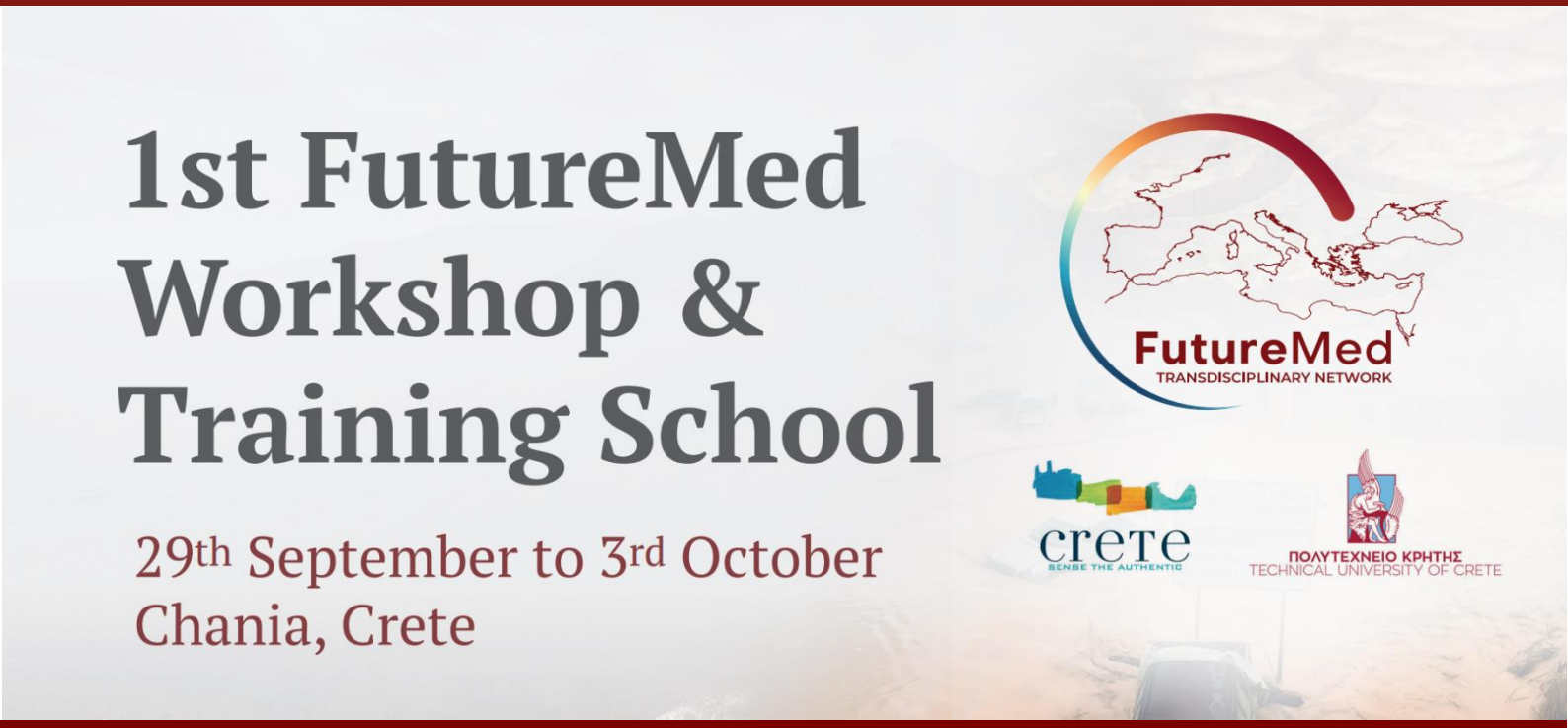

BOOK OF ABSTRACT

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

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General information

Location of the Meeting

KAM Center of Mediterranean Architecture (Akti Enoseos & Georgios Katechakis Square) at Chania, Crete (Greece), https://c-a-m.gr/

Scientific committee

Samira Khodayar Pardo (CEAM)

Emmanouil Flaounas (ETH)

Davide Faranda (CNRS – LSCE)

Ana Mª Vicedo-Cabrera (UniBe)

Francesca Costabile (ISAC-CNR)

Aristeidis Koutroulis (TUC)

Elisa Savelli (Mercy Corps)

Sandra Ricart (POLIMI)

Julie Ingram (UoG)

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Virginia Hernanz (UAH)

Meryem Tanarhte (UH2)

Fatma Handan Giray (ESOGU)

Sonia Quiroga (UCM)

Maria Hatzaki (UOA)

Table of Contents

INVITED SPEAKERS (Session 1)

S1.1 - European state of the climate: Extremes in the Mediterranean region

Samantha Burgess[1]

[1]*European Centre for Medium-Range Weather Forecasts (ECMWF), Reading, UK*

The Mediterranean region is increasingly recognized as a climate change hotspot, where warming trends are amplified and the frequency and severity of extremes are intensifying. Using Copernicus Climate Change Service data, this presentation provides an overview of recent climate conditions in Southern Europe and the Mediterranean, focusing on record-breaking heatwaves, amongst other events and illustrate how the Mediterranean's vulnerability to extremes is evolving in a warming climate. The results underline the urgent need for adaptation strategies informed by reliable, open climate data to increase climate resilience across Europe.

S1.2 - Rapid attribution of heatwave health burden to human-induced climate change

Garyfallos Konstantinoudis[1]

[1]*Imperial College of Science Technology and Medicine, London, UK*

Climate change is increasingly amplifying the frequency and severity of extreme heat events, with profound implications for public health. This talk will present findings from three recent studies that quantify in real-time the impacts of climate-driven heatwaves on excess mortality across Europe.

First, we focus on the June 2025 heatwave in the UK. Leveraging real-time temperature forecasts and published literature on the impacts of heat on health, we produced near real-time projections of excess deaths attributable to heat. Our forecasts highlight the feasibility, urgency and public interest in integrating climate-health indicators into heat-health warnings.

Second, we zoom in on the early-summer European heatwave of 2025 and publish the first ever health attribution rapid study. By combining epidemiological models with climate attribution analyses, we disentangle natural variability from anthropogenic drivers, providing robust evidence that rising greenhouse gas concentrations have substantially increased heat-related mortality in 12 major European cities.

Third, using a comprehensive dataset covering 854 European cities and similar counterfactual analyses, we demonstrate that heat-related mortality during summer 2025 has more than tripled in recent decades due to human-induced climate change.

Taken together, these studies not only quantify the escalating human toll of climate change but also emphasize the need for proactive adaptation. As extreme heat becomes increasingly unavoidable, investment in early warning systems, heat action plans, and urban resilience strategies will be critical to protect vulnerable populations. This work underscores the urgency of reducing greenhouse gas emissions while simultaneously strengthening societal preparedness for a hotter, more hazardous future.

INVITED SPEAKERS (Session 2)

S2.1 - Adaptation is essential, but is it enough?

Lisa Schipper [1]

[1]*Rheinische Friedrich-Wilhelms-Universität Bonn, Germany*

Despite growing global recognition of the urgent need to adapt to climate change, we are facing increasing limits to what adaptation can achieve. While greenhouse gas emissions continue to rise and climate impacts accelerate, adaptation remains both essential and insufficient. In this context, we will explore this tension, examining what happens when the scale and speed of climate impacts outpace our ability to respond. She will discuss the social, ecological, and political dimensions of adaptation limits, highlighting why justice, equity, and inclusion must remain central to adaptation strategies. The talk will challenge participants to rethink prevailing assumptions about adaptation and consider what it truly means to build resilience in a rapidly changing Mediterranean context.

INVITED SPEAKERS (Session 3)

S3.1 - Stakeholder engagement, capacity building, and the nexus cluster to enhance climate change adaptation

Serena Caucci [1]

[1]*Technische Universität Dresden, Germany*

Tackling climate change adaptation requires systemic transformation, rooted in inclusive stakeholder engagement, capacity building, and cross-sectoral collaboration. Under the umbrella of the NexusNet COST Action, three complementary dimensions illustrate how large clusters can spark innovation and strengthen resilience by connecting actors across scales. At the governmental and local level, innovative ecosystems are being shaped through systems-thinking approaches and solution platforms that connect adaptation needs with technological innovation. Within this framework, governments, municipalities, and local stakeholders co-create and co-design pathways to resilience, combining existing solutions with emerging technologies to form robust packages for climate adaptation and sustainability. At the community level, citizen science is reshaping environmental compliance. The joint action grassroots organizations, local authorities, and researchers, and by applying standardized protocols and AI-enhanced tools, locally collected data can achieve regulatory value—transforming citizens into active contributors to environmental accountability and decision-making. At the academic and youth level, capacity development initiatives on climate-resilient management in the water, energy, food, and ecosystems Nexus are equipping early-career researchers with participatory methods, governance insights, and practical case studies. This investment in young innovators is a cornerstone of transformative action and interdisciplinary thinking into the climate innovation. Together, these activities demonstrate the power of large-scale networks such as NexusNet COST Action to foster dialogue, strengthen connections, and spark innovation across governments, communities, and youth—accelerating the transition toward climate-resilient societies.

ORAL PRESENTATIONS (Session 1)

O1.1 - Understanding the 2022 - 2024 Mediterranean Droughts: Climatic Drivers and Regional Impacts

Victor Murphy [1], Valerio Lembo [2], Simona Bordoni [3], Georgios Zittis [4], Pau Benetó [5], Greta Cazzaniga [6], Roberta D'Agostino [2], Mariana Madruga de Brito [7], Platon Patlakas [8], Meryem Tanahrte [9], Selma Zengin Kazanci [10], Robert Stojanov, Riccardo Biella Jaromír Landa, Laura Suarez-Gutierrez, J Novosak, Pinelopi Loizou [4] Francesca Costabile [2], Assaf Hochmann [1]

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[8]*Atmospheric Modelling and Weather Forecasting Group, University of Athens, Department of Physics*

[9]*Laboratory of Process Engineering and Environment, Faculty of Sciences and Techniques, Hassan II University of Casablanca*

[10]*Osmaniye Korkut Ata University*

We investigated the relationship between North Atlantic sea surface temperature (SST) patterns and drought conditions in the Mediterranean region from 2022 to 2024. Using Self-Organising Maps on HadISST data spanning 1950-2024, we identified four dominant clusters representing different ocean states and we labeled as such: Gulf Stream displacement, Negative Atlantic Meridional Overturning, Tripole Pattern, and Subtropical Warming. We found that these SST clusters have a strong influence on atmospheric circulation over the Euro-Mediterranean area, particularly on monthly mean geopotential height at 500 hPa (Z500). Each cluster is associated with distinct geopotential patterns that affect moisture transport and precipitation across the Mediterranean. Particularly, the subtropical warming pattern exhibited the strongest connection to drought

conditions, resulting in high-pressure systems that block moisture-carrying weather systems. We analysed drought indices (SPI, SPEI and CDI) from European Drought Observatory for 2022-2024 across three Mediterranean subregions, finding significant correlations with the SST Subtropical Warming cluster. This pattern is associated with reduced atmospheric moisture content ($p<0.05$), suggesting a clear ocean-atmosphere-drought connection. This allows us to investigate the pathways from atmospheric changes to sectoral impacts, including agriculture, water resources, energy generation, human health, tourism, and wildfire management.

