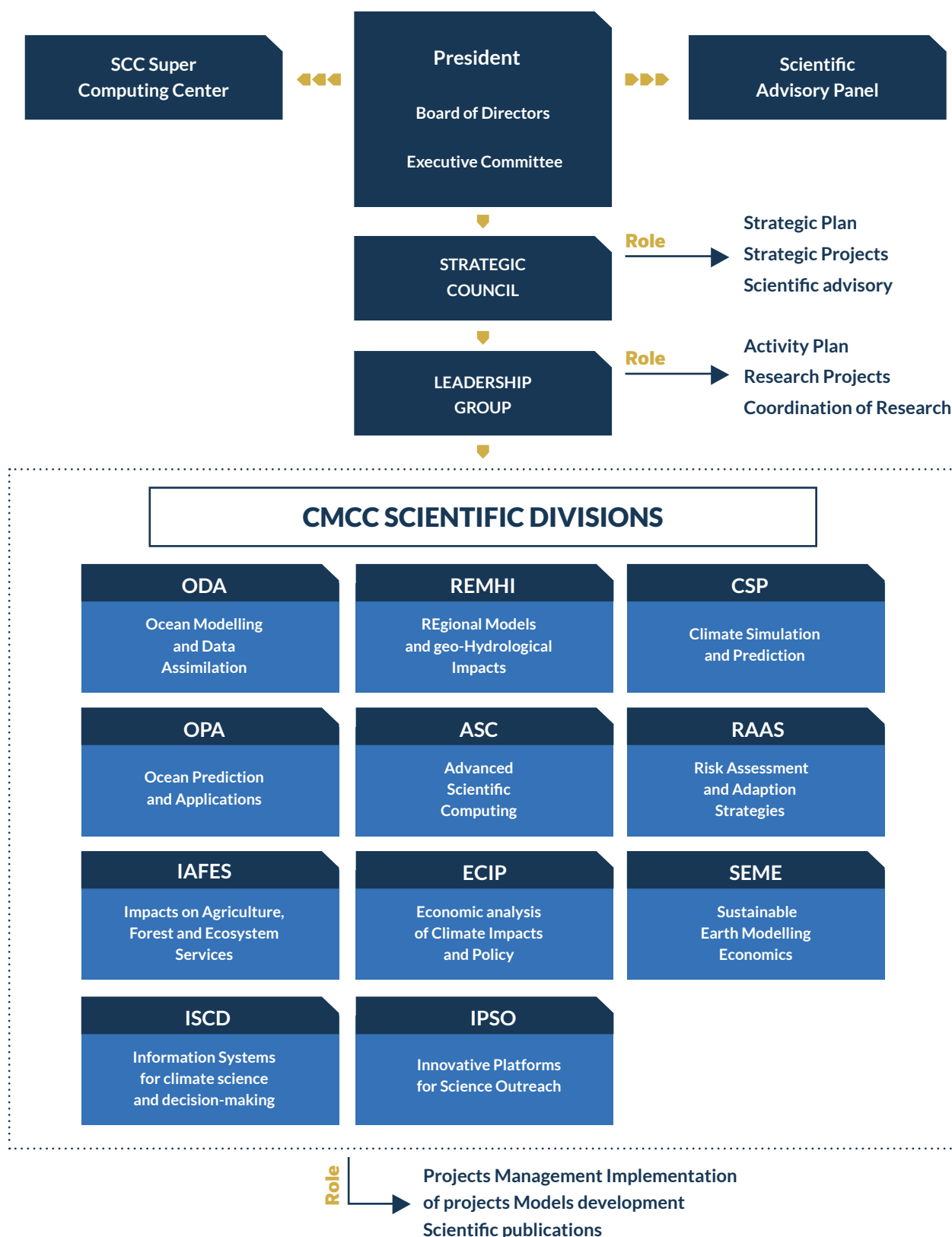
To develop foresights and quantitative analysis of our future planet and society.

”

Administration and Management



Scientific Organization





COFOUNDERS

Istituto Nazionale di Geofisica e Vulcanologia

Università degli Studi del Salento

Centro Italiano di Ricerche Aerospaziali

Università Ca' Foscari Venezia

Università di Sassari

Università della Tuscia

Politecnico di Milano

Resources for the Future

Università di Bologna

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Monia Santini - Impacts on Agriculture, Forests and Ecosystem Services
Serena Marras - Impacts on Agriculture, Forests and Ecosystem Services
Mauro Buonocore - Innovative Platforms for Science Outreach
Giulia Galluccio - Information Systems for Climate Science and Decision-making
Simona Masina - Ocean Modeling and Data Assimilation
Giovanni Coppini - Ocean Predictions and Applications
Paola Mercogliano - Regional Models and geo-Hydrological Impacts
Jaroslav Mysiak - Risk Assessment and Adaptation Strategies
Silvia Torresan - Risk Assessment and Adaptation Strategies
Massimo Tavoni - Sustainable Earth Modelling Economics

2022 at CMCC

11

**Research
divisions**

148

Projects

265

People

205

**Refereed
papers**

2022: IN NUMBERS

People FTE (full-time equivalent)

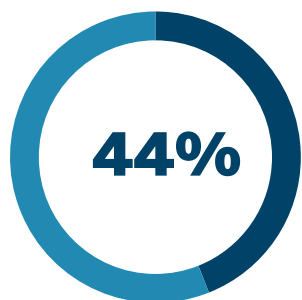
265 people at CMCC

73%
Research Area

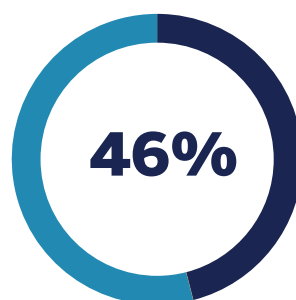
42%
Senior Positions

27%
Services for Research

Women at CMCC



of the people at
CMCC



of senior
positions

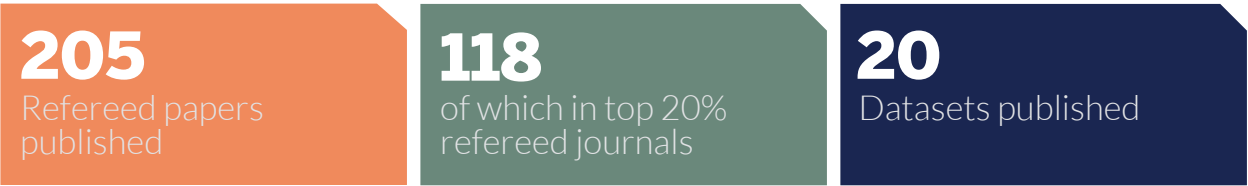
Staff numbers and roles

ROLE	TOT	M	W
Senior Scientist	17	12	5
Scientist	29	18	11
Junior Scientist	26	16	10
Senior Scientific Mgr	21	2	19
Jr Scientific Mgr	6	2	4
Sr Research Associate	26	20	6
Jr Research Associate	32	21	11
Post Doc	36	23	13
Post Degree	24	11	13
Senior Administrative Staff	17	7	10
Junior Administrative Staff	31	16	15

Find job opportunities at CMCC. Submit your CV, browse our open positions, check if your requisites fit with any of them: www.cmcc.it/work-with-us

Publications

View the full list of publications: www.cmcc.it/publications



Applications



Financial Report

BALANCE SHEET : ASSETS	2022	2021
A) Receivables from shareholders for contributions due	0	0
B) Fixed assets	15,082,836	11,711,345
I. Intangible fixed assets	191,387	279,895
II. Tangible fixed assets	13,444,257	10,329,160
III. Financial assets	1,447,192	1,102,290
C) Current Assets	35,927,601	22,275,933
I. Inventories (Work In progress - WIP)	14,213,014	12,075,584
II. Receivables	538,431	872,350
III. Current financial assets	2,000,000	2,000,000
IV. Cash at hand	19,176,156	7,327,999
D) Prepayments and accrued income	35,795	27,400
TOTAL ASSETS	51,046,232	34,014,678
BALANCE SHEET : LIABILITIES	2021	2020
A) Net Liabilities	6,237,873	7,756,475
Capital	662,000	662,000
Reserve Funds	5,536,562	6,607,242
Profit for the year	39,311	487,233
B) Provisions for risks and charges	531,430	406,057
C) Employee Severance indemnities	1,832,512	1,457,356
D) Payments from Clients	36,051,235	17,134,946
E) Accruals and deferred charges	6,393,182	7,259,844
TOTAL LIABILITIES	51,046,232	34,014,678

PROFIT AND LOSS	2021	2020
A) Revenues	22,913,291	19,487,139
Revenues from sales and services	3,431,740	3,634,539
Variations in stocks (WIP)	2,137,430	1,074,144
Other revenues	17,344,121	14,778,456
B) Expenses	22,878,184	18,953,389
Consumable	107,092	192,251
Services	11,125,145	7,903,586
Leases	246,093	340,073
Personnel	8,370,505	7,591,655
Depreciation	2,152,718	1,689,982
Other Operating Expenses	876,631	1,235,842
Difference between revenues and expenses (A-B)	35,107	533,750
C) Financial income and charges	23,546	40,241
D) Impairment on financial assets	0	0
E) Extraordinary income and charges	0	-57,221
Results before taxes (A-B±C±D±E)	58,653	516,770
Income tax expenses - current and deferred	19,342	29,537
a) Current taxes	19,342	29,537
b) Deferred taxes	0	0
Profit (loss) for the year	39,311	487,233

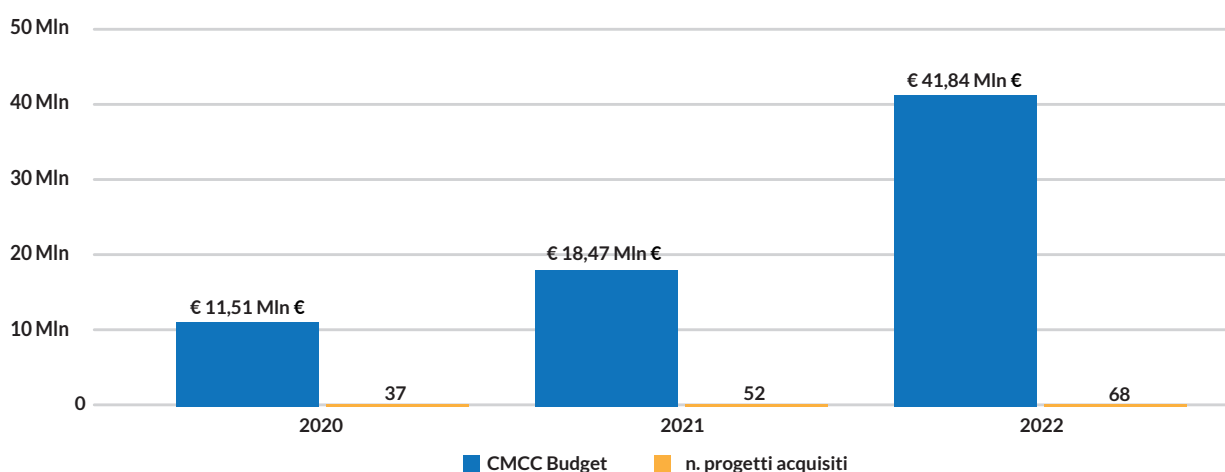
Research Project

148 projects running and managed during 2022

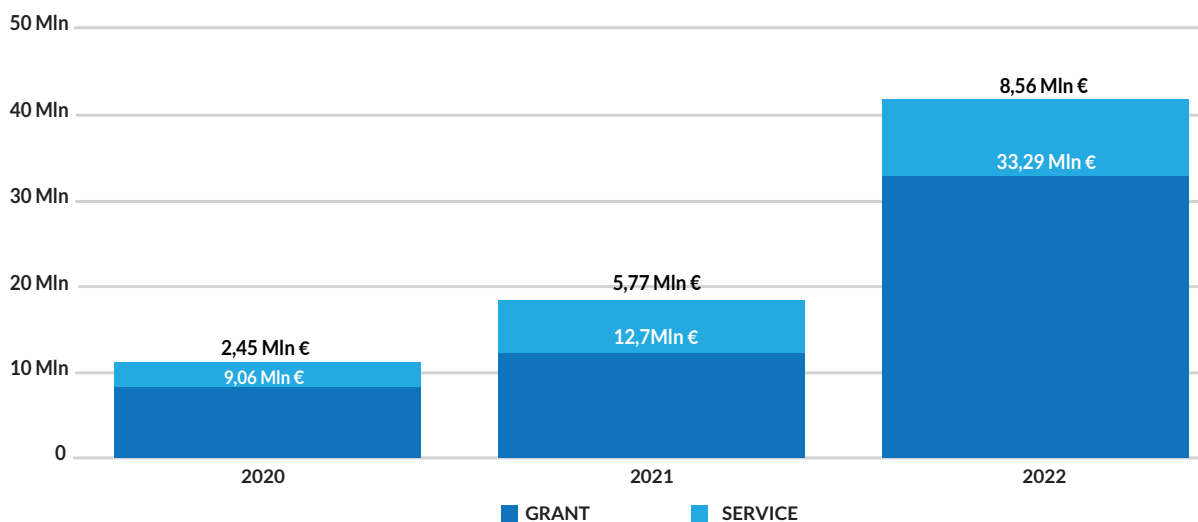
Fundraising Capacity

The graphs below show the CMCC Foundation's capacity of attracting new funds over the last three years.