O1.2 - Assessing mortality risk patterns associated with droughts in a multi-location study

Coral Salvador[1], José Carlos Fernandez-Álvarez[1,2], Luis Gimeno[1,2], Raquel Nieto[1,2], Ana M. Vicedo-Cabrera[3,4] and on behalf of the Multi-Country Multi-City (MCC) collaborative research network

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[2] *Galician Supercomputing Center (CESGA), Santiago de Compostela, Spain.*

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[4] *Oechger Center for Climate Change Research, University of Bern, Bern, Switzerland*

Droughts are becoming increasingly frequent and severe in many regions around the world, posing serious threats to the environment, economy, and public health. However, the association between droughts and human health remains unclear, in part due to the limited geographical coverage and inconsistent findings of existing studies. This study aims to conduct the most comprehensive assessment to date of the mortality risks associated with drought events, analysing data from 831 locations in 49 countries. We used monthly mortality data between 1970 and 2019, sourced from the Multi-Country Multi-City (MCC) collaborative research network. Short- and long-term drought conditions were characterized using the Standardized Precipitation Evapotranspiration Index (SPEI) calculated at one and twelve months of accumulation (SPEI1 and SPEI12, respectively). We applied a two-stage time series analysis approach using quasi-Poisson regression models to estimate locationspecific mortality risks for the same month of drought exposure. Using a threshold function, the association was expressed as the change in the relative risk of mortality comparing a reference condition (SPEI threshold=0) to extreme drought conditions (SPEI=-2). Then, a random-effects multilevel meta-analytical model was used to predict risks at the country level and overall. Overall, our results suggest an increased mortality risk associated with different types of droughts, which was slightly larger and more consistent for short-term droughts (1.008 [1.005, 1.010] using the SPEI1 vs 1.003 [0.997, 1.010] using the SPEI12). Compared to short-term droughts, marked differences in the risk patterns were found between countries during prolonged drought events. An indication of higher vulnerability associated with long-term droughts was observed in locations across Europe, Australia and New Zealand, Western Asia and Eastern Africa. This study represents the largest multi-location analysis to date providing preliminary insights into the health effects

associated with droughts. Identifying vulnerability patterns across different types of droughts may help clarify potential mechanisms involved and support targeted actions to reduce the health burden associated with droughts in the context of climate change.

O1.3 - Integrating Planetary Health and Nature-Based Solutions: Assessing the Impacts of Traffic-Related Air Pollution on Human and Plant Health in Urban Forests

Carmina Sirignanoa,[b], Daiane De Vargas Brondania,[b], Lina Fusaroc,[b], Gianluca Di Iulioa,[d], Alessandro Giammonae,[b], Clarissa Gervasonie,[b], Matteo Rinaldia,[b], Ferdinando Pasqualini[a] , Alessandro Bracci[a] , Marisa Di Pietro[d] , Rosa Sessa[d] , Simone Filardo[d] , Simona Ceccarelli[f] , Alice Traversa[g] , Danilo Ranieri[f] , Eleonora Rubin[i] , Laura De Gara[i] , Chiara Anselmi[k] , Andrea Scartazzak,[b], Annalisa Di Cicco[l] , Stefano Listrani[m], Michele Pier Luca Guarino[h] , Alessandro Di Giosa[m], Antonia Lai[n] , Carlo Calfapietrak,[b], Stefano Decesaria,[b], Luca Mortarini[j] , Silvia Canepari[k] , Annamaria Altomareh,[i], Gloria Bertolie,[b], Francesca Costabilea,[b]

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l) Institute of Marine Sciences, National research council (CNR-ISMAR), Rome, Italy

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n) Diagnostics and Metrology Laboratory, Italian National Agency for New Technologies, Energy and Sustainable Economic Development, (ENEA), Frascati(Rome), Italy

Addressing climate change, biodiversity loss, global pollution, and planetary health requires novel, holistic approaches. Here, we present the initial results of an ongoing experiment combining observational data and numerical modelling to assess the interplay between exposure to urban air pollution and human and plant health in the framework of the NBFC project (www.nbfc.it/en). The experiment targets an urban forest in Rome (Italy) that is surrounded by a heavily tralicked area. We assessed the potential of freshly emitted tralic-related air pollution (TRAP) to induce oxidative stress and inflammation in humans and plants. Fresh TRAP is characterized by high levels of emerging atmospheric pollutants (black carbon, ultrafine particles, and reactive oxygen species; EC/2024/2881) and low levels of fine particulate matter (PM2.5), which can occur in an urban environment after precipitation or ventilation events. TRAP-associated epigenetic markers of inflammation and oxidative stress (microRNA) were assessed in human lung epithelial cell lines and human specimens over sub-daily periods (6-12h). ROS production and lipid peroxidation levels were also assessed in lung epithelial cells after short-term exposure. Functional traits related to photosynthetic machinery were analyzed in two evergreen species, Quercus ilex L. and Laurus nobilis L., sampled at increasing distances from a major road and were expected to have dilerent sensitivities to PM2.5-induced oxidative stress. The Parallelized Large-Eddy Simulation Model (PALM) was used to simulate vegetation cover variations using two nested domains with dilerent resolutions and treating aerosols as passive tracers. Preliminary results have shown pro-oxidative and inflammatory responses in human cells and specimens after exposure to fresh TRAP. A reduction in TRAP-related BC was observed when air masses traversed specific urban forest transects with a higher leaf index, particularly during months of high vegetative activity. A comprehensive analysis of these findings can provide evidence of a cause-and-elect relationship between short-term exposure to fresh TRAP and oxidative stress in humans and plants, with implications for chronic responses. In a highly urbanized world, this evidence could be pivotal for motivating the widespread implementation of nature-based solutions (NBSs) to address planetary health

O1.4 - Floods in Europe, the Mediterranean, North-Africa, and the Middle East: their socio-economic impacts, consequences, and perception

Mélanie Coleman[1], Andries-Jan de Vries[1], Caroline Roberts[1], Daniela Domeisen[1,2]

[1] *University of Lausanne, Lausanne, Switzerland*

[2] *Eidgenössische Technische Hochschule Zürich (ETH), Zürich, Switzerland*

Recent flood events have had disastrous consequences worldwide, highlighting the need to better understand them. This study aims to clarify flood impacts, characteristics, and their public perception in the European Union (EU) and the Middle East and North Africa (MENA), including the Mediterranean, for the period 2000-2023. Both regions have similar number of inhabitants but contrasting socioeconomic settings and climatic conditions. Moreover, while flood impacts in the EU have received much attention, they remain understudied for the MENA. We employ the economic losses, number of fatalities, and of people affected by floods from the Emergency Events Database EM-DAT (CRED, 2025), normalised by the national gross domestic product and population size, to assess quantifiable impacts. Additionally, the results from the Special Eurobarometer SP547 (European Commission, 2024) and from the Afrobarometer (n.d.) were used to investigate public perception of natural disasters. First, the quantifiable flood impacts are studied, at a regional and national level, distinguishing between flood types and seasons. Then, flood impacts are compared to those from other natural disasters. Finally, we review the survey results and compare public perception against measured impacts. While flood events occur more often and cause more economic damages in the EU, they inflict 3.5 times more human impacts in the MENA. Impacts from flood types remained inconclusive because many events were not categorised. Floods were more impactful in summer in the EU, and in autumn in the MENA, except for the number of affected people in spring. In the EU, floods cause more economic damages and affect more people than other natural hazard types, while the largest number of deaths stems from temperature extremes. In the MENA, floods are the most frequent disaster type. The Eurobarometer survey shows that respondents see a personal and national risk from floods, even though they consider extreme weather events as more dangerous. Major discrepancies exist between the perception and quantified impacts of disasters across the EU. In Morocco and Tunisia – the sole MENA countries in the Afrobarometer – the populations saw a bigger increase in drought events than in floods. Some limitations

of the study are the use of existing surveys and the lack of available data on the population perceptions in the MENA, which calls for increased data collection efforts there. Finally, this study introduces a new way of assessing natural disaster impacts by combining measured impacts and public perception, which can serve natural disaster mitigation and management.

O1.5 - Assessing the impacts of extreme temperature events on energy systems in France

A. Akakpo-Numado[1], G. Cazzaniga[1], M. Vrac[1], D. Faranda[1].

[1] Laboratoire des Sciences du Climat et de l'Environnement – LSC

As climate change increases the frequency and severity of extreme events, understanding their systemic impacts has become a key priority for risk management and adaptation planning — particularly in climate-vulnerable regions such as the Mediterranean. The energy sector is increasingly exposed to climate hazards, which can simultaneously affect supply, demand, and infrastructure performance. Within this context, this work focuses on assessing the impacts of extreme temperatures (heatwaves and cold spells) and droughts on energy systems in France, with the aim of identifying system vulnerabilities under future climate conditions. A multi-approach framework -combining a machine learning demand model with physics-based models of renewable energy production potential- is developed to connect climatic variables and power system outputs in order to quantify the exposure and sensitivity of electric networks to extreme weather conditions. Multiple data sources are included to produce simulations of renewable energy production (notably wind and solar), analysis of shifts in electricity demand during extreme events, and assessment of transmission grid capacity under stress conditions. Historical climate analogues are used to better understand how extreme weather events driven by global warming affect the energy sector compared to the past. This approach also evaluates the role of natural climate variability and emerging climate trends, helping to identify impact pathways. In parallel, extreme events tracking algorithms are used to detect and characterize these events, facilitating the selection and comparison of high impact episodes across different spatial and temporal scales

O1.6 - Marine and atmospheric heatwaves concurrence: a major impact of climate change

Francisco Pastor[1], Laura Paredes-Fortuny[1,2], Samira Khodayar[1]

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[2]Universitat de Barcelona, Spain

Climatological extreme events have major societal and environmental impacts that can upscale when different extremes concurrently happen. Extreme heat events, both marine and atmospheric heatwaves, have become more frequent, extensive and have intensified in the last decades in the Mediterranean region. Mainly because of their higher frequencies, their spatial and temporal concurrence has also increased. A joint study on the concurrence of Mediterranean atmospheric and marine heatwaves has shown that the latter undergo an intensification process when the atmospheric counterpart is present while this one does not show any significant change. The physical processes of the marine heatwave intensification are mostly related to latent heat flux balance in the air-sea interface. A reduced latent heat flux from the sea to the atmosphere induces the marine heatwave intensification that rapidly decays with the end of concurrence and the reactivation of the latent heat exchange.

O1.7 - Unravelling drivers of the future Mediterranean precipitation paradox during cyclones

Marco Chericoni[1,2,3], Giorgia Fosser[1], Emmanouil Flaounas[4], Marco Gaetani[1], Alessandro Anav[2,3]

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In recent years, the Mediterranean region has experienced intense cyclones with heavy precipitation, resulting in severe flooding with multiple fatalities and significant damage to infrastructures. Additionally, the basin is increasingly recognized as a climate change hotspot. For these reasons, it is fundamental to understand how Mediterranean cyclones respond to climate change, identifying the key processes driving these changes. Our study is the first combining CMIP6 models with a high-resolution atmosphere-ocean coupled regional climate model (AORCM) over the Mediterranean to investigate how changes in moisture transport and air-sea interaction processes influence precipitation during intense cyclones under three SSP scenarios (SSP5- 8.5, SSP2-4.5, SSP1-2.6). The AORCM is the only available with three SSP scenarios for the Mediterranean basin and it is essential for identifying the physical mechanisms driving cyclone-related precipitation changes. Despite a strong reduction in the number of intense cyclones and a subsequent decline in seasonal precipitation, our results underscore a significant increase in cyclone-related extreme precipitation, especially under the SSP5-8.5 scenario. The AORCM shows that this intensification is driven by enhanced moisture exchange from the ocean to the atmosphere and increased mid-level moisture transport toward the coastal regions of Southern France, Italy, and the Balkans. These results offer valuable information for regional climate impact assessments in the Mediterranean basin and provide novel insights into the physical processes driving precipitation changes. The analysis underscores the potential risk of more damaging inland flooding in a warming climate, particularly in southern Spain and France (including their islands), the Italian Peninsula, the Balkan region and the Levantine Coast, posing severe issues for such densely populated areas. Besides, our results highlight the importance of combing different models within coordinated frameworks to disentangle the influences of large-scale forcings and regional climate processes on the future Mediterranean climate under varying radiative

forcing levels. This approach is crucial for improving confidence in climate projections

O1.8 - Towards an impact-based approach to the detection of analogues: the case study of Emilia-Romagna floods in May 2023

Valerio Lembo [1], Mireia Ginesta [2], Tommaso Alberti [3], and Davide Faranda [4,5,6]

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The framework of weather analogues is a powerful methodology for the detection of climate change fingerprint on weather extremes, that has been widely used in several contexts. The procedure has several advantages compared to standard model-based attribution exercises, being fast and not computationally expensive. Here, we address whether a detection of analogues that includes environmental hazard indicators associated with a severe weather event can provide additional value for the attribution of the event intensity or likelihood. As a case study, we analyse the twin Emilia-Romagna flood event of May 2023. It caused a sizable amount of casualties, widespread destruction and substantial economic damage. We detect analogues of these events among available estimates of sea level pressure, potential vorticity at 850hPa, and river runoff during the historical period, as reproduced in ERA5 Reanalyses. The latter observable, in particular, is considered as an indicator of the environmental hazard associated with the extreme weather event. In addition to that, we also consider high-resolution gridded observations of cumulated daily precipitation, retrieved by the Agency for Regional Environmental Protection of the Emilia-Romagna region. By comparing the univariate analogues attribution considering separately the four mentioned observables, and the multivariate analogues attribution, considering a combination of the observables, we notice that the attribution of the events to climate change is much improved in the latter case, and in particular, that the river runoff is instrumental in obtaining a better characterization of the fingerprint climate change has on the dynamics of the atmospheric event. We consider these results as crucial in the direction of an impact-based attribution science, considering extreme

weather events as multi-risk compound events in which the extreme weather events overlay other environmental and socio-economic factors contributing to the vulnerability of a region.

O1.9 - High-Resolution Projections of Wind Energy Potential for Sustainable Planning in the Eastern Mediterranean

Assaf Hochman [1]

[1]*Fredy and Nadine Herrmann, Institute of Earth Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel.*

The Eastern Mediterranean and Middle East region is facing increasing challenges from climate change, including extreme heat and rising energy demands. This study presents high-resolution (8 km) regional climate projections using the COSMO-CLM model under the IPCC RCP4.5 scenario to assess future summer wind patterns and their implications for wind energy potential up to 2070. We find a spatially heterogeneous response: near surface winds are projected to strengthen by up to 0.7 m/s, potentially alleviating heat stress, while wind speeds at typical wind turbine heights are expected to decline by up to 1.0 m/s due to shifts in synoptic systems, such as the Persian Trough. Consequently, wind energy potential may decrease by up to 7 GJ in six hours across much of the region, with the notable exception of the Red Sea area, which shows potential gains. These results highlight critical considerations for sustainable energy planning and climate adaptation in the region, emphasizing the need to integrate both surface and upper-level wind dynamics into renewable energy strategies.

O1.10 - Wikimpacts 1.0: A new global climate impact database based on automated information extraction from Wikipedia

Ni Li[1,2], Wim Thiery[1], Shorouq Zahra[3,6], Mariana Madruga de Brito[4], Koffi Worou[5,6], Murathan Kurfali[3,6], Seppe Lampe[1], Paul Munoz[1], Clare Flynn[5,6], Camila Trigoso[1], Joakim Nivre[3,6,7], Jakob Zscheischler[2,8,9], and Gabriele Messori[5,6,10]

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Extreme climate events like storms, heatwaves, wildfires, floods, and droughts pose serious threats to human society and ecosystems. Measuring their impacts remains a crucial challenge scientifically. Although data linking climate hazards to socio-economic effects are crucial, their public availability is still relatively sparse. Existing open databases such as the Emergency Events Database (EM-DAT) and DesInventar Sendai offer some impact data on climate extremes, but impact data on climate extremes also appear in newspapers, reports, and online sources like Wikipedia. We introduce Wikimpacts 1.0, a comprehensive global database on climate impacts developed using natural language processing techniques. This database utilizes the GPT4o large language model for extracting information, following document selection, postprocessing, and data consolidation. In this release, we have processed 3,368 Wikipedia articles. Impact data for each event is recorded at three levels: event, national, and subnational. Categories include the number of deaths, injuries, homelessness, displacements, affected individuals,

damaged buildings, and insured or total economic damages. This dataset encompasses 2,928 events from 1034 to 2024, featuring 20,186 national and 36,394 sub-national data entries. Comparison with manually annotated data from 156 events shows that the Wikimpacts database is highly accurate in the event level for time, location, deaths, and economic damage, though details on injuries, affected individuals, homelessness, displacements, and building damage are slightly less precise. An analysis from 1900 to 2024 demonstrates that sub-national data provides more comprehensive coverage of tropical and extratropical storms, and wildfires than EM-DAT, with enhanced data on events in countries like the United States, Mexico, Canada, and Australia. Our study emphasizes the potential of natural language processing in creating open databases with reliable information on climate event impacts.

ORAL PRESENTATIONS (Session 2)

O2.1 - The quality and consistency of urban climate adaptation plans in 327 European cities

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European cities are increasingly affected by climate threats such as heatwaves, flash flooding, coastal erosion and storms. While governments are adopting increasingly ambitious climate goals, the UNEP has recently suggested the existence of an adaptation 'gap' between these goals and the measures being undertaken.

So, are city governments addressing these threats in their official climate adaptation plans (CAPs)? And, moreover, are these plans internally consistent, with clear alignment between climate risks, policy goals, measures and monitoring and evaluation?

We present evidence from two recent studies conducted by core members of the EURO-LCP Initiative1 to address these research questions. In the first study, published in npj Nature Urban Sustainability (Reckien et al., 2023), we found that 51% (167) of the 327 EU-27 and UK cities in our sample had developed a CAP by the end of 2020. We then developed the ADAptation plan Quality Assessment (ADAQA) index to measure and track the quality of CAPs, incorporating it into the Climate Change Adaptation Scoring Tool. Our findings suggest that, overall, the quality of

CAPs improved from 2005 to 2020, primarily in terms of setting adaptation goals, proposing varied and thorough adaptation measures, and detailing their implementation. However, there has only been a slight improvement in monitoring plan implementation and involving civil society in the planning process.

In the following study published in Nature Climate Change (Reckien et al., 2025), we assessed the current adaptation gap at urban level by analysing 'consistency' in adaptation planning. We conducted five 'consistency checks' at different stages of the adaptation management process. This highlighted gaps, misalignments and inconsistencies between the various planning phases of the 167 European cities. Seventy percent of our checks across all the CAPs identified inconsistencies within the adaptation process. These mainly arise from a lack of consideration of social vulnerability, particularly regarding planning the implementation of measures for vulnerable groups and involving them in the development and evaluation of plans. This could reduce the effectiveness of CAPs, as vulnerable groups are at risk of being exposed to more extreme weather events caused by climate change.

O2.2 - Quality check of urban adaptation plans for more effective policies

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Cities are playing a pivotal role in addressing climate threats and ensuring the safety and resilience of their communities. Thanks also to the boost and guidance provided by international networks, they are often undertaking planning initiatives independently from higher levels of governance. One example is the Global Covenant of Mayors (GCoM), which primarily involves small and medium-sized cities in Europe and beyond. It supports them by offering a platform for learning and peer exchange, as well as practical assistance in the form of guidelines for drafting plans and ongoing support for monitoring activities.

But how comprehensive are the current adaptation plans, and what are the main challenges they face? How can their quality be assessed in terms of the alignment between the different components of the plans themselves?