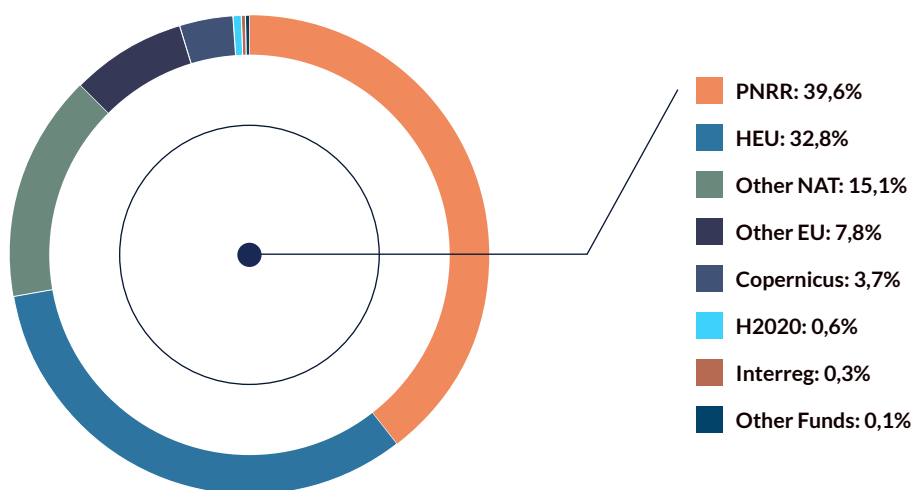
Budget funded programmes (per starting date) - CMCC FR Capacity



Budget and n. projects acquired (considering start date)



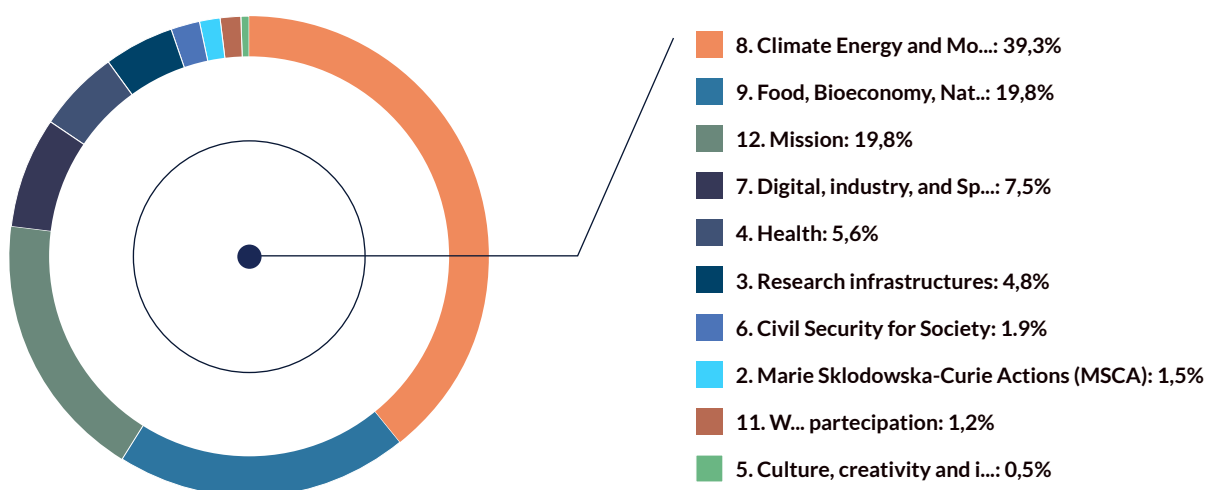
SOURCE OF FUNDING (PER BUDGET, PER STARTING DATE) in 2022



CMCC PARTICIPATION IN HORIZON EUROPE (HEU, Work Programme 2021 – 2022 calls)

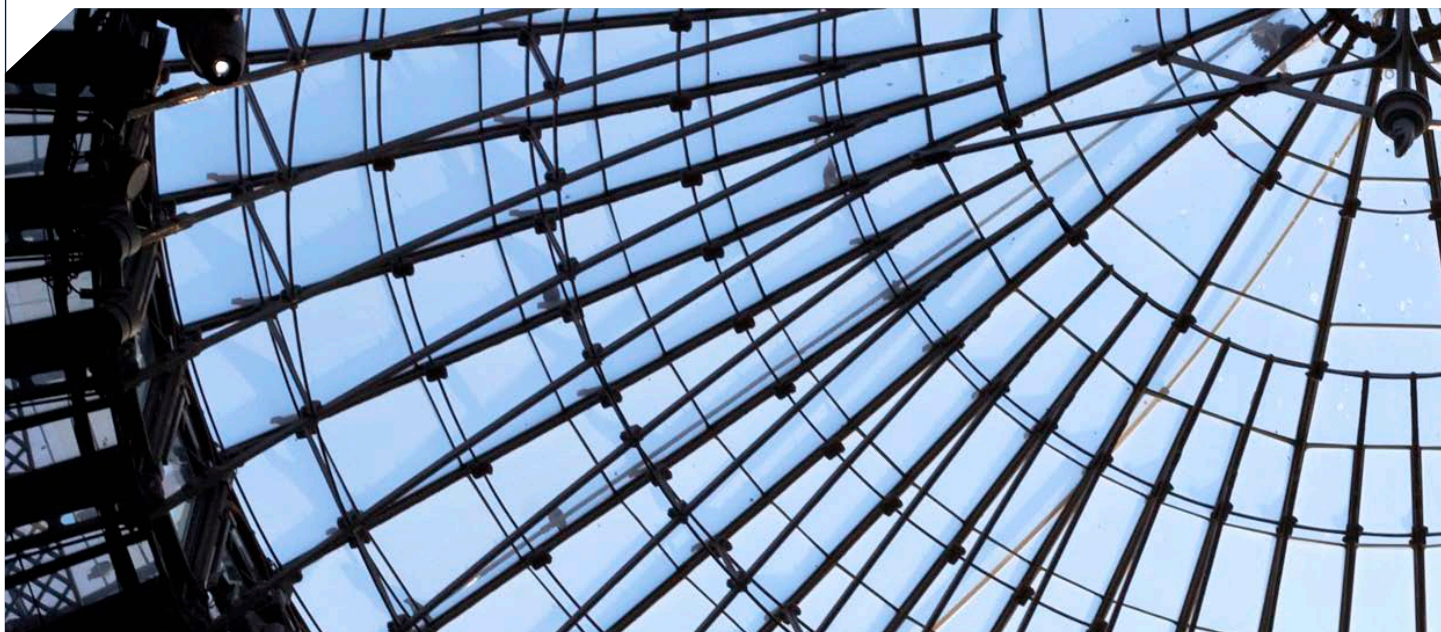
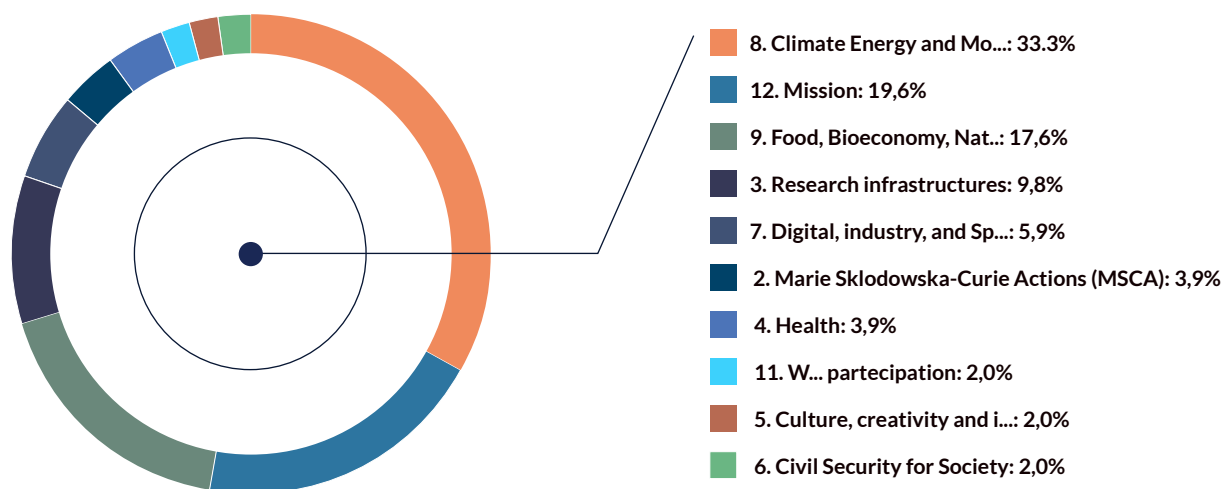
- **128 PROPOSALS SUBMITTED** (of which 34 coordinated by CMCC) over the first two years of HEU

- **55 PROPOSALS FUNDED** (of which 12 coordinated by CMCC), for a CMCC contribution of 32,2M€ distributed over the Work Programs shown in picture below



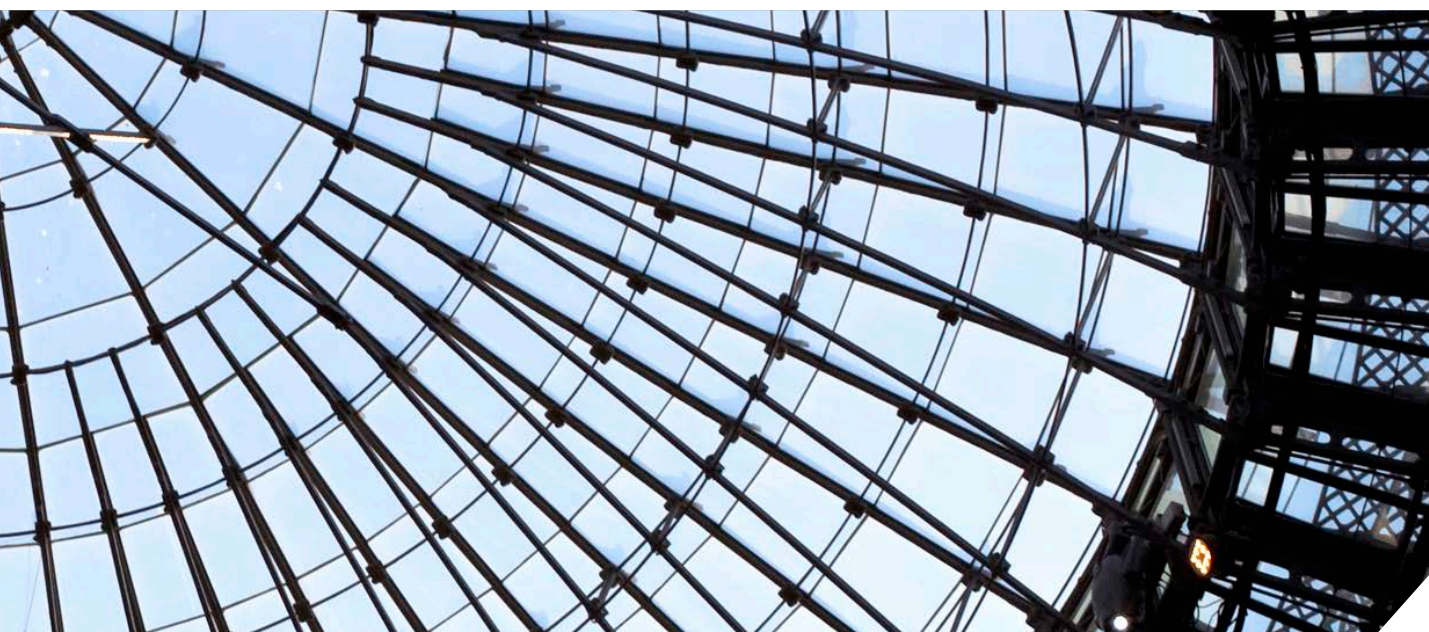
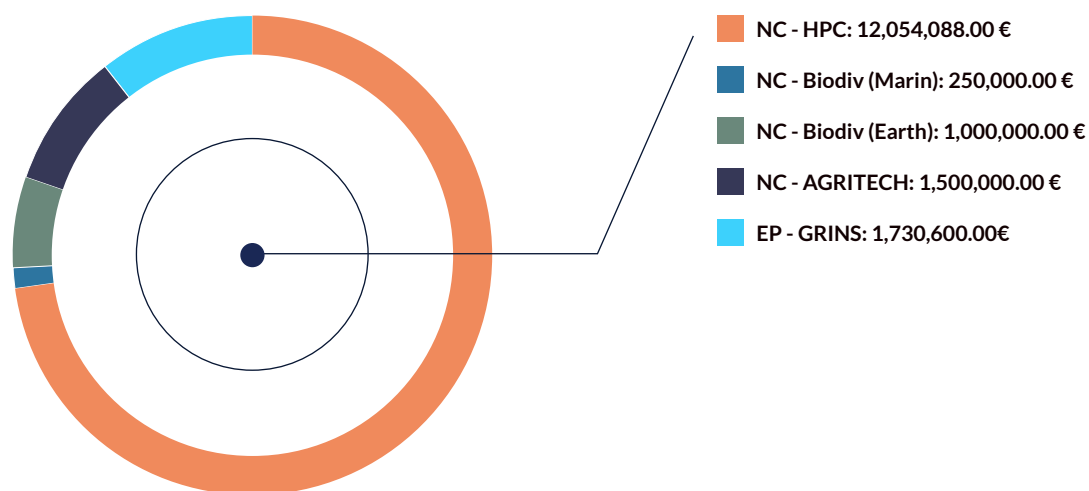
CMCC PARTICIPATION IN HORIZON EUROPE - FOCUS 2022

- **60** proposals submitted (of which 15 coordinated by CMCC) during 2022
- **27 PROPOSALS FUNDED** (of which 5 coordinated by CMCC), for a CMCC contribution of **15,8M€** distributed over the Work Programs shown in picture below



FOCUS PNRR 2022: Impacts on CMCC

- **3 M€** for 50 CMCC permanent researchers involved, ~ 500 Person Months
- **2,5 M€** for new staff to recruit in the next 3 years
- **4 M€** for open calls and cascade funding (NC - HPC)
- **6,4 M€** for infrastructure (NC - HPC)
- CMCC Founding Member of **3 'Foundations'** of ~ **50** institutions each







SUPER COMPUTING CENTER

Since 2008, the CMCC Supercomputing Center (SCC) is the most powerful computational facility in Italy and among the most advanced in Europe, fully dedicated to Climate Change research. In 2022 the SCC changed its location at the new CMCC headquarters in Lecce.

The CMCC Supercomputing Center is composed by two interacting High Performance Computing (HPC) facilities:

ZEUS

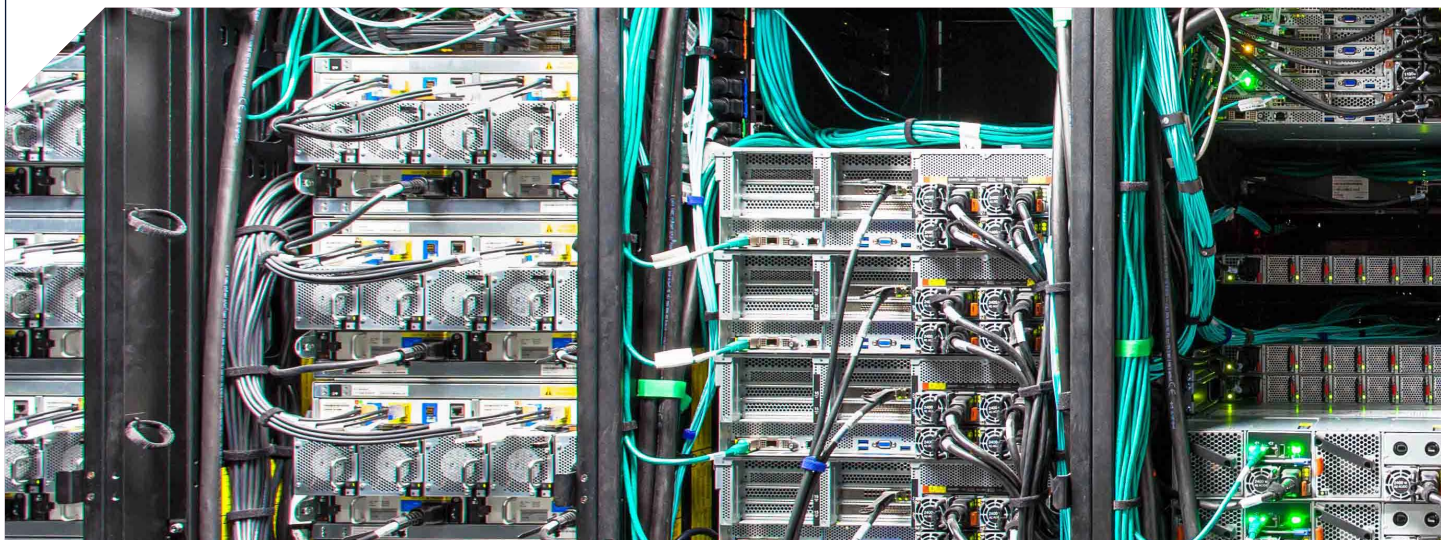
the supercomputer currently in operation, is based on **348 Lenovo SD530 biprocessor nodes** (for a total of **12,528 cores**) all interconnected by means of an Infiniband EDR network. The HPC system has a computing power (theoretical peak performance) of **1,202 TFlops**.