To answer these questions, we identified seven quality criteria on which to base the evaluation of the adaptation plans developed by cities: (i) Fact base; (ii) Adaptation Goals; (iii) Adaptation Measures; (iv) Implementation, (v) Monitoring and Evaluation; (vi) Participation; (vii) Consistency. The first six components are in line with (Reckien et al., 2023) and investigate the completeness and scope of the plans, i.e. whether they are comprehensive and balanced. The seventh component, consistency, compares key sections of the plans and assesses the alignment between the identified risks and planned measures, and the overarching adaptation policies and targeted vulnerable population.

The ADAQA-GCoM evaluation tool was developed based on the structure of the GCoM's Adaptation Climate Action Plans (A-CAP), including these seven components and 28 indicators. Using this tool on the 2,205 A-CAPs worldwide and analyzing the results provides valuable insights into the strengths and weaknesses of urban plans. This allows for specific questions, such as "Do the plans measure the impacts on vulnerable groups?", to be answered. More generally, it enables local governments to assess whether their plans cover the appropriate topics and to benchmark against others

The outcomes of this research are of wide interest to decision makers at all levels of governance, as well as to planners, practitioners and researchers. This is because they provide an updated and accurate description of the current state of urban

climate adaptation planning, and can suggest ways to improve the quality of plans and ensure their effective implementation.

O2.3 - Flood adaptation and resilience in urban systems

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Urban areas are increasingly vulnerable to the growing impacts of hydrometeorological hazards, including floods, droughts, and heatwaves, which are exacerbated by climate change and urbanisation. The Mediterranean region, in particular, faces frequent and devastating flood events, with rising sea levels and intense storm activity further intensifying these risks. These hazards pose severe threats to critical societal services and infrastructure (CSSIs), such as transport networks, water supply systems, and energy grids, which are essential for maintaining urban functionality. We seek to address these challenges by developing innovative solutions to enhance urban resilience and preparedness against multiple hydrometeorological hazards. This research integrates advanced technologies, cutting-edge methodologies, and transdisciplinary collaboration to provide actionable insights and tools for disaster risk reduction and climate adaptation.

Our study focuses on three interconnected pillars: advanced monitoring and prediction systems, systemic risk analysis, and practical tools for adaptive action. We employ state-ofthe-art artificial intelligence (AI) techniques, such as Long Short-Term Memory (LSTM) networks and multivariate copula analysis (MvCAT), to improve hazard prediction accuracy. These models identify current and future hotspots of hydrometeorological risks by analysing hazard intensity, duration, and frequency. Recognising the interconnected nature of urban systems, we apply network resilience metrics and risk mapping techniques to assess vulnerabilities in infrastructure networks. The project uses graph theory metrics, such as degree centrality and betweenness centrality, to identify critical nodes within transport, energy, and water networks. Additionally, it employs probabilistic methods and failure propagation analysis to simulate cascading effects, providing a comprehensive understanding of systemic risks. These insights inform strategies to strengthen infrastructure resilience, ensuring continuity of essential services during extreme events.

To bridge the gap between science and practice, our approach emphasises stakeholder engagement and co-creation. Collaborating closely with the City of Stockholm and other regional stakeholders, the project develops adaptive roadmaps tailored to local needs and conditions. These roadmaps address technical, social, financial, and regulatory mechanisms for disaster risk management, ensuring practical, sustainable, and context-specific solutions. By

integrating stakeholder input, our work fosters collaboration between academia, industry, and the public sector, ensuring that its outcomes are both impactful and widely applicable.

O2.4 - Pastoral Livelihoods and Adaptive Strategies under Climate Stress in Semi-Arid Regions

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Pastoral lifestyles, which are based on small livestock farming, are becoming increasingly vulnerable to the effects of climate change, especially in the arid and semiarid regions of the Mediterranean basin. Climatic stress factors, including extreme temperature increases, prolonged drought periods, reductions in grazing areas, and depletion of water resources, pose a threat to these livelihoods from both economic and social perspectives. Despite the notable adaptability of pastoral systems rooted in traditional knowledge to environmental variability, contemporary climate pressures are effectively testing the limits of this capacity. The present study discloses the adaptation strategies that have been developed by pastoral communities in order to combat climate change. Furthermore, it evaluates the feasibility of these strategies from social, economic, and ecological perspectives. The responses of shepherds to climate change were analysed through field observations and in-depth interviews conducted in Eastern Anatolia and similar semiarid regions. The findings indicate various adaptation practices, including changes in herd structures, rearrangement of grazing schedules, preference for climate-resistant native breeds, and collective pasture management. Nevertheless, the sustainability of these strategies is constrained by structural challenges, including a paucity of infrastructure, market dependency, inadequate support policies, and gaps in intergenerational knowledge transfer. In this context, the adaptation of pastoralist communities to climate change should be addressed from perspectives other than environmental, but also social justice and governance. The present study directly aligns with the theme of the FutureMed meeting, entitled "Pathways to Just and Sustainable Adaptation", and highlights the role of supporting adaptation strategies based on local knowledge in strengthening climate resilience within pastoral systems. It is recommended that efforts be made to enhance the sustainability of pastoral livelihoods. Such enhancement may be achieved through participatory planning, the recognition of local knowledge systems, and inclusive policy-making.

O2.5 - Climate Adaptation tools under scrutiny: risks to just and sustainable adaptation in the Mediterranean

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Climate change adaptation (CCA) tools are increasingly used for risk assessment, adaptation planning, implementation and monitoring, across sectors and at different levels of governance. However, an analysis of more than 120 CCA tools revealed gaps and issues that raise concerns about their implication for just and sustainable adaptation across Mediterranean region. Some of these gaps include the way in which user groups are targeted, the spatial and sectoral focus of the tools, and their regional coverage, especially with regard to Southern Mediterranean countries.

The analysis shows that most tools are designed for institutional and technical users such as policy makers, local governments and private sector professionals. While this reflects the importance of decision-makers in adaptation processes, it leaves other groups such as educators and NGOs unconsidered. This limited targeting creates a gap in accessibility: many tools require a high level of prior knowledge or technical expertise to interpret and apply, which restricts their use to those with specific skills or resources. This can be particularly problematic in the Mediterranean region, where local knowledge, public awareness and education are key to long-term resilience and where many adaptation measures have to be implemented at the community level.

Most tools are geared towards political-administrative boundaries. Very few take into account physical geographies such as ecosystems or watersheds, which are essential for understanding biophysical processes and related climate impacts and develop appropriate responses in cross-boundary environmental systems in the Mediterranean region. Similarly, only a limited number of tools provide fine-scale results or the high temporal resolution required at the local scale for operational

decisions such as early warning systems, short-term planning in agriculture or water resource management during extreme weather events.

In the inventory, the Mediterranean region itself is only represented to a limited extent. Only 12% of tools have been developed specifically for this region, although many global or European-focused tools include the Mediterranean in their geographical coverage. Most tools with a Mediterranean focus target northern countries, which risks reinforcing existing regional inequalities and overlooking the specific socio-economic and environmental challenges of the South. More targeted tool development and better evaluation of existing tools is needed. In particular, there is a need for adaptation tools that are tailored to the Mediterranean context and that reflect its diversity, complexity and high climate vulnerability.

Ultimately, without a common framework establishing the tools' main characteristics and standards, current CCA tools risk falling short in achieving climate adaptation across the Mediterranean. In some cases, current tools may promote inappropriate strategies, exclude key stakeholders, and in turn, enable maladaptation. Ensuring tools are inclusive, sustainable, and responsive to local needs is therefore essential to avoid these pitfalls and support sustainable and just adaptation.

O2.6 - Beyond the technology fix: what humanitarian and development practitioners are learning about climate adaptation in the MENA region

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As climate pressures intensify, the MENA region faces compounding challenges driven by extreme water scarcity, escalating climate impacts, and deep-rooted fragility. In response, humanitarian and development organizations like Mercy Corps have been promoting innovative technologies—such as solar-powered drip irrigation—to improve water-use efficiency and strengthen climate resilience. While these technologies offer clear benefits, they also expose critical risks. Without inclusive governance and long-term planning, similar adaptation efforts can become maladaptive—undermining the very resilience they aim to build.

Drawing on Mercy Corps' experiences in Jordan, Syria, and Iraq, this presentation explores how scaling such solutions in the absence of strong regulatory frameworks and equitable access can worsen water depletion, widen social inequalities, and lead to unjust, unsustainable forms of adaptation.

As humanitarian and development funding declines, private sector investment is rising—often without adequate oversight—further increasing the risk of inequitable and ecologically harmful water use. This shifting landscape demands a renewed focus on safeguarding adaptation outcomes. We argue that true resilience requires not just adaptation, but transformation: reorienting systems toward just transitions by empowering local institutions, embedding participatory water governance, and ensuring climate solutions are both socially inclusive and environmentally sustainable.

O2.7 - Migrant Farmwork in a Changing Climate: Problematising mal/adaptation at the nexus of precarity and migration

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This research explores the climate vulnerability of migrant farmworkers, considering their high socio-economic vulnerability within the climate-sensitive commercial agriculture of the Mediterranean Basin, through a case study of Turkey. Turkish is experiencing climate extremes inincreased frequency and erratic climate conditions, that adversely affect agricultural production. These include extreme heat, draught, irregular precipitation and frosts. In Turkey, similar to other Mediterranean states such as Greece, Italy and Spain, agricultural workforce is composed of seasonal and migrant workers. A vast majority of the workers belong to Kurdish and Arab ethnic groups in Turkey, including internally displaced people (IDPs) and Syrians. Utilizing a critical political economy approach and synthesizing a decade of qualitative data, we move beyond hazard-based frameworks to focus on the impacts of extremes and adaptation strategies. We demonstrate that migrant farmworkers experience climate change on three levels: direct impacts of exposure to hazards, socioeconomic impacts on livelihoods and social vulnerabilities, and systemic impacts showing interconnected effects of multiple climate events on multi-local livelihoods of the workers. To this end, we introduce the concept of agri-labour mobility systems, which operate through ad hoc system of routes shaped by labor demands at specific points in production cycles and the minimum income thresholds required to offset the costs of migration. This framework allows us to problematize migration as an adaptation strategy to climate change and analytically connect climate-induced mobility and immobility through the analysis of internal differentiation within farmworker households in interaction with. Finally we assert that experiences with climate change for multilocal rural livelihoods can only be understood by looking at the migration routes, multiple commodities and locations and the continuity of the experiences with the climate irregularities rather than a single instance of exposure, loss and damage. This article is an output of a larger research project entitled ‘Unravelling Climate Change Impacts on Migrant Farmlabour in Global Food Production’ funded by Swedish Research Council for Sustainable Development, led by Dr. Sinem Kavak.