JUNO

the new supercomputer installed in the new CMCC headquarters in Lecce during 2022, has a computing power (theoretical peak performance) of about **1,134 TFlops** and is based on the new Intel processors generation (**3rd Generation Intel Xeon Scalable codenamed "Ice Lake"**) and also on the latest generation of **NVIDIA GPU (NVIDIA Ampere architecture)**.

This new project includes the upgrading of the computing and storage facilities through the European funds dedicated to the Regional Operational Programme 2014 – 2020 (Apulia region).

The technical details of both the supercomputers Zeus and Juno are summarized in Table below.



The CMCC long term archiving system

In order to manage and preserve for medium/long term the huge quantity of climate data produced by the research and operational activities at CMCC, in 2019 a new archiving system has been deployed.

The hardware components of this new system are:

IBM TS4500 tape library with nr 6 LTO8 drives and 2 accessors, 5PBytes of capacity

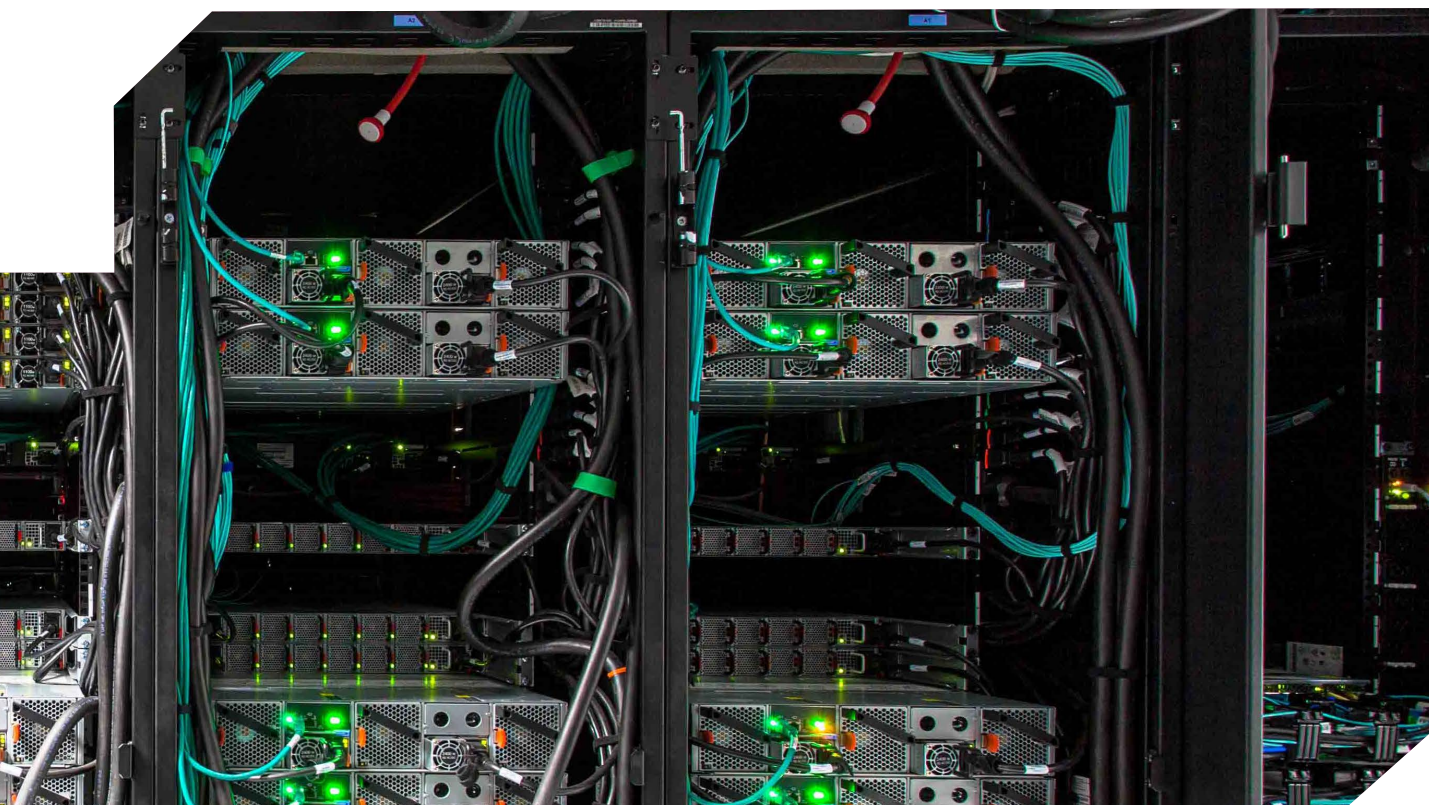
Nr 2 servers Lenovo ThinkSystem SR630

Nr 1 IBM DS2200 FC storage system

16Gbps FC SAN implemented with nr 2 Lenovo FC switches B6505

IBM Spectrum Archive Enterprise Edition is the software that manages the tape library operations and stores the data on the tape tier in the Linear Tape File System (LTFS) format.

In 2022, the CMCC archiving system moved to the new CMCC data center and has been upgraded to extend both its capacity (to 40 PetaBytes) and its I/O throughput by adding 8 more LTO8 drives.





A modern interior space featuring a large, white, cylindrical column. To the left of the column is a wall with blue panels. In the foreground, the backs of three white chairs are visible, suggesting a meeting or conference room. The ceiling is white with recessed lighting.

THE CMCC BUILDING IN LECCE

The new CMCC Headquarters in Lecce were inaugurated on June 10, 2022, with an open meeting, titled **"Foresight Dialogues"**.

Representatives of institutions, scientists, experts, gathered for a public discussion on methods and tools to advance scientific knowledge and public awareness on what is considered one of the most challenging issues of our times: climate change and its impact on society, economic systems and the environment.

The event was an occasion to reflect on the role of multidisciplinary collaboration to secure a swift and comprehensive transition towards a sustainable development.

It was also an arena for discussing crucial themes for the construction of a better future for both current and new generations: cutting-edge scientific research, the frontiers of technological innovation and computing, as well as food and water resources as a global and local challenge.

<https://www.cmcc.it/the-cmcc-headquarters-in-lecce>



The event was structured in three main sessions.

“Climate Science and sustainable transition”, with speeches by CMCC President Antonio Navarra; the Mayor of Lecce Carlo Salvemini; Anna Grazia Maraschio, Alessandro delli Noci and Claudio Michele Stefanazzi of Regione Puglia; Minister Enrico Giovannini; DG Climate of the European Commission Mauro Petriccione; Carlo Carraro of CMCC@Ca’Foscari and IPCC WGIII.

“European Policy and climate transition”, with Members of the European Parliament Paolo De Castro and Raffaele Fitto; Riccardo Valentini of CMCC Foundation and Università della Tuscia; and journalist Luca Fraioli (Repubblica, Green & Blue).

“The future of water”, with Giulio Boccaletti (author of the book “Acqua. Una biografia”), Tina De Francesco of Acquedotto Pugliese S.p.A. and journalist Tommaso Perrone, director of LifeGate.

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<https://www.cmcc.it/the-cmcc-headquarters-in-lecce>





HIGHLIGHTS 2022

What will the climate of the future look like? The CMCC Foundation has a long experience in the field of climate predictions, making it one of its most important assets and becoming one of the few centers at the international level to produce climate forecasts at many different time scales.

Climate change is already having a deep impact on people, society and economies, directly and indirectly. Extreme weather events; growing heat stress; wildfires, floods and landslides; food and water safety; the emergence and spread of infectious diseases: These are just a few of the many topics that CMCC is investigating throughout its research divisions.

Now more than ever, making informed and efficient decisions that help build a better future requires a combination of reliable scientific data, as well as innovative and smart tools to analyze and make sense of it.

Among other impacts, research shows that rising temperatures and intense heat waves could cause severe droughts, threatening essential water supplies for agriculture, causing huge loss of human life and increasing the chance of fires. It is therefore crucial to be able to predict, as precisely as possible, the risks deriving from climate change impacts all over the world.

Moreover, the constant increase in the global temperature due to past and current greenhouse gas emissions is causing severe consequences for the ocean and cryosphere system: the ocean is becoming warmer, more acidic and less hospitable for biodiversity. The melting of the ice is causing sea level rise with consequent extreme events on the coastal areas becoming more intense. CMCC is providing a scientific contribution to this topic with its observing and forecasting activities, while also taking an active role in international networks and organizing events dedicated to the ocean and its protection.

As our planet increasingly faces the unpredictable consequences of climate change and resource depletion, urgent action is needed to switch to a more sustainable development model. In order to meet the 1.5°C temperature increase goal set out in the Paris Agreement, global carbon emissions must reach net zero around mid-century. CMCC contributes to advance the international dialogue on zero carbon by taking part in several innovative research projects and authoring cutting-edge scientific publications.

In the following sections, we will highlight just a few of the many research activities carried out at CMCC, to address the complex and multifaceted aspects of climate science.





ADVANCED AND MULTIDISCIPLINARY SCIENCE: CMCC AND THE NRRP

The National Recovery and Resilience Plan, NRRP (Piano Nazionale di Ripresa e Resilienza, PNRR) is part of the Next Generation EU (NGEU) programme, created by the European Union in response to the pandemic crisis.

The Plan is developed around three strategic axes: digitisation and innovation, ecological transition, and social inclusion. It aims at repairing the economic and social damage that followed the Covid-19 pandemic, contributing to addressing the structural weaknesses of the Italian economy, and leading the country along a path of ecological and environmental transition.

The CMCC Foundation participates in some research projects created in the framework of the NRRP, that started in the second half of 2022 and will last for 36 months. In particular, CMCC is involved in three National Centres, an Extended Partnership and an Innovation Ecosystem, acting as a partner or in some cases as a coordinator.

National Biodiversity Future Center – NBFC

The Vision of NBFC is to promote the sustainable management of Italian biodiversity in order to improve the planet's health and return beneficial effects, essential for all people. The general objectives of such a unique cross-disciplinary and innovative platform are: understanding and addressing direct drivers for biodiversity decline at marine, terrestrial and urban level, and valorizing biodiversity to make it a central element for sustainable development.

In concrete terms, the NBFC aims at addressing interdisciplinary and frontier research and innovation activities devoted to the monitoring, conservation, restoration and valorization of Italian biodiversity.

CMCC is an Affiliate partner of two Spokes. For the spoke "Terra" (Earth), CMCC will develop climate projections and explore different scenarios, modeling the responses of ecosystem and plant communities to climate change, integrating drivers and indicators of risks and identifying adaptation strategies to increase the resilience of natural ecosystems to climate change.

In the spoke "Mare" (Sea), CMCC will contribute with oceanographic and biogeochemical models to test hypotheses and quantify resilience of habitat species, to support early warning for habitat critical conditions and to identify climate extreme events.

<https://www.nbfc.it/>





National Center for the Development of New Technologies in Agriculture - Agritech

The National Center for the Development of New Technologies in Agriculture (Agritech) is based on the use of enabling technologies for the sustainable development of agri-food production, with the aim of promoting adaptation to climate change, reducing the environmental impact in the agrifood sector, the development of marginal areas, and to guarantee safety, traceability and security of the supply chains.

Agritech is established to address the global need to counteract the effects of climate change, reduce environmental impact of agriculture and improve productivity and sustainability. The Research Center will focus on the application of enabling technologies in the Agrifood sector through five general research objectives: Resilience, Low impact, Circular, Recovery, and Traceability.

In particular, CMCC is involved in the creation of an integrated model for the development of Italy's marginal areas to promote multifunctional production systems enhancing agro-ecological and socio-economic sustainability.

CMCC will design, test and develop methods, models and tools to support land management, with a focus on protecting the soil from erosion and promoting agro-ecology, in the context of climate resilience and carbon neutrality.

<https://www.cmcc.it/projects/agritech-national-research-centre-for-agricultural-technologies>

National Center for High Performance Computing, Big Data and Quantum Computing

The Centre carries out Research and Development activities, at national and international level, for innovation in the field of simulations, computing and analysis of high-performance data. These activities are conducted within a cutting-edge infrastructure for high performance computing and big data management, which systematizes existing resources and promotes and integrates emerging technologies.

CMCC is carrying out the leader activity of the spoke “Earth & Climate” and is a Founding member of the HUB. Within the spoke, the scientific activity of CMCC and its affiliates is mainly aimed at developing a shared interdisciplinary framework for advanced Earth System Models (ESM) and numerical experimentations.

The framework is focused on digital infrastructures and efficient workflows to streamline the production, facilitate the training, accelerate the understanding, and improve the quality of climate simulations and predictions. This will provide the Italian climate scientific community with flexible, reliable and powerful numerical tools, which, in turn, will be used to produce usable and scientifically robust climate related information and data to sustain national users and stakeholders in their decision-making processes.

<https://www.supercomputing-icsc.it/>



Nodes - Nord Ovest Digitale E Sostenibile

NODES is an Innovation Ecosystem structured in a way such as to guarantee interdisciplinarity among its diverse themes and cross-fertilization of digital-driven technology and innovation. NODES' vision is to boost the competitiveness of industries and research institutions, positioning the territory at a national and international level as an attractive "territorial system" for high-skilled talents and private investments.

CMCC is one of the partners contributing to the work of spoke 6. CMCC is involved in two flagships: ForMiDaBiLÆ and VINO.

CMCC will provide technical support to ForMiDaBiLÆ (Forage system to make resilient Maize, Dairy and Biogas supply chains for a Lasting Agricultural Ecosystem) by focusing on climate impact on dairy herds from a productive point of view. It will focus on data collection in farms equipped with automatic milking systems in order to quantify the animal response to heat stress with the application of dynamic models.

CMCC will also contribute to VINO (Vineyard management for wine production) with the provision of climate data and indicators under actual and future conditions; suitability analysis under climate change conditions; and use of crop models for testing climate change impacts.