O2.8 - Combating Energy Poverty with Heating System Transition in Edirne: A Just and Sustainable Adaptation?

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Energy poverty, the inability to a2ord or access adequate, reliable, and clean energy for basic needs such as heating, cooling, lighting, and cooking, is not merely an infrastructural deficiency but a fundamental issue of social justice. Many of the households struggling with energy poverty face broader structural inequalities, such as income disparity, substandard housing, and exclusion from basic services. While necessary, the energy transition to renewable energy sources to meet the Net Zero target carries a risk of deepening inequalities if not carefully designed. Against this background, this paper investigates the justice and sustainability aspects of Edirne (Türkiye) pilot of the EU's Horizon 2020-funded "Wellbased: Improving health, wellbeing and equality by evidence-based urban policies for tackling energy poverty" project. In a randomized controlled trial setting, Wellbased project evaluated the e2ects of various interventions aimed at addressing energy poverty. The Edirne pilot of the project was implemented in the neighborhoods with a high density of Roma population, and the intervention involved energy audits, energy e2iciency training, home insulations and—most critically—an upgrade from traditional, room-heating stoves to energy-e2icient heating systems capable of warming all rooms via radiators. Except for one household, the energy source was retained. The study measured both physical health and well-being indicators, revealing statistically significant improvements in blood oxygen levels and blood pressure. However, well-being outcomes were more complex. In in-depth interviews, many households reported positive e2ects such as improved thermal comfort, healthier children, and a stronger sense of home. However, in an environment where energy prices were rising, increased energy consumption due to heating the whole home put additional financial strain on some households. This outcome highlights the unintended consequences of adaptation interventions in energy, especially when markets are unstable. Drawing on quantitative and qualitative data collected during the project, the paper critically assesses the intervention as a case of both e2ective and contested adaptation. It argues that infrastructural upgrades may not be enough to address energy poverty unless it is taken from a broader policy framework stabilizing energy costs and empowering low-income populations. This case contributes to wider debates on just and sustainable adaptation in the Mediterranean context, through its focus on an underrepresented region and a vulnerable group. It also demonstrated the

importance of designing adaptable interventions that consider economic volatility and are grounded in community participation.

O2.9 - Adaptation strategies to heat waves: Assessing the economic impacts on agricultural labour

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The intensification of extreme heat events points to increasing risks for outdoor workers. This is particularly relevant in Mediterranean countries where heatwaves are progressively more frequent. The economic impacts of heatwaves, including costs for healthcare and social security, are significant for society. For instance, more than 4,000 work-related injuries per year have been linked to heat events in Italy. In addition to social costs, sectors characterized by outdoor activities are vulnerable to costs linked to reduced worker productivity that can occur when individuals are exposed to high temperatures in working environments. Thus in recent years, regulations have been introduced in several Italian regions, and a heatwave alert system has been developed to reduce risks for workers and improve working conditions. In many agricultural systems, complying with such regulations requires the adoption of adaptation measures to reduce interference with field operations. Knowledge of the practical implications and cost-eUiciency of these measures is crucial to support policies and inform the risk management plans of companies, but empirical data is currently limited, and evidence is mainly based on modelled estimations. In this contribution, we present an evaluation of perceptions and costs of diUerent adaptation measures that can be implemented at the farm level to reduce the negative impacts of heat waves on work productivity. The work was carried out on nine farms in Emilia-Romagna (NE, Italy). Through exploratory interviews and closed-ended questionnaires, we identified with the land managers the challenges related to heatwaves and provided a cost estimation for diUerent adaptation measures. The Analytic Hierarchy Process (AHP) was employed for the assessment of the eUectiveness of diUerent adaptation measures based on three criteria: acceptability by workers, flexibility and timeliness of adoption. Results show that, according to the land managers, up to 30% productivity reduction can aUect workers during heatwaves and that the most eUective adaptation measure is the anticipation of working hours. Based on the information collected, we provide an estimation of costs related to the adoption of the diUerent adaptation measures and highlight the relevance of structured thermal risk assessment plans to safeguard workers' productivity and health. We conclude by proposing recommendations for sustainable adaptation policies.

O2.10 - Evaluation of adaptation actions for tourism sector in the mediterranean region of Turkiye

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Weather conditions and climate characteristics affect overall human physical, social and economic activities including tourism sector. Since the tourism and leisure activities are performed mainly outdoor, they are among the most influenced and hindered activities by weather and climate conditions to the aspects of thermal, visual and physical suitability as considered in the tourism climate indices. Within this context, climate impacts create hazards, increase vulnerabilities and cause risks for all the components of tourism value chain. As the size of climate impacts enlarges, the risks like the decrease in tourist satisfaction and number, the loss of tourism receipts and employment can be seen for tourism sector. Therefore, adaptation measures should be determined through tourism climate adaptation action plans which adopt sustainable and responsible tourism behaviours and principles. This study evaluates the tourism climate adaptation strategies and actions prepared for a famous summer tourism destination, Muğla province covering Bodrum, Marmaris and Fethiye, which are among the districts attracting the largest tourist number in Mediterranean Region of Türkiye in the scope of a EU supported project benefited by Turkish Ministry of Environment Urbanism and Climate Change and implemented by UNDP. In the tourism climate adaptation action plan prepared for Muğla Province, as one of four pilot cities, totally 8 main actions were developed based on the methodologies defined by AR 5 and 6 with the participation of local and central tourism stakeholders. These actions try to include local human resources, social capital, accessibility to destination and municipal and basic services and tourism businesses and facilities by considering the climate hazards e.g. heatwaves, extreme weather events and drought and wild fires. The actions mainly involve the development of social and physical adaptive capacity in the destination.

ORAL PRESENTATIONS (Session 3)

O3.1 - Municipal Risk Reduction Plans as Strategies for Climate and Territorial Justice: Lessons from Ilhéus, Brazil

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This paper draws on empirical analysis of the Municipal Risk Reduction Plan (PMRR) implemented in Ilhéus, in southern Bahia, to discuss the challenges and possibilities of building sustainable futures through a territorially grounded and socially just lens. The PMRR is a key municipal planning instrument for risk reduction and management, first implemented by the Ministry of Cities in 2003. In 2023, the initiative was reintroduced in 20 municipalities in Brazil, in partnership with universities, to ensure the application of a scientific and technical background. Based on fieldwork conducted between 2024 and 2025 in peripheral communities aUected by the 2021 floods, the research adopts an ethnographic and participatory approach, centred on dialogue with residents of high-risk areas, local leaders, technical staU, and public oUicials. This work discusses the importance of engaging communities in initiatives to develop solutions for urban areas that mitigate and prevent disasters. The Municipal Risk Reduction Plan (PMRR) introduces the principles of social justice through the concept of the right to the city, with a focus on vulnerable areas. The main goal is to reduce sociospatial inequalities. Besides improving urban infrastructure, the activities are designed to enhance essential public services and provide opportunities for safe spaces for leisure and cultural activities. The adaptation of tasks is carried out through a participatory process, in which the community's voice is actively heard and incorporated to guide the next steps in the plan’s implementation. The institutional arrangements developed throughout the process contribute to the consolidation and contextualisation of the project, aiming to integrate territorial specificities, citizen participation, and key public actors in creating environments capable of safeguarding the lives of their residents.

O3.2 - Institutionalizing Climate Action in Top Turkish Universities: A Comparative Document Analysis through the Lens of Institutional Theory

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Universities play a critical role in advancing climate action by embedding sustainability into their institutional structures, curricula, and outreach activities. This study examines how three leading Turkish universities—Boğaziçi University, Middle East Technical University (ODTÜ), and Istanbul Technical University (İTÜ)—positioned within the Mediterranean region —develop their institutional capacity for climate action by analyzing their sustainability reports and related public documents. Using institutional theory as a conceptual framework, the research focuses on the regulative, normative, and mimetic dimensions to understand how external pressures, shared values, and imitation shape the formalization and communication of climate initiatives. Content analysis of sustainability reports, strategic plans, and oLicial climaterelated publications from these universities will be conducted. The study seeks evidence of compliance with national and international climate policies (regulative), alignment with professional and social norms around sustainability (normative), and the adoption of best practices inspired by peer institutions (mimetic). By interpreting these documents as institutional artifacts, the research aims to reveal how climate action becomes institutionalized in higher education in Türkiye. The findings will provide insight into the mechanisms that support or hinder the integration of climate priorities within university settings and oLer recommendations for strengthening institutional capacity. This research contributes to understanding the role of universities in climate resilience and supports regional eLorts to align education with sustainability goals.

O3.3 - University Students as Climate Stakeholders: Insights on Local Policy Participation in Türkiye

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This study aims to explore how university students in Türkiye perceive and engage with local climate governance processes. The views of young people are still not fully represented in local adaptation initiatives, and this is concerning given that climate change presents significant challenges for Mediterranean nations. The research will explore how students make sense of climate risks, their experiences with local institutions, and the kinds of suggestions they o>er for making climate decision-making more inclusive.

The study will use a qualitative approach and include one-on-one, semi-structured interviews with students from different universities of Türkiye. The interviews will focus on students' awareness of local climate problems, their opinions on the measures taken by local authorities, and the factors that shape or limit their participation in these processes. The collected data will be analyzed using content analysis with the help of MAXQDA software.

To understand how young people can become more active in creating equitable and effective climate action, the study draws on the concepts of participatory governance and climate justice. The expected results are to obtain useful insights into how local organizations can plan for climate change adaptation in a more transparent, coherent, and inclusive way, especially by taking into account the perspectives and contributions of young people.

O3.4 - Assessing Farm Resilience to Climate Change: Insights from Field-Based Analysis

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limate change and the agricultural sector share a complex, two-way relationship. Agricultural practices contribute to the crisis yet also hold significant potential for its mitigation and adaptation. Therefore, developing resilience capacities for climate change is vital for ensuring the agricultural sector's sustainability and improving the quality of life and prospects for agricultural workers. This process demands a thorough understanding of climate change, a clear grasp of emerging challenges, and the implementation of proactive adaptation strategies. Considering that smallholder farmers, cultivating less than two hectares, produce roughly 35% of the world's food and account for about 84% of all global farms, their ability to withstand climate change becomes critically important. This study aims to craft a detailed roadmap for enhancing the climate change resilience of family farmers and small-scale producers in Eskişehir Province, Türkiye. To achieve this, primary data will be gathered through structured surveys targeting small scale farmer groups and key stakeholders. The survey instrument has been designed to capture three key dimensions of resilience: Robustness, adaptability, and transformability with a strong focus on climate change impacts. Using multivariate regression analysis refined through field survey data, this study aims to generate evidence-based insights to inform both policy and practice. The study will contribute to academic understanding and inform policy-oriented research across climate change, agricultural economics, food security, and sustainable rural development.

O3.5 - Perceptions and Adaptation Strategies to Climate Change among Apple Producers in the West Mediterranean Region of Türkiye

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This study aims to examine the knowledge levels, future concerns, and decision-making processes of apple producers in the Western Mediterranean Region of Türkiye, with respect to climate change. The study has conducted in in Eğirdir, a district of Isparta province located in the Western Mediterranean Region because Isparta ranks first in apple production in the country, accounting for approximately 25% and Eğirdir is one of the key apple-producing districts within the province. In the study area, apple production constitutes a major source of income not only for farmers but also for seasonal labourers employed during the harvest period. The data for this research collected through face-to-face surveys conducted with 57 farmers, selected using the Neyman sampling method. The questionnaire covers farmers' socio-economic and demographic characteristics, their use of environmentally friendly production systems, sources and levels of information regarding climate change, their perceptions, concerns about the future, and planned responses to future climate risks. In addition to descriptive statistics, a binary logistic regression model will be employed to identify the factors influencing farmers' adaptation to climate change. The study will determine the proportion of farmers who have adopted adaptive strategies as well as the positive and negative factors that influence these adaptations. Based on the findings, impacts of climate change will be discussed from the producers' perspective and policy and practical recommendations will be developed for both apple producers and policymakers to enhance resilience and promote sustainable agricultural practices in the region.

O3.6 - The Land Use-Climate Change-Biodiversity Nexus in European Islands Stakeholders

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Environmental change, particularly climate and land use changes, has significant impacts on biodiversity, economy, and society. To promote climate adaptation and mitigation strategies, it is crucial to understand the perspectives and knowledge gaps of stakeholders involved in functions affected by or addressing land use and climate change. A large number of stakeholders across 21 European islands were consulted regarding their views on climate change and land use change risks affecting ecosystem services on their island. Climate and land use change impacts were analysed with machine learning to quantify their importance. Climate change is more perceived by warmer temperatures, and land use change by deforestation. Water scarcity and water-related risks are top priorities for stakeholders, and addressing these issues is crucial for a sustainable future. Energyrelated risks, such as energy deficiency but also wind and solar energy facilities problems, rank high as combined climate change and land use change risks. Stakeholders generally perceive climate change impacts on ecosystem services as negative, with natural habitat destruction and biodiversity loss identified as the top risks. Land use change impacts are also negative but also more complex to explain, with a higher number of explanatory variables associated with the impact outcome. Stakeholders have sufficiently common perceptions regarding climate change and land use change impacts on biodiversity despite the geographic disparity. Stakeholders differentiate between factors related to climate change impacts and land use changes.

O3.7 - Co-Mapping Vulnerability to Climate Gentrification in the Context of Urban Heat: A Participatory Index at the Metropolitan Scale

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Climate adaptation strategies in cities increasingly risk reinforcing housing inequalities through climate gentrification, that is, the displacement of vulnerable residents driven by both climate impacts and adaptation measures that raise the desirability and cost of resilient, cooler neighborhoods, attracting wealthier residents and real estate investment. While existing research has focused on retrospective patterns of climate gentrification, there remains a need for predictive, participatory tools that inform equitable planning.

This study develops a vulnerability index to climate gentrification focused on heat at the metropolitan scale using a participatory mixed-methods approach. The index, grounded in the exposure–sensitivity–adaptive capacity framework, integrates spatial indicators with expert knowledge from municipal technicians and grassroots organizations in the Barcelona metropolitan area. A composite spatial index was created using both equal and expert-derived weights and applied to 2051 census tracts. Findings reveal spatial disparities in vulnerability to climate gentrification across the metropolitan region, with high vulnerability concentrated in peripheral municipalities combining high exposure, social sensitivity, and low adaptive capacity. Expert weighting surfaced divergent perspectives between administrative

practitioners—who emphasized infrastructural solutions—and community groups—who highlighted structural inequality and displacement risks.

This study offers a novel methodological tool for anticipating displacement linked to climate and urban heat adaptation and demonstrates the value of participatory mapping in vulnerability assessments. It underscores the importance of embedding housing justice into climate planning, especially at the metropolitan scale, and calls for cross-sector collaboration to ensure that adaptation policies protect, rather than displace, historically marginalized populations.

O3.8 - Participatory Sensory Methods for Inclusive Climate Decision-Making

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This contribution explores the potential of participatory sensory methodologies as instruments for inclusive engagement in climate and biodiversity governance. Drawing on ethnographic fieldwork conducted in both the Arctic and the Western Carpathians, it demonstrates how sensory knowledge, such as olfactory, auditory, and tactile experiences, can be co-produced and meaningfully shared among diverse actors, including local communities, conservationists, and researchers. In contrast to dominant, data-driven or survey- and focus group-based models of environmental decision-making, sensory methods foreground the embodied, affective, and place-based ways in which communities relate to their more-than-human environments.

The research intervenes in current debates on inclusive resilience by showing how sensory practices enable forms of participation that transcend linguistic, educational, and digital divides. The approach generates situated climate knowledge that reflects seasonal rhythms, ecological disturbances, and interspecies entanglements by involving local actors in tasks such as multispecies transect walks, smell mapping, and sensory storytelling. Often inaccessible through conventional quantitative tools, these insights offer a richer, more grounded understanding of ecosystem change and human–nonhuman co-dependence.

Moreover, the participatory design of these methods allows community members to reflect upon and articulate their values, memories, and concerns regarding ecological transformation. This concreative process does not merely document perceptions but actively shapes the terms of engagement, fostering mutual recognition and potentially recalibrating the epistemic authority within climate governance frameworks.

The paper argues that participatory sensory methods can enhance procedural and epistemic justice in environmental decision-making. By recognising alternative modes of knowing and being in the world, such approaches contribute to more pluralistic and responsive forms of resilience. The findings are relevant for researchers, policymakers, and practitioners seeking to bridge experiential knowledge with institutional frameworks for climate adaptation and biodiversity protection.

O3.9 - Integrated Forecasting and Warning System for Hydro-Meteorological Risk in Abruzzo Region: A Tool for Climate Resilience

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The increasing frequency and intensity of extreme hydro-meteorological events in the Mediterranean area, are a clear signal of ongoing climate change. In this context, the Civil Protection Agency of the Abruzzo Region has developed a structured system for forecasting, prevention, and early warning, integrating meteorological, hydrological, and hydrogeological monitoring into a comprehensive platform: Allarmeteo (https://allarmeteo.regione.abruzzo.it). This system represents a practical example of transdisciplinary application of climate science for societal safety.

The forecasting phase involves continuous data acquisition from a regional meteorological and hydrometric network, combined with numerical weather prediction models and threshold-based alert indicators. These inputs feed into daily bulletins and automatic alert generation tools. The prevention phase relies on preparedness actions coordinated with local municipalities, including seasonal risk assessments and activation of civil protection protocols. The warning phase is executed via Allarmeteo, which provides real-time updates, color-coded alert maps, and automated notification systems to both institutional users and the general public.

Local authorities and population are informed through multiple communication channels: SMS alerts, email, push notifications, as well as integration with municipal emergency management tools. Before and during events, the Civil Protection Agency maintains constant coordination with mayors and emergency operators to ensure rapid response and localized risk mitigation.

Besides its operational role, Allarmeteo is a valuable tool for research and climate analysis. The system collects and archives impact data linked to meteorological events, enabling post-event evaluation and contributing to the identification of patterns in climate extremes. In this way, the platform not only reduces risk, but also acts as an indicator for studying the evolving behavior of extreme events in the context of climate change. This contribution highlights how structured regional systems, when embedded in a multilevel governance framework, can bridge climate science and societal impact, improving both emergency management and long-term resilience.

O3.10 - Implementing Environmental Sustainability in Malta's Main Tertiary Hospital

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Sustainability is a key challenge for healthcare organisations worldwide. This study is a reflective exploration of sustainability and corporate social responsibility within the context of a public tertiary hospital in Malta. Operating under the Health Department and fully government-funded, the organisation has made strides in healthcare delivery but remains at the early stages of implementing sustainability principles. With healthcare contributing significantly to environmental degradation, embedding sustainability into its core operations is increasingly urgent. This study highlights the integration of the Triple Bottom Line (TBL) framework—economic, environmental, and social dimensions—as a foundation for organisational transformation, guided by values-based leadership and experiential learning.

This observational study critically assesses personal insights, organisational dynamics, and academic literature to examine how sustainability can be promoted within the healthcare sector. Moreover, barriers to sustainability leadership are discussed, including short-term financial pressures, organizational inertia, and limited stakeholder engagement. It focuses on waste management, resource efficiency, and improving stakeholder involvement, while identifying leadership strategies to catalyse cultural change. By applying theoretical frameworks such as Kolb's experiential learning cycle and complexity theory, the study explores pathways for initiating sustainable practices in this healthcare organisation.

Through reflective analysis, the study finds that effective sustainability implementation in healthcare is hindered by linear thinking, lack of awareness, and limited practical application of existing policies. The analysis reveals that effective sustainable leadership is characterized by a long-term vision, stakeholder inclusiveness, and systems thinking. Transformational leadership is instrumental in promoting sustainability by inspiring employees, fostering innovation, and encouraging proactive environmental and social governance. The role of values—such as accountability, transparency, and empathy—is underscored as a fundamental driver of sustainable decision-making. Experiential learning, particularly Kolb's cycle, has enabled a deeper understanding of how personal values—like curiosity, self-direction, and universalism—can be harnessed to promote environmental stewardship. The use of sense-making as a strategic tool allows for navigating the complex and often ambiguous landscape of climate change engagement. Applying the TBL model in practical terms, such as improving waste management through the EU Waste Hierarchy and digital transformation via e-health records, can serve as actionable starting points. These

interventions are framed not only as cost-saving strategies but as initiatives that enhance patient care and institutional accountability.