<https://www.ecs-nodes.eu/>



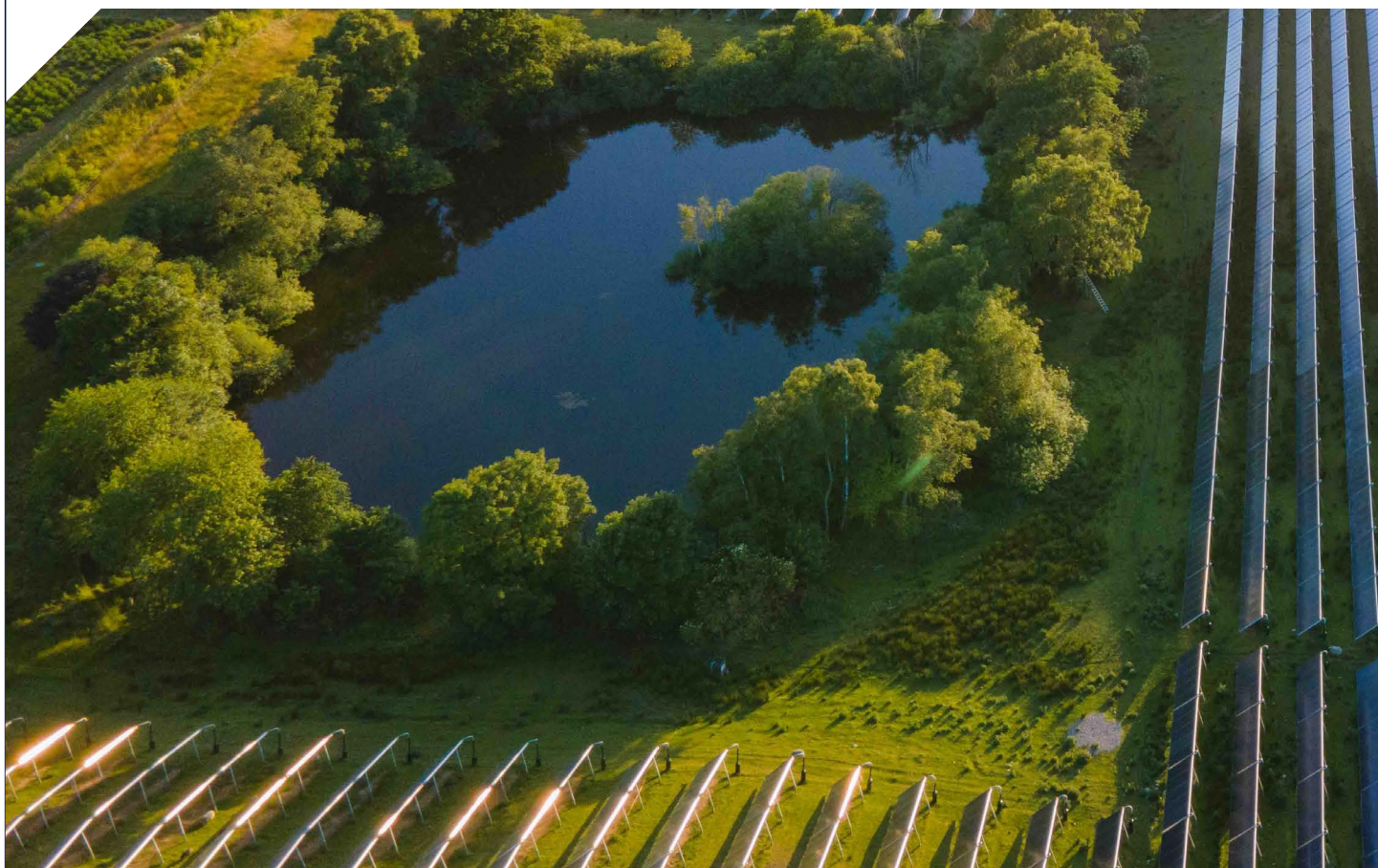
GRINS - Growing Resilient, Inclusive and Sustainable

The public and private research system can play a fundamental role in supporting decision-makers by providing high quality, timely, easy to access and usable data as well as effective and user-friendly tools for data analysis, supporting knowledge transfers and the design of evidence-based public policies.

With this goal, the GRINS Extended Partnership will develop AMELIA (dAta platforM for the transfEr of knowLedge and statistIcal Analysis), an online data platform giving access to high quality data and instruments for data analysis for a wide range of applications. It will offer tools to support fundamental and applied research for firms and households and for policy analysis and evaluation of the actions of public administration.

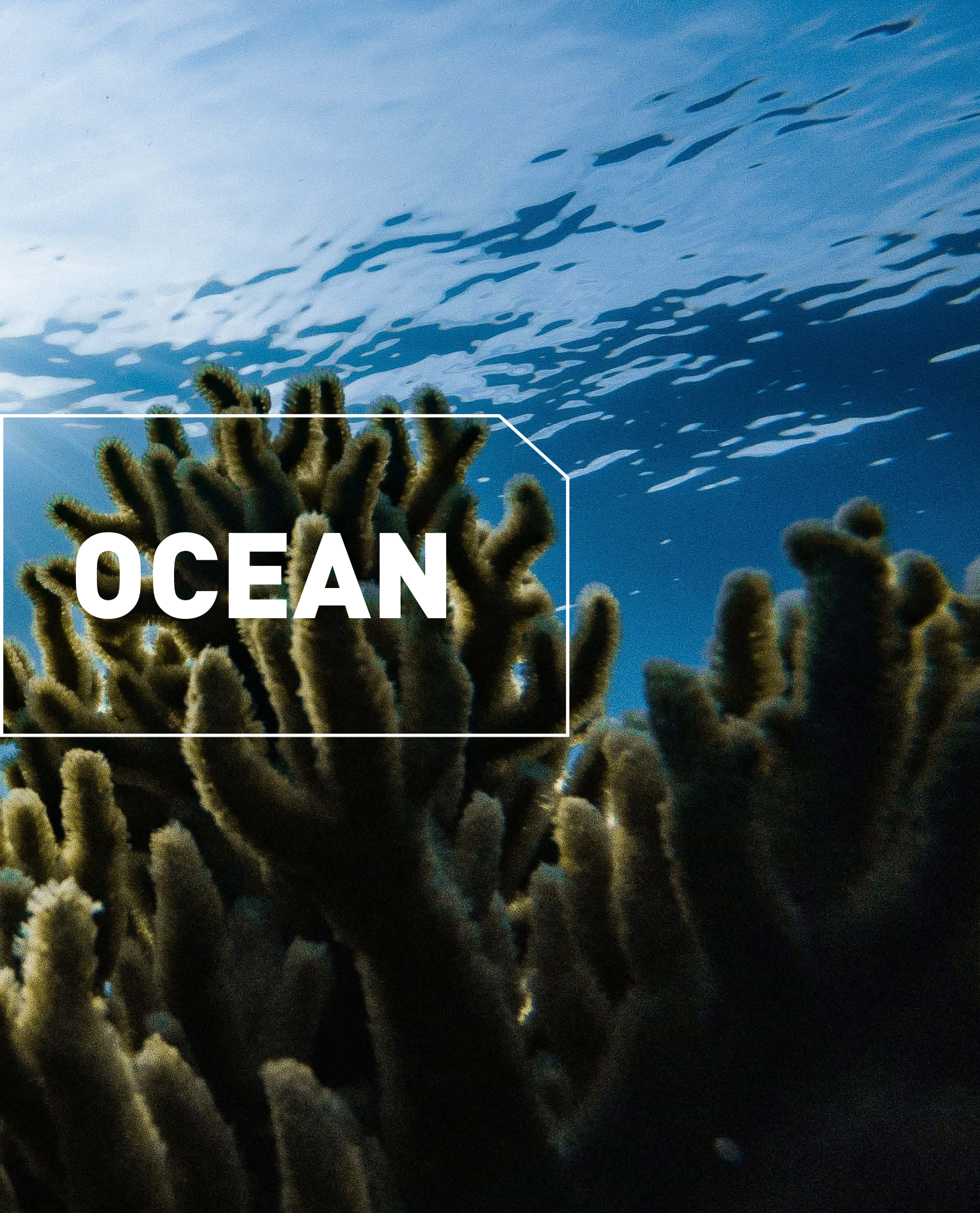
CMCC is an affiliate partner in 3 spokes and a founding member of the HUB. CMCC coordinates WP1 in the spoke “Low Carbon Policies”, which investigates the socio-economic and biophysical impacts of a changing climate and produces scenarios of how the world would be if large investments required to tackle climate change are going to be implemented.

<https://www.cmcc.it/projects/grins-growing-resilient-inclusive-and-sustainable>









OCEAN

Marine heat waves in the Mediterranean: Observations and predictions

A marine heat wave (MHW) began in May 2022 and spread eastward across the Mediterranean Sea. Marine heat waves (MHWs) occur when extreme warm ocean conditions persist for several days or more. They have wide ranging ecological and economical effects causing mass-mortality of wild and farmed marine organisms and ecosystems, severely affecting marine conservation efforts and aquatic food sector activities. CMCC maintains the Mediterranean Forecasting System (MedFS), which produces forecasts of the next 10 days as well as a reconstruction of the recent past known as analysis, both of which are freely available on the Copernicus Marine Service.

This year, the Ligurian Sea experienced MHW conditions for 3-weeks before they decayed and returned in mid-June. The MHW hit the Gulf of Taranto later but with greater intensity, reaching nearly 5°C above average. The MedFS analysis has been successful in accurately capturing the surface temperature onset, persistence, and decay of these extreme conditions.

At the CMCC, ongoing work in the FEVERSEA ESA Research Fellowship and the EuroSea project will continue to advance research in the understanding and prediction of MHWs in this vital region of economic activity and biodiversity.

The work done by CMCC has drawn significant attention from media, particularly with an interview with Radio 3 Scienza, articles on newspapers Il Manifesto and Nuovo Quotidiano di Puglia, and a short video reportage on SkyTG.

<https://www.cmcc.it/article/marine-heat-wave-in-the-mediterranean-observations-and-predictions>

The Marginal Ice Zone as indicator of sea ice variability

Antarctic sea ice plays a critical role in the polar and global climate and ecosystems, modulating the exchanges of momentum, gasses and heat between the ocean and the atmosphere. A deep knowledge of sea ice variability is necessary for adequately simulating these fluxes and thus for climate modeling.

The Marginal Ice Zone (MIZ) is the dynamic interface between the open and sea ice-covered ocean, and is characterized by intense exchanges between ocean, sea ice and atmosphere.

In 2022, within the H2020 project Crices, CMCC's research focused on studying the complex, multiple-scale dynamics of the MIZ that are essential to understand how sea ice is evolving and to predict its future. Based on the ensemble of global ocean/sea ice reanalysis produced by the Copernicus Marine Environment Monitoring Service (CMEMS) and a suite of high-resolution climate models (available through CMIP6), the group provided an overview of the circumpolar MIZ variability and seasonal cycle, and elucidated the mechanisms contributing to the expansion or retreat of Antarctic ice in some regions and contraction in others.

<https://www.cmcc.it/article/antarctic-ice-a-better-knowledge-of-the-ocean-improves-the-predictability-of-sea-ice-variability>

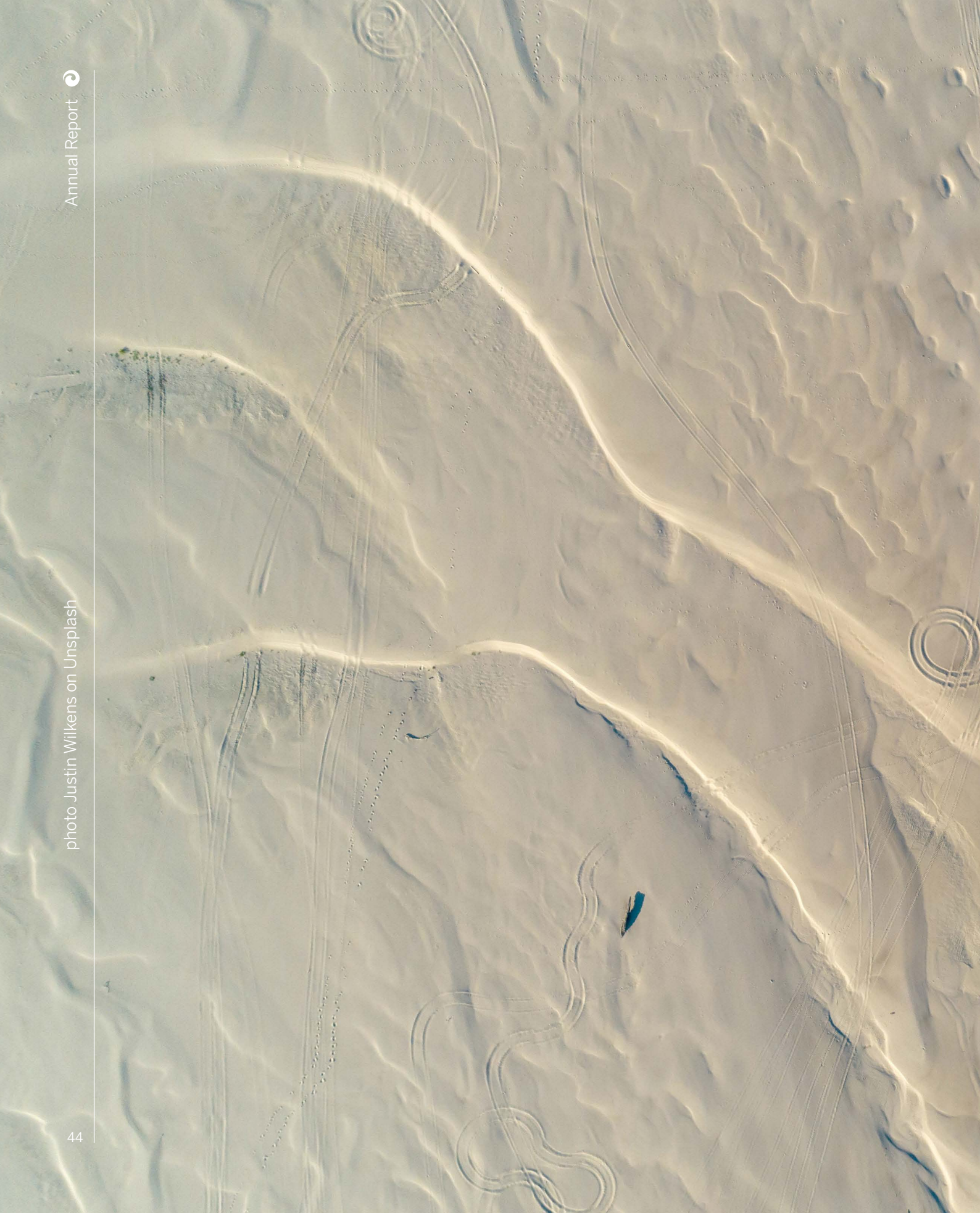


New insights from increasingly cutting-edge models: only drastic cuts in atmospheric CO₂ can reverse trends

Results from international research teams and projects which use different kinds of models, when put together, show a high degree of coherence and point towards a common picture of the changes our planet is currently undergoing. CMCC participates in this global effort with its second-generation Earth System Model (CMCC-ESM2), whose findings confirm trends in ocean chemistry and biology transformations caused by climate change, as shown in the *article “CMIP6 Simulations With the CMCC Earth System Model (CMCC-ESM2)”* published by CMCC researchers in the *Journal of Advances in Modelling Earth Systems*. A trend worth stressing is the oxygen depletion of the oceans. As water warms, it holds less oxygen and chokes off crucial oxygen supplies to a variety of marine species. In the long run, the phenomenon will have an impact on deep ocean ecosystems, on where and what creatures eat, on which species live or die.

The model also confirms ocean acidification that exposes marine ecosystems and organisms to severe threats and predicts that it would be possible to invert this trend only under the most optimistic climate change mitigation scenario. CMCC-ESM2 projections also show alterations in ocean stratification, which is at the heart of ocean circulation of gasses and nutrients and slows down the whole oceanic circulation.

<https://www.cmcc.it/article/new-insights-from-increasingly-cutting-edge-models-only-drastic-cuts-in-atmospheric-co2-can-reverse-trends>



An aerial photograph showing a stark contrast between a dry, cracked, and layered riverbed on the left and a dark, rippling body of water on the right. The riverbed is composed of various shades of tan and brown, with visible sediment patterns and small pools of water in the cracks. The water is a deep, dark green, with small ripples on its surface. A white rectangular box with a diagonal cut on the top right corner is superimposed over the riverbed, containing the text 'DROUGHT & WATER' in bold white capital letters.

DROUGHT & WATER

Drought: Clear impacts on global agricultural production

The effects of drought on major crops are crucial to achieve both food and energy security. This is the focus of a study led by the CMCC Foundation and published in *Scientific Reports*. Maize, rice, soybean, and wheat are key in the debate concerning food, land, water, energy security and sustainability.

While strong evidence exists on the effects of climate variability on the production of these crops, so far multifaceted attributes of droughts – magnitude, frequency, duration, and timing – have been tackled mainly separately, for a limited part of the cropping season, or over small regions.

The study “*Complex drought patterns robustly explain global yield loss for major crops*” realized a more comprehensive assessment on how droughts - with their complex patterns given by their compound attributes – are consistently related to negative impacts on crop yield on a global scale.

The study complements the existing knowledge by considering complex patterns of droughts through their compound attributes, considering the reference period 1981–2016. These standardized indexes allow looking at moisture and yield anomalies, enabling robust comparison among cropping systems, countries, and years.

<https://www.cmcc.it/article/drought-clear-impacts-on-global-agricultural-production>



The global map of aridity

Water needs of plants or crops to maintain their physiological processes depends on many meteorological and climatic variables, including solar radiation, air temperature, relative humidity and wind speed, as well as specific crop characteristics and cultivation practices. Therefore, precipitation alone does not properly characterize vegetation water stresses.

In a rapidly changing global environment and climate, measuring these variables becomes a direct and critical indicator, and a predictive tool, for the trend, direction, and magnitude of climatic change and its impacts upon the terrestrial biosphere, with implications for plant growth, sustainable development, and eventually for human civilization.

An international team of scientists has released an updated and improved database presenting the values of the indices of these metrics for the entire globe at a very high spatial resolution of approximately 1 km² for the period 1970-2000, and as baseline for future projections. The peer-reviewed article describing the database, published in the Nature journal Scientific Data, includes important contributions by the CMCC Foundation.

<https://www.cmcc.it/article/the-global-map-of-aridity>

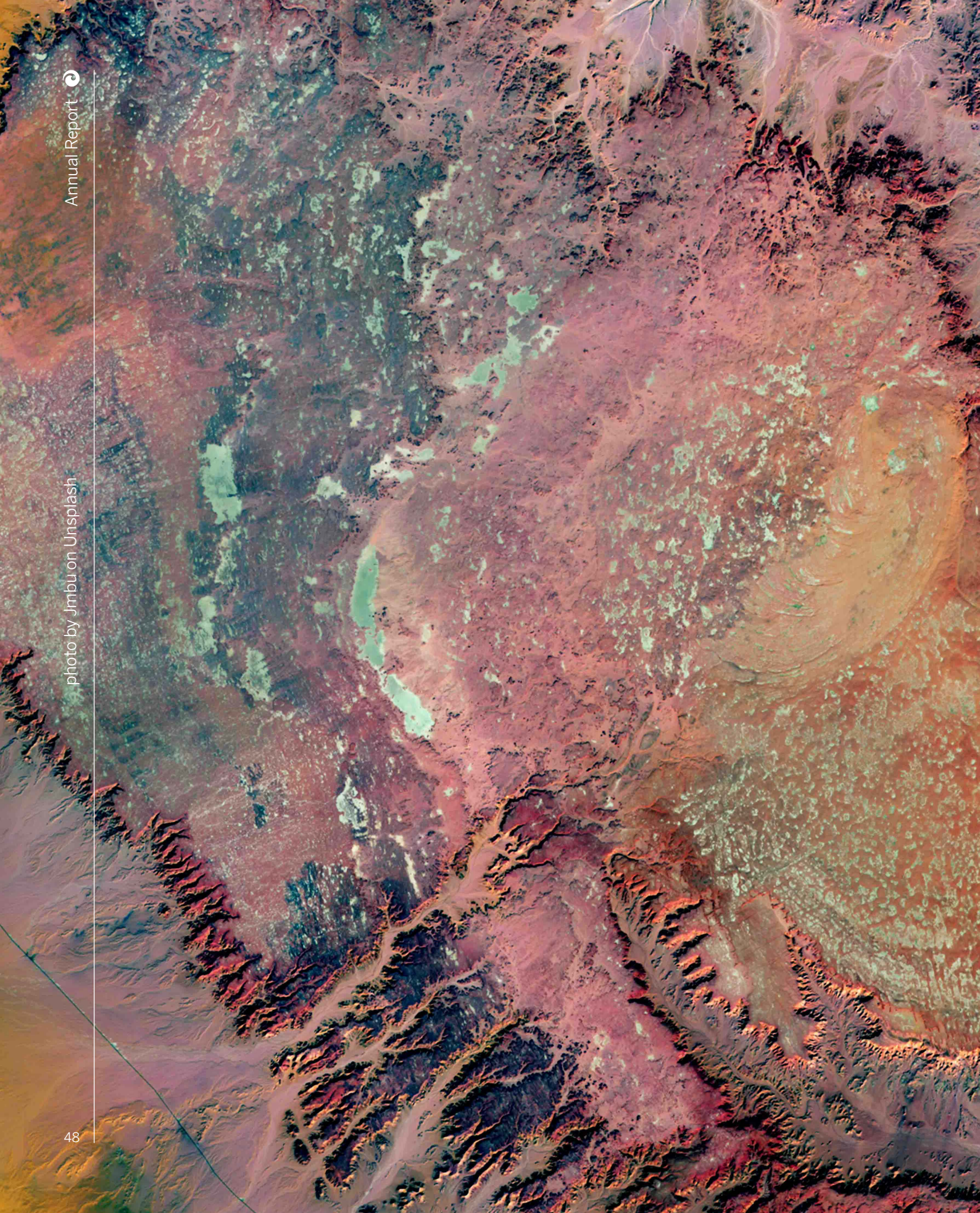


Mediterranean cooperation for an integrated management of water resources

Agriculture is by far the most water demanding sector in the Mediterranean and a sustainable use of water, combined with economic growth, cannot be achieved without improving irrigation efficiency and water productivity. The current heavy depletion of water sources is leading to water scarcity and degradation, deterioration of ecosystem services, conflicts with domestic and industrial uses and, in general, it poses limitations to economic growth. These trends will be exacerbated by climate change.

The CMCC Foundation coordinated a series of workshops with local stakeholders in the four pilot case studies of the ACQUAOUNT project (in Jordan, Tunisia, Lebanon, and Italy). Stakeholders vary from farmers to sectoral corporations, as well as to local, regional, and national agencies involved in the management of water resources at basin scale. The aim of the ACQUAOUNT project is to implement the concept of the Integrated Water Resources Management (IWRM) and sustainable irrigation through the deployment of innovative tools, smart water services and solutions, for public and private use, while contributing to climate resilience.

<https://www.cmcc.it/projects/acquaount-adapting-to-climate-change-by-quantifying-optimal-allocation-of-water-resources-and-socio-economic-interlinkages>



An aerial photograph of a vast, arid landscape. The terrain is characterized by deep, winding cracks and a mix of reddish-brown, tan, and purple hues, suggesting a dry lake bed or a desert floor. A white rectangular frame is superimposed on the left side of the image, containing the text "FUTURE EARTH" in large, bold, white capital letters. The frame has a small notch on its right side.

FUTURE EARTH

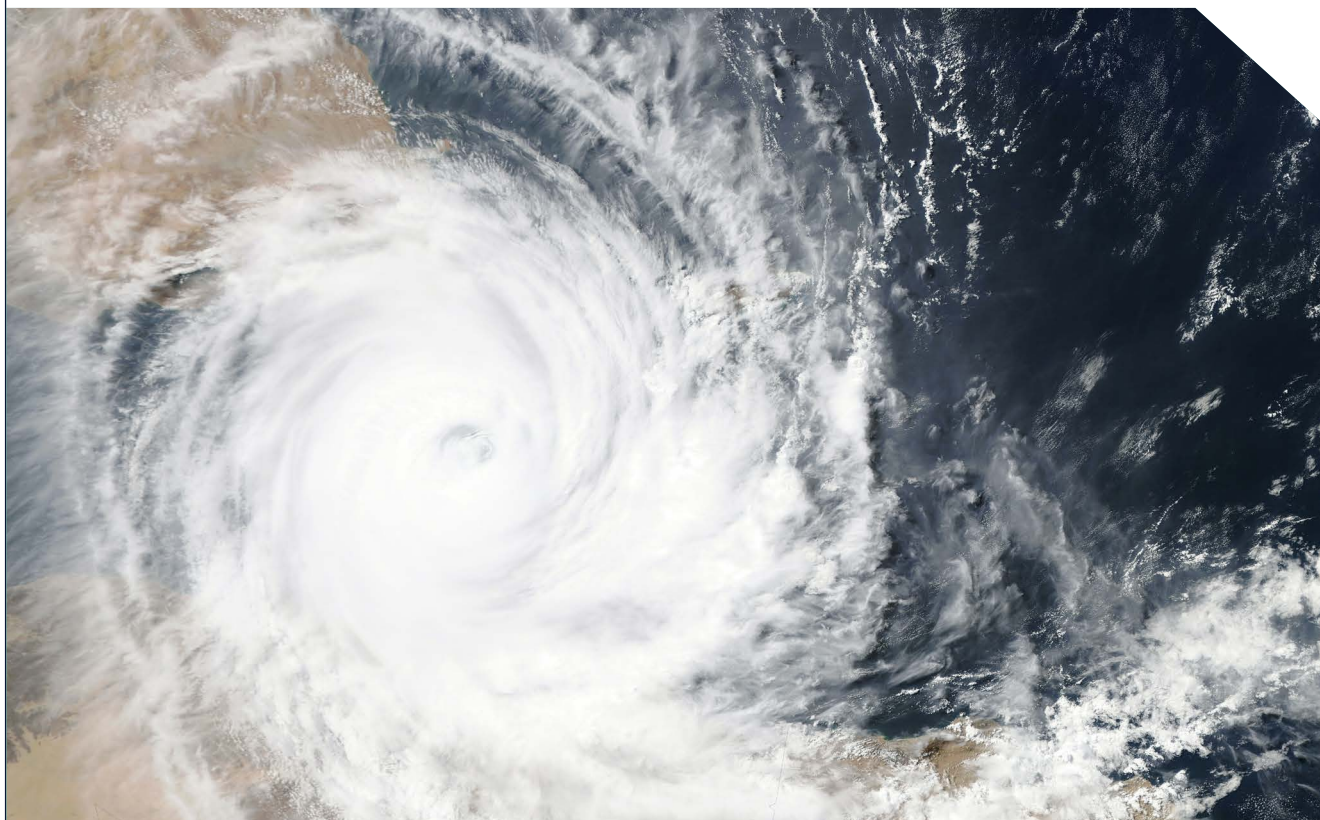
The CMCC decadal prediction system

For a long time, the only available products to inform decision-makers on future climate-related risks were projections: century-scale climate change simulations initialized from arbitrary model states to which were applied anthropogenic and natural forcings. A major limitation of climate projections is their limited information regarding the current state of the Earth's climate system, which may affect climate changes in the near future.

Decadal predictions, obtained by constraining the initial condition of a dynamical model (coupled global circulation model/Earth system model) through a realistic estimate of the observed climate state, provide a better understanding of climate fluctuations in the near-term range (typically up to 10 years) and thus an invaluable tool in assisting climate adaptation.

The CMCC decadal prediction system (DPS) is able to skillfully reproduce past climate surface and subsurface temperature fluctuations over large parts of the globe. The encouraging results obtained in studies that use the CMCC DPS demonstrate that it is a valuable addition to the current generation of DPSs. This stresses the need to further explore the potential of the near-term predictions, further improving future decadal systems and initialization methods, with the aim to provide a reliable tool to inform decision-makers on how regional climate will evolve in the next decade.

https://www.cmcc.it/lectures_conferences/predicting-mediterranean-climate-on-interannual-to-decadal-timescales-perspectives-from-the-cmcc-decadal-prediction-system





Extreme rainfall and past climate: An experiment over twenty European cities

The availability of reliable spatial and temporal data at proper spatial and temporal scale about extreme weather events represents a pivotal challenge for supporting Disaster Risk Reduction (DRR) policy and practice. A step change in the capability for modeling climate at local scales, especially for extreme weather events that most impact society, is represented by ERA5@2km, a new high-resolution precipitation dataset to support adaptation strategies, risk assessments, and impact analysis at urban scale. The new dataset was presented in a study led by the CMCC Foundation and published on *Weather and Climate Extremes* and based on a new generation of reanalysis, acknowledged as ERA5, released by the European Centre for Medium Range Weather Forecast (ECMWF).

The study evaluates the reliability of this new precipitation dataset for spatial patterns, trends, and extreme values. The evaluation is performed by making use of a set of available high-resolution observational datasets (comparable in terms of spatial and temporal resolution) for a subset of twenty cities (i.e., London, Cologne, and Milan), analysing multiple features of interest such as mean spatial pattern of annual precipitation, multi-year cycle of monthly precipitation, multi-year cycle of hourly precipitation for summer season, and annual maximum hourly precipitation.