Fostering sustainability in healthcare requires more than compliance—it demands a reorientation of organisational values, systems innovation, and the empowerment of individuals to act as change agents. By leveraging experiential learning and values-driven leadership, healthcare institutions can embed sustainability into their operations and culture. The convergence of medical practice and sustainability is essential for the wellbeing of people and planet, affirming the urgency to act now for a resilient and responsible healthcare future.

ORAL PRESENTATIONS (Session 4)

O4.1 - Socio-Economic Benefits Analysis: a WMO AG-SEB perspective

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A key aspect of the Socioeconomic analysis of Early Warning Systems (EWS) is its alignment with concepts from decision sciences and probability theory that highlight the economic value of information-based systems. These systems provide end-users with precise, timely, and relevant information, enabling them to make better decisions for managing weather, climate, and water. In this context, the socio-economic impacts on the value chain (VC) pertain to the outcome of improving climate resiliency. This comprehensive approach ensures that the generated information can be effectively utilized in decision-making processes, thereby improving societal outcomes (WMO, World Bank, GFDRR, and USAID, 2015). Improving climate services and measuring their benefits is crucial to bridge the gap between data generation and its practical application to improve preparedness and resilience.

O4.2 - Strategic-business adaptation: A Firm's perception on climate risk management

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While climate change has been studied extensively at national and household levels, less attention has been paid to how individual firms perceive local climate risks and what actions they take in response. To address this, data from Spain's Business Activity Survey (EBAE), which began including a Climate Module in late 2021, provides valuable insight. This module includes questions on firms' expectations of climate change impacts, the timeline of those impacts, awareness of climate risks, adaptation measures taken, and perspectives on public climate policies.

By examining this data across different sectors and regions, patterns begin to emerge. Firms in areas experiencing more frequent or severe climate events often report a higher awareness of climate risks. Businesses in agriculture, tourism, and other environmentally exposed sectors tend to anticipate more direct consequences and are more likely to consider or adopt adaptive practices. Geographic location plays a major role: firms in drought-prone or flood-prone regions report different levels of concern and preparedness than those in less affected areas.

O4.3 - Measuring stakeholders' acceptability of climate policies: A spatial econometric perspective

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When analyzing the acceptability of climate policies by stakeholders, it is important to recognize that such perceptions do not emerge in isolation but are influenced by what happens in neighboring regions. The spatial distribution of acceptability indicators already suggests possible correlations, with clusters of high or low values across close areas. Ignoring these patterns may seriously affect the robustness of estimated relationships. Spatial econometrics provides a rigorous framework to detect and account for spatial dependence, enabling a complementary analysis that considers both the individual level of acceptability and its diffusion across space. This leads to more reliable insights into how climate policy preferences spread and consolidate regionally.

POSTER PRESENTATIONS (Session 1)

P1.1 - High-Resolution Characterization of Compound and Sequential Extreme Events in a Mediterranean Climate Change Hotspot

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Extreme climate hazards can occur in isolation or interact as concurrent or compound events, amplifying their impacts on key socioeconomic sectors such as agriculture, tourism and health. In the Mediterranean basin, these interactions pose significant risks over its densely populated regions which are highly vulnerable to the combined occurrence of climate hazards. Hence, the study of this aggravating issue in the context of global warming emphasizing the analysis of concurrent, compound and sequential climate extreme events in this basin is crucial to better comprehend their relationships and to improve early warning systems and adaptive strategies in emerging Mediterranean climate hotspots. In this study daily high-resolution datasets from different sources, e.g. ROCIO-IBEB, EMO-1, CERRA, EFFIS, ICV, ERA-5 and MED-REP-L4, have been used to identify atmospheric and marine heatwaves, droughts, wildfires and extreme precipitation events in the Mediterranean basin, as well as to detect emerging hotspots. Our findings over specific Mediterranean climate change hotspots such as the Valencia Region in eastern Spain, recently affected by devasting floods in autumn 2024, reveal a rising frequency of concurrent hazards for the period 1979-2021, with droughts emerging as a key driver of both summer wildfires and extreme autumn precipitation. Besides, our results also indicate an increasing influence of Mediterranean Sea warming on both maximum 2-meter air temperature over land and extreme autumn precipitation highlighting the relevance of the well-documented Mediterranean SST increase on climate extremes. Besides, relationships among key climate variables are studied using different methodologies, such as lagged correlations and normalized information flows, to estimate climate factors influences on climate extremes.

These results provide a solid foundation for extending the analysis to the Mediterranean basin with a special focus on other emerging hotspots detected, for instance, in the northern Italian, southern French coastal regions and the northeast Adriatic sea coastal regions, according to preliminary results. The present study seeks to determine whether areas susceptible to dry hazards are concomitantly

exposed to forest fires and floods, as well as to ascertain whether these areas are located in proximity to marine heatwaves in order to identify concurrent and compound hazard patterns. Furthermore, an ongoing analysis of flooding risk will provide additional information on a local scale, which is crucial for identifying interactions among climate hazards, and for evaluating potential risks and vulnerability over these areas

P1.2 - Exploring Shifts in Extreme Precipitation and Synoptic Forces Across the Iberian Peninsula: A Regionalized Perspective

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The Iberian Peninsula is considered a climate change hotspot presenting substantial changes in precipitation such as generalized increasing number of dry days and mean intensification that induce important impacts over main socioeconomic sectors such as agriculture, tourism, health and energy. However, changes in the characteristics of extreme precipitation events (EPEs) present a marked local-to-regional component associated with the complex topography and the different synoptic conditions leading to EPEs over particular subregions. These changes further difficult an accurate assessment of climate change impacts and an efficient adaptation. Therefore, it is key to identify variations in atmospheric dynamics as main drivers of the changes in EPEs characteristics on subregional scales to better determine the areas subject to specific changes and facilitate decision makers in providing effective mitigation and adaptation strategies. To this end, this study first analyses climatological changes in the characteristics of EPEs over different subregions identified using a precipitation regionalization approach with a high resolution (~5 km) gridded dataset covering the period 1951-2020. Besides, the specific synoptic conditions yielding EPEs over each subregion are analysed using an objective methodology with ERA5 data, and changes in the synoptic conditions, as well as in the integrated water vapor (IWV) column, are evaluated. The precipitation regionalization yielded the identification of 8 subregions in the Iberian Peninsula presenting a generalized mean intensification of EPEs for the study period. However, the intensification is more marked for most extreme events in the Mediterranean subregions, especially for the southern subregion of Segura with a relative increase in EPEs intensity of 0.7 % per year. Besides, our findings highlight generalized increasing geopotential trends at 500 hPa in Atlantic subregions associated with a northward displacement or a weakening of atmospheric perturbations yielding a decrease in 500-hPa vorticity of about 1 % over these subregions. Instead, a marked climate variability of atmospheric perturbations leading to EPEs together with non-significant changes in their intensity is observed in Mediterranean subregions in contrast with the intensification of the surrounding stability conditions, i.e. increasing 500-hPa geopotential, over southernmost subregions. Similarly, IWV shows no variation in Mediterranean regions whilst a generalized increase occurs over Atlantic regions,

especially along the areas with high IWV and low climate variability denoting well-defined moisture advection from the North Atlantic Ocean.

P1.3 - Multi-scale assessment of the extreme heat intensification under climate change and its impacts on health in the Mediterranean region

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The Mediterranean region is a hotspot of climate change, where over the last decades, extreme heat events have become more frequent and intense. The record-breaking temperatures observed in the summers of 2022 and 2023 in the Mediterranean region highlight the need for an effective implementation of adaptation strategies to protect the population from extreme heat.

Here we present a multiscale study that analyses the recent increase in heatwaves (HWs) in the Mediterranean region and the local extreme heat impacts in Spain, in the western region of the Mediterranean Sea, which is particularly affected by heat-related mortality.

Initially, we identified the most affected areas by HW over the last decades. Our results suggest that, generally, the largest changes in the HW intensity have occurred in the upper tail of the distribution, indicating a greater intensification of the most extreme events rather than a uniform increase.

In a second phase, we investigated the influence of the HW characteristics on the heat-related mortality in 12 Spanish capital cities. We applied a quasi-Poisson regression model and distributed lag linear and nonlinear models on a time series in each city. We found that there were no general patterns in the HW characteristics-mortality relationship. The most intense HWs are not always associated with the highest mortality risks. We found that the city of Valencia, on the Mediterranean coast, is the most affected of the studied cities.

Then we evaluated how representative the extreme heat-mortality of the province capitals in the Valencian Region –Valencia, Alicante, and Castellón –is for other subdivisions of the respective provinces. We used a two-stage time series approach to derive a model for the Valencian Region. We estimated, for the first time in the Valencian Region, the extreme heat mortality on a small scale, which revealed the most affected areas, that had not been identified before. This assessment is particularly relevant to evaluate the performance of the heat adaptation plans that are implemented in the region. Furthermore, this methodology could be extended to other regions.

Our results highlight the need for considering the local characteristics –not only the intensity –of extreme heat events and their local impacts in the design of adaptation strategies.

P1.4 - The role of atmospheric processes and climate change in the Valencia flooding of October 2025

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On 29 October 2024, catastrophic flooding caused significant loss of life and widespread damage in Valencia, raising urgent questions on the atmospheric processes leading to this extreme precipitation event and the role of climate change in shaping its severity. The extreme precipitation formed under the influence of Rossby wave breaking, leading to a quasi-stationary cutoff-low, remaining for 3 consecutive days over the region. The cyclonic circulation sustained intense atmospheric moisture transport from easterly directions over the Mediterranean Sea toward the east coast of Spain. Using a pseudo-global warming experiment, we investigate how climate change influenced this extreme event and how such an event may look like in the future. To this end, we run high-resolution Weather and Research Forecasting (WRF) model simulations under past, present-day, and future climate conditions, and compare differences in extreme precipitation characteristics such as peak intensities, total amounts, and spatial distribution at the catchment scale. The findings of this work contribute to a better understanding of high-impact events in a changing climate affecting the Mediterranean, one of the world's major climate change hotspot regions.

P1.5 - Urban Heat Island assessment through the Discomfort Index: ground-based vs satellite-derived data

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The Urban Heat Island (UHI) effect increases heat exposure in cities, intensifying health risks during extreme heat events. Understanding how this phenomenon varies spatially and temporally is key to developing effective urban adaptation strategies. This study aims to compare two distinct approaches for assessing urban heat stress: (1) in-situ monitoring through a thermal sensor network that offers high temporal resolution data, and (2) satellite-based remote sensing that provides spatially continuous Land Surface Temperature (LST) and derived heat indices.