<https://www.cmcc.it/article/extreme-rainfall-and-past-climate-an-experiment-over-twenty-european-cities>



Atmosphere-ocean coupling in the Atlantic basin

The CMCC Foundation made an important scientific contribution through its Climate Simulations and Predictions (CSP) division's participation in the ROADMAP project, specifically referring to improving existing knowledge on the role of the model horizontal resolution in representing atmosphere-ocean coupling in the Atlantic basin, with two main published works.

"Mitigating Climate Biases in the Midlatitude North Atlantic by Increasing Model Resolution: SST Gradients and Their Relation to Blocking and the Jet", published on the *Journal of Climate*, examines how certain obstinate biases in the midlatitude North Atlantic respond to increasing resolution (from 1° to 0.25° in the ocean) and how such biases in sea surface temperature (SST) affect the atmosphere. Using a multimodel ensemble of historical climate simulations run at different horizontal resolutions, it is shown that a severe cold SST bias in the central North Atlantic, common to many ocean models, is significantly reduced with increasing resolution.

"Impact of resolution on the atmosphere-ocean coupling along the Gulf Stream in global high-resolution models", published on *Climate Dynamics*, investigates the horizontal resolution dependence of the ocean-atmosphere coupling along the Gulf Stream, of simulations made by six Global Climate Models according to the HighRe-sMIP protocol, and compares it with reanalysis and remote sensing observations.



Modeling large-scale hail hazard over Italy

Hail is a meteorological phenomenon with adverse impacts that affects multiple socio-economic sectors such as agriculture, renewable energy, and insurance. Nevertheless, the understanding of the favourable environmental conditions for hail formation and the models' inadequacy to represent these phenomena have been limited by the scarce temporal and spatial coverage of hail observations. This is a major concern for the mitigation of hail-related risk in sensitive regions such as Italy, which is one of the more hail-prone areas in Europe. In the paper "Modelling hail hazard over Italy with ERA5 large-scale variables", published by the CMCC Foundation on Science Direct, a hail model that has been developed to describe the hail hazard over Italy was presented.

In this study, several large-scale meteorological variables and convective indices (from ERA5 reanalysis) are considered to describe hail probability. The best set of variables to be used as predictors in the hail model has been selected with a machine learning approach, based on a genetic algorithm. The model output is an estimation of the hail probability over Italy in the 1979-2020 period, on a 30×30 km grid which has been used to characterize the seasonality and long-term variability of the hail events and to investigate the potential large-scale drivers of hail storms over Italy.

https://www.cmcc.it/lectures_conferences/modelling-hail-probability-over-italy-with-a-machine-learning-approach



A low-angle, upward-looking photograph of several modern skyscrapers. The buildings feature glass facades that reflect the sky and each other, creating a complex geometric pattern. The perspective makes the buildings appear to converge towards the top of the frame. The sky is a clear, pale blue. A white rectangular box is superimposed over the center of the image, containing the word "ECONOMICS" in white, bold, sans-serif capital letters.

ECONOMICS

Air pollution and climate change: A common origin and a common solution

Climate change and air pollution are two major societal problems. Air pollution is responsible for millions of deaths worldwide and crop loss every year. Both climate change and air pollution share a common origin – fuel burning – and a common solution – a clean and fair energy transition. Their complex interplay calls for an advanced evaluation framework that can support decision making. Previous assessments have looked at the co-benefits of climate policies for air pollution, but few have optimised air pollution benefits.

Accounting for air pollution impacts reduces climate mitigation costs without increasing inequality and increases global and regional welfare. A comprehensive integrated assessment modelling framework capturing the most critical interactions between air pollution, climate mitigation and the economy, was presented in the study led by the RFF-CMCC European Institute on Economics and the Environment (EIEE), published in *The Lancet Planetary Health*.

The study lays out a modeling framework that internalises air pollution’s economic impacts on human mortality, while considering climate constraints and aerosol feedback.

<https://www.cmcc.it/article/addressing-jointly-air-pollution-and-climate-change-to-reduce-health-economic-impacts>



A just energy transition for Europe

AdJUST (Advancing the understanding of challenges, policy options and measures to achieve a just EU energy transition) is a project funded by the European Union’s Horizon Europe programme and carried out by a transdisciplinary European consortium. The objectives of AdJUST are to achieve a step change in societal understanding of the distributive repercussions of the transition to climate neutrality, and to identify effective and actively support policy interventions to accompany climate action so that no-one is left behind. The project is coordinated by the CMCC Foundation, which also co-leads the WP1 “Building a shared vision and narratives for the just transition”, and is the leader of the WP5 “Synthesis, dissemination and communication” and of the WP6 “Management and coordination 1”.

AdJUST engages European public bodies, industry, civil society and researchers to design and promote a shared vision, inspiring them towards the common goal of achieving climate neutrality. It combines research approaches from complementary disciplines with a continuous social dialogue, ensuring that the project practices open science, models procedural justice, and builds understanding, trust and capacity among citizens and other stakeholders concerning the transition to climate neutrality.

<https://www.cmcc.it/projects/adjust-advancing-the-understanding-of-challenges-policy-options-and-measures-to-achieve-a-just-eu-energy-transition>



photo by Alexander Tsang on Unsplash

Assessing uncertainties to address climate change

Massimo Tavoni, Director of the RFF-CMCC European Institute on Economics and the Environment (EIEE) and full professor at the School of Management of Politecnico di Milano, was awarded a Consolidator Grant from the European Research Council (ERC) for his research proposal EUNICE (from the Greek, Euníkè: “eu”, good, and “níkè”, victory).

EUNICE aims at correcting misspecification and biases of ensembles of climate-energy-economy models studying climate stabilization and developing ways to validate scenarios’ insights.

Its primary outcome is to develop a methodologically innovative and comprehensive approach to quantifying, translating, and communicating relevant uncertainties associated with low carbon pathways and exploring distant futures, transforming the methodological and experimental foundations of model-based climate assessments.

The approach and insights of EUNICE can be applied to other high-stakes environmental, social and technological evaluations. EUNICE’s unique combination of computational science with human behaviour and citizens’ participation will broker debates on high-stake societal decisions and increase faith and recognition of scientific methods.

<https://www.cmcc.it/article/assessing-uncertainties-to-address-climate-change-erc-grant-to-massimo-tavoni>

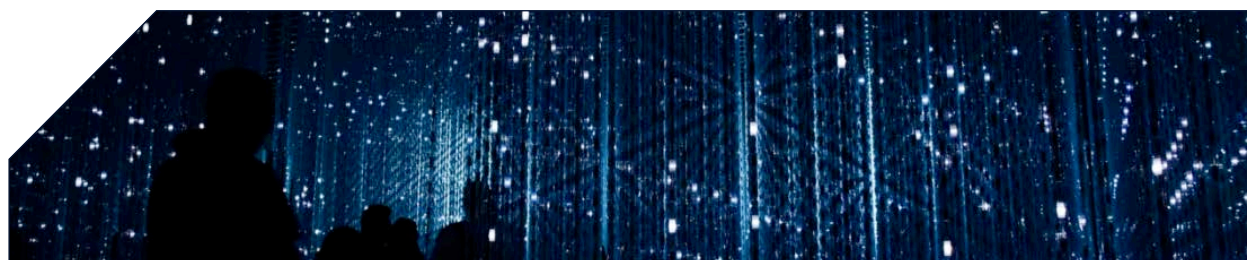


European Climate and Energy Modelling Platform 2022 (ECEMP)

The annual ECEMP conference took place in Brussels and online, bringing together Europe's climate and energy modeling community over a three-day period in a forum for deep exchange of research and modeling practice and varied discussions. The event featured a balanced mix of high-level panel discussions and interactive workshop sessions, in a way to enable a peer-reviewed digest of models and policy insights for the transformation of the European energy system. The ECEMP 2022 conference worked as an exchange platform for researchers and modeling teams from across Europe; from H2020 projects, representatives of the European Commission as well as partners from industry and civil society.

The 2022 Conference was characterized by the overarching topic of "Acting on the ambitions to a net-zero EU: roadblocks, challenges and opportunities." The main themes presented during the conference spanned from Mitigation, adaptation and climate impacts; to Innovation, societal and technical changes for Net Zero; and Bridging national and European energy modeling to inform strategies for 2030, 2040 and 2050.

<https://www.eiee.org/ecemp-2022-conference/>



The road ahead: How to reduce emissions and energy use for Italy's transport sector

Italy's overall greenhouse gasses emissions have been falling during the past 30 years, thanks to a combination of technological change, energy policies and sluggish economic growth. However, the transportation sector is a remarkable exception, with current emissions slightly above 1990 (+3.2%). This raises serious concerns about the feasibility of the goals of the European Green Deal. In order to investigate how the transport sector can be decarbonized, the Italian Ministry of Sustainable Infrastructure and Mobility (MIMS) has established a structure of independent experts, named STEMI (structure for a green transition for mobility and infrastructure), to help develop a policy for the ecological transition in these areas. Members of this group, which includes CMCC scientists, explained how to reduce emissions and energy use for Italy's transport sector in an article published in Nature Italy.

Their work, based on the existing scientific literature and on consultation with stakeholders, has looked into the technological options for decarbonization available now and in the foreseeable future and has identified investment priorities. In particular, solutions based on direct electrification emerge as the most promising technological options for various segments, with strong growth prospects, especially for road transport.

<https://www.cmcc.it/article/decarbonising-transport-in-italy>



An aerial photograph of a wind farm. Several white wind turbines are scattered across a dark, possibly forested or agricultural landscape. The sky is filled with large, white, fluffy clouds. The overall tone is somewhat somber due to the dark ground and heavy clouds, but the white turbines and clouds provide contrast.

DECARBON- IZATION

The effects of lockdown on carbon dioxide emissions in European cities

A clear reduction in CO₂ emissions was observed in many European cities during the COVID-19 lockdown, and sometimes they remained surprisingly low even after restrictions were lifted. In Amsterdam, for example, the emissions were reduced by 40% during lockdown and surprisingly they remained about 30% lower than average for four months after the lockdown.

The study “Direct observations of CO₂ emission reductions due to COVID-19 lockdown across European urban districts”, published in the journal *Science of The Total Environment* by an international research team led by ICOS Italia, the Italian network for the monitoring and assessment of greenhouse gasses, examined the effect of social restrictions on local emissions of CO₂, with a special focus on emission reductions mainly as a result of limitations on mobility.

The study, led by the CMCC Foundation (among the authors, are Giacomo Nicolini, Gabriele Antoniella and Dario Papale of IAFES), shows emissions cuts of up to 87% across 11 European cities, analyzed by using micrometeorological data from 13 measurement stations.

<https://www.cmcc.it/article/the-effects-of-covid-19-lockdown-on-carbon-dioxide-emissions-in-urbanized-areas>

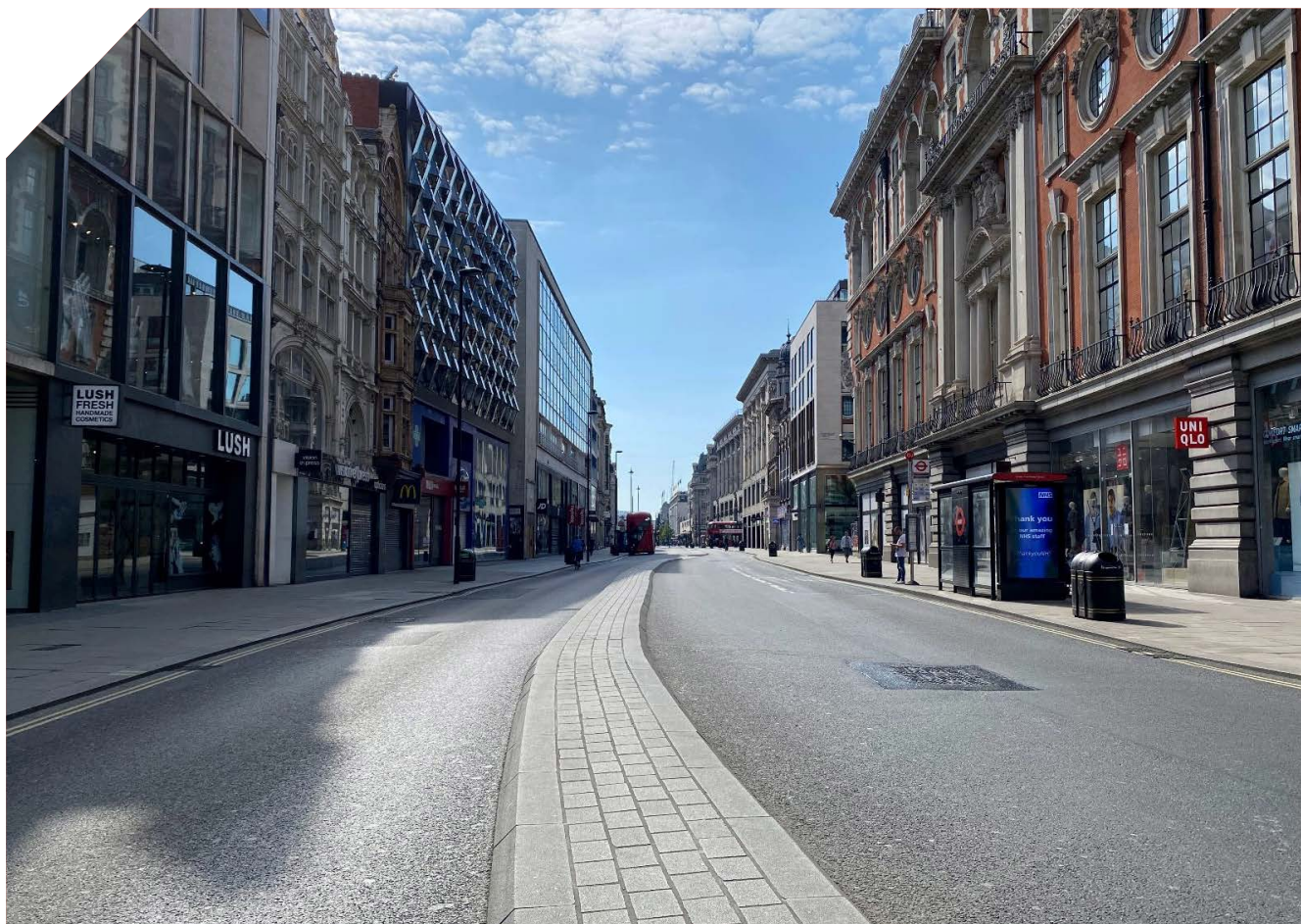
Carbon Border Adjustment Measures and decarbonization

The analysis of carbon border tax adjustment mechanisms (CBAM) is becoming an increasingly hot topic in the European Union as a consequence of the progressive phasing out of free allocation of pollution allowances in the EU Emissions Trading System (ETS) and of the aggressive US policy supporting with huge subsidies green innovation and decarbonization of its economic system.

CBAMs refer to the notion of imposing a cost equivalent to domestic climate regulatory costs on otherwise unregulated imports, in order to reduce global greenhouse gas emissions and to avoid the emergence of trade advantages and disadvantages as different governments enact climate policies with different levels of ambition.

CMCC divisions ECIP (Economic Analysis of Climate Impacts and Policy) and SEME (Sustainable Earth Modelling Economics), as part of the European Institute on Economics and the Environment (EIEE), and in collaboration with RFF and RITE, are analyzing costs and effectiveness of CBAMs for the EU Emissions Intensive Trade Exposed industries (EITEs).





Delivering on the Paris Agreement: A demand-driven, integrated assessment modeling approach

After 3.5 very productive and scientifically exciting years, in which CMCC-ECIP researchers worked with a large number of stakeholders to co-create modeled pathways for supporting climate action in Europe and worldwide, the PARIS REINFORCE research project came to an end in November 2022. Its results emphasized the complex policy interactions among the EU mitigation targets, the pre-existing policies and the pursuit of the UN's Sustainable Development Goals (SDGs), while stressing the ancillary benefits and trade-offs with and within the non-EU mitigation pathways. PARIS REINFORCE aims at underpinning climate policymaking with authoritative scientific processes and results, and enhancing the science-policy interface, in light of the Paris Agreement and associated challenges.

Within the project, CMCC was responsible for analysing the implications of new Common Agricultural Policy on land use emissions; for analysing the interaction among EU mitigation targets, other policies in place and the SDGs; and for analysing ancillary benefits and trade-offs in the non-EU national mitigation pathways.

<https://www.cmcc.it/projects/paris-reinforce-delivering-on-the-paris-agreement-a-demand-driven-integrated-assessment-modelling-approach>





CLIMATE RISKS AND POLICIES

The MAGICA project: Maximizing the synergy of European research Governance and Innovation for Climate Action

CMCC is coordinator of the MAGICA project, which has the ambition to guide future climate research. This will be done through a scientifically rigorous, democratic, and open iterative process involving the strategic, scientific, and social components of climate change research and innovation.

MAGICA maximizes the synergies between infrastructure investments and initiatives of climate change research and innovation across the European Research Area (ERA) by building upon and further implementing the Mission of JPI Climate in support of the international and European climate agenda. In addition, MAGICA organizes a series of flagship events, such as the European Climate Change Adaptation Conference (ECCA), the Carbon Neutrality Forum, and the Knowledge Hub Conference on Sea Level Rise. Those flagship events gather decision-makers and practitioners to exchange with the scientific community on urgent knowledge needs for climate action. The Equinox Summit which took place as the first European Climate Science Summit in March 2023 marked a milestone to further strengthen the science policy interface as approached and supported by MAGICA.

<https://www.cmcc.it/projects/magica-maximising-the-synergy-of-european-research-governance-and-innovation-for-climate-action>



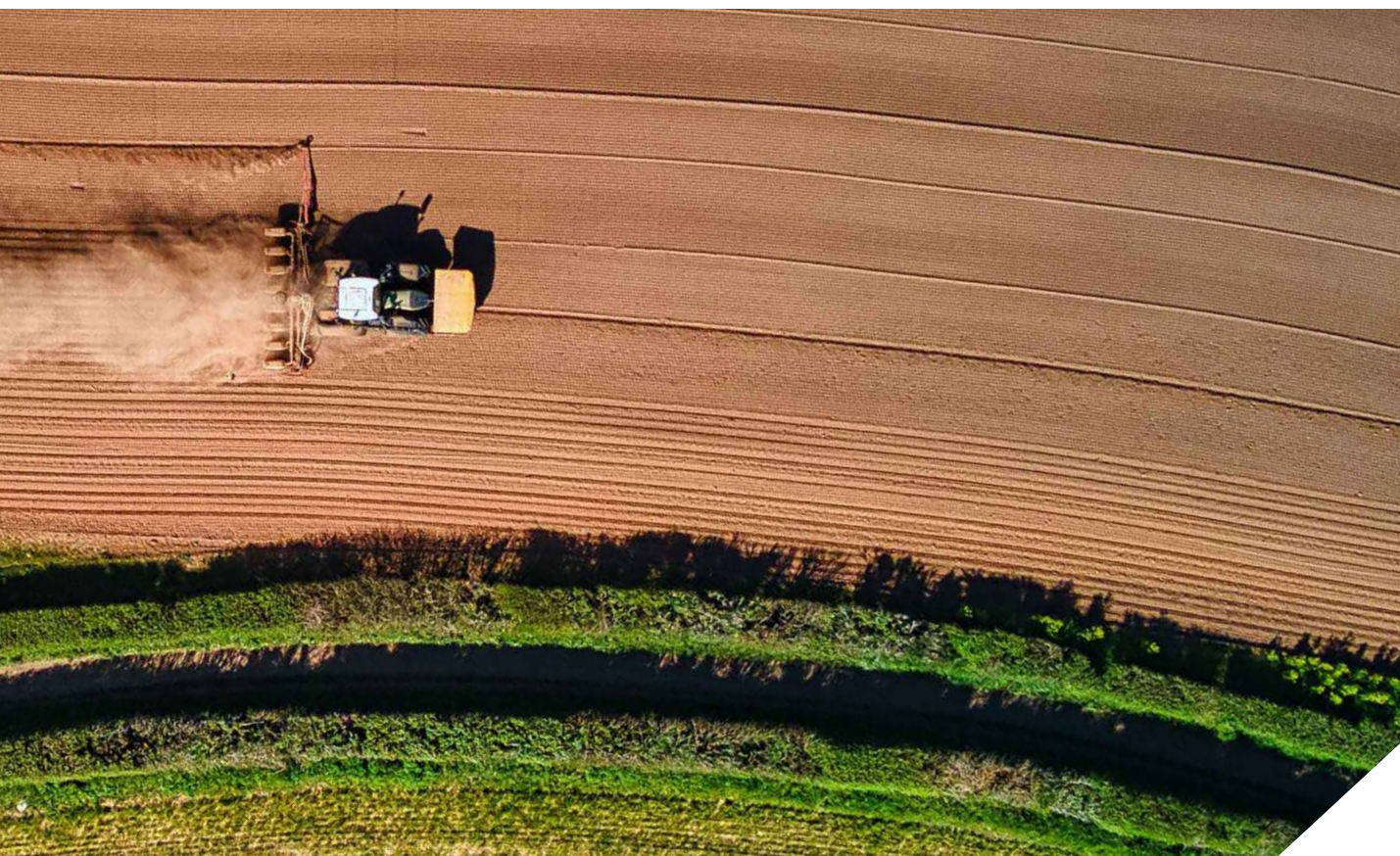
Linking nutrition enhancement to climate change adaptation

Climate change and malnutrition are two dynamics that influence and aggravate each other. Climate change poses a serious threat to global nutrition security, while current food systems are significantly contributing to this warming dynamic, and malnutrition is reducing people's ability to cope with the induced changes. Therefore, climate science and communication are crucial to inform both international funding institutions and local decision-makers in the design and selection of comprehensive, effective, and innovative actions.

A consultancy project has been carried out for the International Fund for Agricultural Development (IFAD) to inform its investment portfolio on the design and implementation of interdisciplinary development strategies linking nutrition enhancement and climate change adaptation. CMCC was involved in all activities, mainly providing technical expertise on the climate change and nutrition nexus.

The project aims to generate and share knowledge from previous experiences within IFAD projects in Latin America regarding best practices and the effective implementation of climate financed and/or focused projects and identifying any impacts of these climate activities on nutrition. Furthermore, the services provided will support on identifying potential co-benefits and linkages between climate-focused activities and nutrition, as well as addressing the empowerment of women, youth, and indigenous people.

<https://www.cmcc.it/projects/lessons-from-the-field-strategies-for-effective-implementation-of-climate-focused-projects-and-enhancement-of-nutrition-benefits>



Safer airports with climate risk assessments

The aviation sector has long been criticized for contributing to the causes of climate change through greenhouse gas emissions, but the need for aviation to adapt to the consequences of climate change has not been well researched or considered and the methodologies for risk assessment and the definition of targeted adaptation strategies are still limited.

Nevertheless, the impacts of climate change on the aviation sector are well known, with temperature increases, extreme precipitation, changes to storm and wind patterns, sea level rise and storm surges. The greatest risks are expected in central and southern Europe and, more specifically, Mediterranean airports face risks associated with sea level rise, higher occurrence of extreme temperature and precipitation events.

A study recently published on *Natural Hazards* with the contribution of the CMCC Foundation (among the authors are Marta Ellena and Paola Mercogliano of REMHI) presents the theoretical frameworks for risk assessment related to extreme temperatures, extreme precipitations and sea level rise with a focus on Mediterranean airports, while identifying the sources of climate risk that may induce potential impacts on airports. The application of these theoretical frameworks allows defining the level of risk associated with each hazard, with the goal to support the identification of specific adaptation measures for the Mediterranean airports.

<https://www.cmcc.it/article/safe-airports-with-climate-risk-assessments>



Mutamenti: Ideas and actions for a changing climate

Within the framework of its “Protecting the environment” mission, under the Planet Goal, the Fondazione Compagnia di San Paolo created the Mutamenti Call for Ideas and Actions for a Changing Climate, promoted in collaboration with CMCC. The Call was created with the aim of taking action to increase the resilience of the Piedmont, Valle d'Aosta, and Ligurian hinterland territories to the impacts of climate change.

CMCC contributed to this project by offering support for qualitative climate risk analysis for local administrations of the territories covered by the Mutamenti project. The risk assessments are to be used by those areas as a basis for planning measures of resilience to the impacts of climate change. Indeed, the selected territories use the results to adopt targeted policies and tools, to develop new economic, social, and environmental models to adapt and resist in the long term to the stresses of a changing climate, to develop the necessary resilience and to assist the communities to be prepared to efficiently respond to the challenges of climate change.

<https://www.cmcc.it/it/mutamenti>



Fondazione
Compagnia
di San Paolo



IDAlert: Making Europe prepared and resilient to health threats

Past and recent health crises, including the COVID-19 pandemic, have shown there is a need for stronger and more inclusive preparedness and responsiveness to epidemic-prone pathogens at the EU and global level. This requires developing novel indicators, innovative early warning systems, efficient tools for decision-makers, and evaluating adaptation and mitigation strategies. IDAlert is the new international project with the contribution of CMCC that will help build a Europe more resilient to emerging health threats by developing a range of decision-support tools and systems to enable decision-makers to act on time with improved responses. IDAlert – Infectious Disease decision-support tools and Alert systems to build climate Resilience to emerging health Threats – is funded by the European Commission under the Horizon Europe programme.

The CMCC Foundation leads the work on quantifying socio-economic inequality in climate impacts on zoonotic diseases across Europe. Additionally, it contributes to evaluating citizen science interventions and adaptation strategies and support stakeholders to design sustainable long-term upstream solutions to reduce zoonotic transmission and emergence, as well as conducting macroeconomic assessment in the health sector under different climate change scenarios.

<https://www.cmcc.it/article/strengthening-europes-resilience-to-emerging-health-threats>





REACHING OUT

Online Analytics

229.596 visits

462.424 page views

29 Webinars

Social Media Presence



TWITTER

5.2K (5.194)

+14%



INSTAGRAM

4.3K (4.276)

+21,3%



FACEBOOK

6.4K (6.328)

+12,2%



LINKEDIN

11K (10.555)

+61,1%

A fast changing world makes predictions increasingly difficult. Climate change is considered to be one of the most prominent challenges of our times, a pervasive topic that actively involves countless actors around the world, conditioning every sector of society.

At CMCC, research focuses on climate change, providing increasingly detailed and shared knowledge on its causes, the options to limit its impacts, and the solutions to build climate-resilient communities.

Understanding how all components of our society, economy and planet will evolve in the coming decades is crucial to better understand what our world will look like, and how we can act towards a more sustainable future.

Communication and public outreach therefore have the important role to find new languages and to describe the complexity of climate change, to act as a bridge between science and policy, between the academic world and the public, and to foster the transformation of scientific knowledge into concrete action.

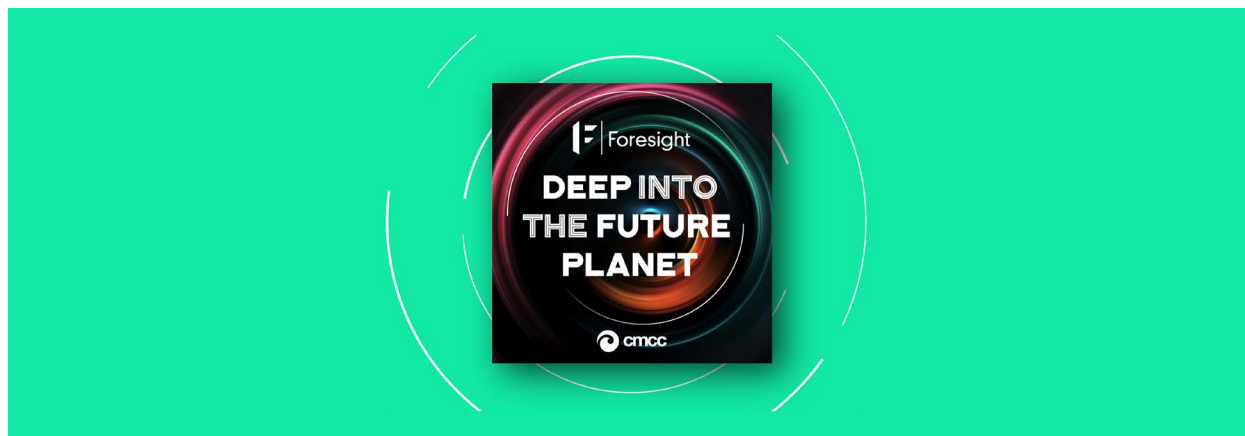
Deep into the Future Planet: The podcast

Foresight – Deep into the Future Planet, is a podcast produced by the CMCC and FACTA.

The future is being shaped by today's ideas, solutions, and decisions. The future is now.

In a world in which the climate crisis is taking centre stage, we can draw inspiration from the insights of scientists, artists, and activists. The Foresight podcast takes the listener on a planetary journey that goes deep into the future of innovation, technology, nature, and humanity in search of the best way to forge a sustainable future.

<https://www.climateforesight.eu/category/podcast/>



CMCC @ COP27

CMCC events at the UN Climate Conference COP27

From science to economy, from policy action to climate change communication, on November 6-18, 2022, the CMCC Foundation participated in the UN Climate Change Conference (COP27) in Sharm el Sheikh, Egypt. During COP27, countries gathered to take action towards achieving the world's collective climate goals as agreed under the Paris Agreement. The CMCC Foundation organized and co-organized several COP27 side events.

<https://www.cmcc.it/cmcc-at-cop27>



The transmission of climate impacts through international trade: implications for the EU

International trade can play an important role in smoothing negative economic shocks experienced by a country. There is, however, a growing body of evidence that trade can also act as a transmission channel for localized crises.

This session presented analysis of these dynamics in the context of climate change, assessing the potential, trade related, cascading macroeconomic and sectoral effects on the EU, triggered by impacts on agricultural commodities, energy demand, and supply chain stresses associated with the interruption of important maritime trade nodes. The effects of these dynamics on food markets were also discussed, through case studies of international food systems and Brazilian soy.

SPEAKERS: Francesco Bosello, Senior Scientist, Euro-Mediterranean Centre on Climate Change; Emilie Stokeld, Research Assistant, SEI York; Joe Simpson, Research Assistant, SEI York; Richard King, Senior Research Fellow, Environment and Society Programme, Chatham House; Rania Zaatour, Postdoctoral Researcher, Potsdam Institute for Climate Impact Research (PIK).



IPCC Session on Delivering a Sustainable Future: Feasibility and Policy

The session looked at the IPCC mitigation pathways and transitioning in the context of sustainable development. It considered the policies, structures and institutions to realize such transitions

SPEAKERS: Fatima Denton, WG III Coordinating Lead Author, Chapter 17; Massimo Tavoni, WG III Lead Author, Chapter 3; Minal Pathak, IPCC WG III TSU Senior Scientist; Navroz Dubash, WG III Coordinating Lead Author, Chapter 15; Michael Grubb, WG III Coordinating Lead Author, Chapter 1.

Deep into the Future Planet: Journalism, Media and Narratives of the Climate Crisis

Words, data, pictures: how to inform and engage the public? How to increase public awareness of the climate crisis? CMCC launches the second edition of the international climate change communication award – named after artist Maria Rebecca Ballestra – with a global dialogue among experts, journalists, and media professionals at COP 27. By focusing on examples of climate communication, including journalistic investigation, science journalism, podcasts, magazines, networks, gaming and digital editorial initiatives, CMCC invites authors of local and international projects in the field of climate communication to join the CMCC Climate Communication Award – Maria Rebecca Ballestra – network.

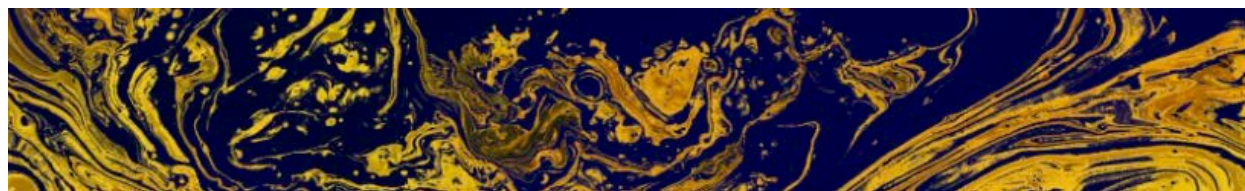
SPEAKERS: Leo Hickman, Editor in chief Carbon Brief; Elisabetta Tola, Radio3 Rai, author of the podcast “Foresight. Deep into the Future Planet”; James Fahn, Executive Director Earth Journalism Network; Rehab Abdalmohsen, Science journalist and water reporter; Lone Anderson, Co-Founder Grape ESG; Emanuele Bompan, Editor in chief Renewable Matter; Mauro Buonocore, CMCC, Head of Media and Communications; Alessandra Mazzai, CMCC, Coordinator Climate Change Communication Award; Selvaggia Santin, CMCC, Coordinator of Change Game.



Italy's 1.5°C national pathways

In this session, Italy's 1.5°C pathways from the 1.5°C national pathway explorer were presented, with technical considerations and lessons learnt in view of the implementation of the Fit for 55 package.

SPEAKERS: Chiara Di Mambro, ECCO; Claire Fyson, Climate Analytics; Emanuele Peschi, Italian Institute for Environmental Protection and Research; Marinella Davide, Ca' Foscari University of Venice and Euro-Mediterranean Center on Climate Change.





Launching a European Climate Science Assessment Mechanism for Policy Support

Actions in response and to prevent disasters need to be informed by the best available science, whose strategic focus now includes the acceleration of the development and transfer of climate knowledge from research and innovation to policy and decision making in support of climate actions. Therefore, JPI Climate is proposing a new European structure which addresses strategic gaps, and which will significantly enhance the profile and use of the outcomes from European investments in research and systematic observations. This envisions a European scientific assessment/stocktaking process, that is focused on three key interlinked challenges i.e. achievement of climate neutrality, climate resilience and management of transition and societal transformation.

SPEAKERS: Frank McGovern, JPI Climate; Eamon Ryan (TBC), Irish Minister for the Environment, Climate and Communications; Clara De la Torre (TBC), European Commission: Director General Climate Action; Simone Borghesi, EAERE President-Elect, Director FSR Climate, EUI and University of Siena; Phoebe Koundouri, EAERE President, AUEB, Co-Chair UN SDSN Europe; Marinella Davide, Ca' Foscari University, Harvard University, CMCC and SISC; Massamba Thiolye, Executive, Climate Change Innovation Hub, UNFCCC.

Organized by the CMCC, member of the European Joint Programming Initiative JPI Climate, in collaboration with the European Association of Environmental and Resource Economists (EAERE) and Società Italiana per le Scienze del Clima (SISC), this side event is supported by MAGICA project "Maximising the Synergy of European Research Governance and Innovation for Climate Action", funded by the European Union.

Romeo Bassoli Prize

A page of science. The “Romeo Bassoli” Prize for science journalism on climate and sustainability.

On December 20, 2022, the CMCC Foundation organized a meeting on climate and sustainability in journalism, in memory of the late science journalist Romeo Bassoli.

Creator of what has long been the only daily page entirely dedicated to science on Italian newspapers, creator and promoter of numerous initiatives to promote the dialogue between science and journalism, press officer of the National Institute for Nuclear Physics (INFN), Romeo Bassoli was one of the most brilliant interpreters of Italian scientific journalism.

The CMCC Foundation commemorates his figure and collects his legacy with a prize that is awarded to people and initiatives that stand out for their competence, innovation and originality in the field of scientific journalism dealing with climate and sustainability.

The 2022 Prize was awarded to Francesco Martinelli of Radar Magazine.

The award ceremony featured a discussion on the themes of climate and sustainability in scientific practice, with Antonio Navarra, CMCC President; journalist Eva Benelli, Zadig; journalist Luca Carra, Scienza in rete; and Mauro Buonocore, Director of Communications and Media at CMCC.

https://www.cmcc.it/lectures_conferences/una-pagina-di-scienza-premio-romeo-bassoli-per-il-giornalismo-scientifico-sul-clima-e-la-sostenibilita

cmcc Martedì 20 dicembre 2022 - ore 17.30

Una pagina di scienza

Un incontro sui temi del **clima e della sostenibilità** nella pratica giornalistica partendo dal ricordo della figura di Romeo Bassoli, uno dei più brillanti interpreti del giornalismo scientifico italiano. Nel corso dell'evento sarà assegnato il **Premio "Romeo Bassoli"** per il giornalismo scientifico sul clima e la sostenibilità" promosso dal **CMCC**.

Partecipano

Antonio Navarra - Presidente CMCC
Eva Benelli - Zadig
Luca Carra - Scienza in rete
Francesco Martinelli - Radar Magazine

Incontro valido per il riconoscimento dei crediti formativi obbligatori dell'Ordine dei giornalisti. I giornalisti che intendono registrarsi per l'ottenimento dei crediti possono farlo attraverso il portale formazionegiornalisti.it

CMCC, via Marco Biagi, 5 - LECCE



The background of the image is a blurred photograph of a large crowd of people, likely at a public event or conference. The colors are muted, with a lot of dark tones and some lighter, out-of-focus highlights. A white rectangular box with a slightly irregular top-right corner is superimposed over the image, containing the text.

EDUCATION AND TRAINING PROGRAMS

View the complete list of Education and Training Programs: www.cmcc.it/education-programs

Education Programs are a very important part of the wide range of activities carried out by CMCC.

The Graduate Programs, as well as Summer Schools and Winter Schools, have earned an outstanding reputation over time within the climate change scientific community, thanks to the high level and international breadth of their offering and to partnerships with European universities, international institutions, and world-famous experts participating as professors and guest speakers.

Addressed to researchers already engaged in scientific activities with CMCC as well as to external students, our educational initiatives aim to improve the participants' research performance, provide opportunities for professional growth and take full advantage of the energy and motivation of the younger generations.



PhD Programs in collaboration with Partner Universities

- Science and Management of Climate Change (Ca' Foscari University of Venice)
- Agrometeorology and Ecophysiology of Agricultural and Forestry Eco-Systems (University of Sassari)
- Sciences, Technologies and Biotechnologies for Sustainability (University of Tuscia)
- Biological and Environmental Sciences and Technologies (University of Salento)
- Complex Systems Engineering (University of Salento)
- Future Earth, Climate Change and Societal Challenges (Alma Mater University of Bologna)
- Master of Research in Science and Management of Climate Change (in collaboration with Ca' Foscari University of Venice)

Graduate Programs

CMCC Graduate Programs offer advanced courses and research activity, with a special focus on themes concerning innovative management strategies, both from a physical and a socioeconomic perspective, for phenomena related to climate and its changes.

Master of Research

Ca' Foscari University of Venice and the CMCC Foundation launched a Master Programme in Climate Change Science and Management targeted at international students with experience or interest in dealing with scientific and socioeconomic aspects of the urgent global challenges posed by global warming.

PHDs	TOTAL NUMBER of STUDENTS (a.y. 2022-2023)
Science and Management of Climate Change (Ca' Foscari University of Venice)	27
Agrometeorology and Ecophysiology of Agricultural and Forestry Eco-Systems (University of Sassari)	11
Sciences, Technologies and Biotechnologies for Sustainability (University of Tuscia)	55
Biological and Environmental Sciences and Technologies (University of Salento)	64
Complex Systems Engineering (University of Salento)	90
Future Earth, Climate Change and Societal Challenges (Alma Mater University of Bologna)	83
MASTER	
Master of Research in Science and Management of Climate Change (in collaboration with Ca' Foscari University of Venice)	8

CMCC organizes and manages a programme of Summer and Winter Schools for students of the CMCC Graduate Programs, also open to students from other international Ph.D. programmes on climate change.

Adaptation and sustainable risk management: the second Future Earth Research School (FERS)

From October 3 to 15, 2022, the second course of the Future Earth Research School (FERS) on “Adaptation and sustainable risk management” took place in Bertinoro (FC), Italy. Through lectures, discussions as well as participative exercises in small break out groups students had the opportunity to explore the topic of climate change adaptation in depth, also thanks to the collaborations established with two companies, a hospital and a local administration based in the Emilia Romagna region.

16 Ph.D. students, young researchers, and professionals from 7 countries (Italy, Iraq, Brasil, Spain, Mexico, Uganda, and Denmark) attended the course, aimed at understanding how risks occur and how they can be assessed and managed focussing on interactions between the physical and the human environment, and how risks are shaped by their interactions.

The participants confronted the challenge of climate change adaptation, mentored by an outstanding faculty and engaged in participatory activities, looking for practical solutions.

Four challenges will engage the students in finding new policies for adaptation, and will allow them to explore the issue also from a political, economic and social point of view.

Coordinated by the CMCC Foundation and funded by the Emilia-Romagna Region, FERS provides high-level scientific courses that give researchers the tools to understand and anticipate future global environmental challenges.

<https://www.cmcc.it/article/adaptation-and-sustainable-risk-management-the-second-future-earth-research-school-fers-kicks-off>





IPCC FOCAL POINT FOR ITALY

The IPCC Focal Point for Italy is the meeting point between the IPCC and the national scientific community and general public, and has the goal to foster exchange of information on the institution's results and activities. The Focal Point participates in the IPCC plenary meetings, represents IPCC in the national context and implements communication and outreach activities. The CMCC Foundation acts as the IPCC Focal Point for Italy through its President, Dr Antonio Navarra.

In 2022, CMCC hosted the Italian official press conferences for the presentation and announcements of the contributions to the IPCC Sixth Assessment Report of Working Group II and Working Group III.



28 February 2022: exclusive online presentation for Italy of “Climate Change 2022: Impacts, Adaptation and Vulnerability”, the WGII contribution to the Sixth Assessment Report

In February, the IPCC published its awaited report on the impacts of climate change and how to address them. This new edition contains assessments of impacts and risks with a particular focus on ecosystems, biodiversity, society, and people, globally and regionally.

Immediately following the international presentation of the IPCC, the IPCC Focal Point for Italy organized a webinar to present to the Italian community the most up-to-date synthesis of scientific knowledge on how adaptation to climate change can help identify solutions and develop the potential needed to achieve the Sustainable Development Goals (SDGs). Italian authors and experts of the IPCC report offered insights and details, in particular for the contents of the report dedicated to Europe and the Mediterranean area.

Speakers:

Antonio Navarra – President CMCC, University of Bologna, IPCC Focal Point for Italy

Piero Lionello – University of Salento, CMCC, Lead Author IPCC Report AR6 WG2

Francesca Spagnuolo – Scuola Superiore Sant’Anna Pisa, Lead Author IPCC Report AR6 WG2

Gustavo Naumann – CIMA Foundation, Contributing Author IPCC Report AR6 WG2

Moderator:

Mauro Buonocore, CMCC – Head of Communication Office and IPSO Division

https://www.cmcc.it/lectures_conferences/cambiamenti-climatici-2022-impatti-adattamento-e-vulnerabilita

4 April 2022: exclusive online presentation for Italy of “Climate Change 2022: Mitigation of Climate Change”, the WGIII contribution to the Sixth Assessment Report

What are the possible paths to limit greenhouse gas emissions and contain climate change?

The IPCC released its report on climate change mitigation in April 2022. The third volume of the Sixth Assessment Report of the IPCC is the most updated and accurate summary on the progress of knowledge, on the solutions available and on the actions to be taken to limit global emissions of climate-changing gasses.

The report presents analyses which, taking into consideration various sectors of society and the economy, place the theme of mitigation in the perspective of sustainable development.

Immediately following the official presentation of the IPCC, the IPCC Focal Point for Italy organized a webinar with Italian experts and authors of the report to present to the Italian community the most up-to-date synthesis of scientific knowledge on the most useful paths for reducing the anthropic causes of climate change.

Speakers:

Lucia Perugini, CMCC Foundation

Massimo Tavoni, European Institute on Economics and the Environment (EIEE), Politecnico di Milano

Elena Verdolini, European Institute on Economics and the Environment (EIEE), University of Brescia

Paolo Bertoldi, European Commission DG JRC

Moderator:

Mauro Buonocore, CMCC Foundation

https://www.cmcc.it/lectures_conferences/cambiamenti-climatici-2022-mitigazione-dei-cambiamenti-climatici





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