Since August 2024, a network of 17 sensors has been deployed across the city of Alzira, located in eastern Spain. These sensors record air temperature and relative humidity every 10 minutes, allowing for detailed temporal analysis of thermal conditions at specific urban locations. Most sensors are installed on lamp posts, following three main criteria: placement at approximately 3 meters above ground level, south-facing orientation, and positioning away from radiative surfaces such as walls, in order to reduce interference from localized heat sources. In parallel, satellite imagery from Landsat 8 and 9 missions has been used to estimate LST (spatial resolution 30 m) across the same area. Although satellite data lack temporal continuity, they allow for spatially comprehensive mapping of surface temperatures and identification of urban hotspots.

Preliminary results show a general spatial correspondence between in-situ air temperature data and satellite-derived LST, particularly in detecting the hottest areas of the city. However, differences arise due to the nature of each measurement: LST reflects surface heating, while in-situ sensors capture ambient air conditions. This comparison highlights the strengths of each method—sensor networks offer temporal precision and real-time monitoring, whereas remote sensing enables spatial overview and historical analysis. Together, these complementary approaches provide a more complete understanding of urban heat dynamics, supporting evidence-based policies for reducing heat exposure and enhancing urban resilience.

P1.6 - Thermal inversions: a trap for urban pollutants. A case study of winter-time air quality episodes in Murcia, Spain

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The metropolitan area of the city of Murcia is located in the topographic depression of the middle sector of the Segura River, constituting a wide flat valley with very persistent episodes of nighttime temperature inversions (NTI), especially in winter. The main objective of the study is to analyze the relationship between air pollution levels and the characteristics of nocturnal atmospheric stability processes in the city of Murcia. Furthermore, the research aims to determine the synoptic atmospheric configurations that give rise to the highest concentrations of pollutants.

Daily and hourly data on nitrous dioxide (NOx) and PM_{10} concentrations are used, obtained from stations operated by the Department of Water, Agriculture, Livestock, Fisheries and Environment of the Government of the Region of Murcia (2008-2024). For the atmospheric analysis, daily data are extracted from nighttime radiosounding (00 UTC) launched from the Territorial Meteorological Center (AEMET) in the city of Murcia (1986-2015). To quantify an inversion, several different measures are used, including height of the base (Z_{BASE}) and top (Z_{TOP}) levels of the inversion layer from Earth surface, temperature at the base (T_{BASE}) and top (T_{TOP}) levels of the inversion layer, temperature difference (DTINV) across the inversion layer and thickness of the inversion layer (DZ_{INV}), intensity of temperature inversion (I), the surface atmospheric pressure (PA), and the temperatures at the 850 and 500 hPa geopotentials (T850 and T500).

Nighttime temperature inversions (NTIs) are particularly persistent throughout the year in the city of Murcia, although particularly so in winter (87.1% in January). They are surface-based inversion (SBIs) type, with the inversion layer close to the surface on 95% of occasions. This significantly influences NOx concentrations (DJF), which are unfavorable to extremely unfavorable during 33.5% of the quarter. Meanwhile, PM10 concentrations are unfavorable to extremely unfavorable during 25.4%.

The results show strong statistical correlations (Spearman) between the characteristics of the inversion layers and atmospheric concentration levels (R_2 of -0.86 between NOx concentration vs. T_{BASE}, -0.85 between NOx vs. T850, or 0.81 between NOx vs. the inversion intensity (I). Furthermore, the most significant NOx episodes occur under a continental subtropical ridge in North Africa (Z500), with a N-S axis over Algeria. The mid-to-upper tropospheric wind flow is from the SSW

(significant positive anomaly). The largest PM_{10} episodes are generated by a continental subtropical ridge in North Africa (Algeria-Tunisia), with a NNW-SSW axis. The mid-level atmospheric wind flow is from the WSW (source area in the Sahara Desert).

P1.7 - Biomass burning impacts: Wildfires as air quality architects in the Mediterranean

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Rising frequency and intensity of wildfires in recent years, driven by elevated temperatures, dry and windy conditions, highlight the urgent need to evaluate their impacts. The Mediterranean region, particularly during spring and summer, is characterized by high temperatures (often exceeding 30oC) and persistent winds. These conditions have led to an increase in wildfire events over the past decade, with particularly intense outbreaks observed in July and August. The shift in climatological patterns provide indicators of future climate risks.

To evaluate the prominent impacts of wildfires, we investigated the dominant chemical mechanisms within fire plumes, as a function of the fuel type. Using field measurements, we examined the direct effects of wildfires on atmospheric composition and potential climate feedbacks. In addition, the Weather Research and Forecasting model coupled with Chemistry (WRF-Chem) was utilized, adjusted for future climatological scenarios, to explore the effect of future fire emissions on air quality across the Mediterranean region. Different chemical model schemes were evaluated to access the model's performance and sensitivity. The pollutant levels were predicted, focusing on key constituents of fire plumes, such as greenhouses gases, organic species and particulate matter. Combination of field measurements and regional modelling supports a comprehensive understanding of the chemical composition of fire plumes and their effect on future air quality. Our findings aim to provide an evaluation of wildfires driving chemical mechanisms and potential climatological impacts, enabling the implementation of necessary scientific and policy measures to address the increasing threat of wildfires in the Mediterranean region.

P1.8 - Impacts of wildfires on the global atmosphere: multi-year simulations using a range of emissions datasets

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Our study focuses on investigating the present-day influence of wildfires on the global atmosphere. To achieve this, we utilized four observational biomass burning (BB) emissions datasets for present-day simulations employing the TM5 Chemical Transport Model (CTM). To assess how different emissions estimates influence the model's ability to simulate the atmosphere, we compared the following datasets: GFED4s, GFASv1.2, FEERv1.0-G1.2 and QFEDv2.6r1, over the period 2003-2015. Our study aims to investigate the role of wildfires in affecting important trace gases and aerosols. Their impact on atmospheric composition and their interactions with solar radiation affect the radiative balance at the Earth's surface and, consequently, temperature trends in the troposphere.

P1.9 - The 2023 great wildfire of Evros and the study of its relationship to climate change

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The 2023 wildfire in the Evros region of northeastern Greece was the biggest ever recorded in the European Union. It brought up concerns about whether climate change might be linked to extreme wildfire events. This thesis looks at the weather conditions before and during the fire and explores if anthropogenic climate change could have affected them.

For this purpose, meteorological data from the ERA5 dataset provided by the Copernicus Climate Data Store were used for the period July to September from 1940 to 2024. We focused on temperature, humidity, wind speed, and rainfall — the main variables used in the Fire Weather Index (FWI). For each day in this period, we calculated minimum, maximum, average, 25th and 75th percentiles, and then compared these values with those during the 2023 fire. In the first days of the fire, temperature and wind speed were among the highest on record, while humidity was very low.

Then, we calculated the FWI for all years and looked at how it changed over time. To see if climate change played a role, we also used model data from ISIMIP3a. This included two different scenarios : one with the effect of climate change and one without. We calculated the FWI in both and compare the results. We also used normal distributions in both the ISIMIP data and the Copernicus data, in order to compare the trends.

We present preliminary results on how climate conditions have changed over time and if they may be related to extreme wildfire events such as the one in Evros.

P1.10 - Effect of wildfire emissions on cloud properties since the preindustrial times

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Wildfires have been more frequent and more intense since preindustrial times due to more favorable conditions for fire ignition, i.e. droughts and higher fuel availability (Jones et al., 2022). Emissions of wildfires add in the atmosphere aerosols that can serve as cloud condensation nuclei (CCN). Thus, wildfires can alter cloud properties as well as the Earth's radiative balance. On the other hand, aerosol - cloud interactions are one of the most uncertain mechanisms in atmospheric science, due to the high variability of aerosols and their properties (Heyn et al., 2017).

In our study we employed the Earth System Model EC-Earth (van Noije et al., 2021), to investigate the effect of wildfires emissions on cloud properties compared to preindustrial times.

Our results have shown, as expected, that cloud droplet number concentrations have increased in areas where wildfire aerosols have increased and vice versa. Nevertheless, higher concentration of cloud droplets does not imply an increase in cloud cover in all regions of the globe that experienced higher concentrations of wildfire aerosols. In fact, cloud cover exhibits a variable behavior around the globe with either increasing or decreasing values because of wildfire emissions changes. Specifically in the Mediterranean a decrease of cloud droplet number concentration due to wildfires is observed with a small increase in cloud cover percentage. This is probably an effect of local meteorology or cloud microphysics.

P1.11 - Comparison of Satellite and Ground-Based Estimates of Burned Area in Greece: Evaluating NASA

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Wildfires are among the most impactful natural disasters, severely impacting ecosystems, human communities, and economies. While fires contribute to certain natural processes for the regeneration and evolution of some ecosystems, the increasing frequency and intensity of wildfires are largely driven by human activities, climate change, and extreme weather events. In Greece, forest fires are a major threat to ecological balance, with human involvement identified as the leading cause. As a result, the need for effective wildfire monitoring and prevention is the most vital and urgent that it has ever been.

This study compares burned area estimates derived from NASA's MODIS MCD64A1 global product, with ground-based records from the Hellenic Fire Service over the period 2002-2023. Satellite products, like MODIS provide consistent global-scale data for understanding, managing and mitigating wildfires. By collecting, processing, and analyzing these datasets, this research examines the temporal evolution of wildfires, their spatial distribution, and their relation to land use.

The results of the comparison between 2021-2023, indicate an average absolute difference between MODIS and Fire Service data of approximately 5%. Moreover, when excluding cropland areas, which are often misclassified as burned by satellite, the average monthly discrepancy rises to 52% for Greece over the entire period of study. In large wildfire events, MODIS estimates are closer to Fire Service records, although its overall accuracy is limited by factors such as cloud cover, complex terrain, spectral similarity between land types, and coarse spatial resolution, leading to differences in smaller fire events where ground-based observations are more precise.

By identifying and analyzing the similarities and differences between MODIS satellite data and official ground-based estimates, this study evaluates the reliability and limitations of each dataset in the context of wildfire monitoring in Greece. The findings aim to enhance understanding of wildfire dynamics across spatial and temporal scales and to inform the development of more informed strategies for fire monitoring and management.

P1.12 - Modeling climate change and migration in North Africa: a non-linear data-driven perspective on environmental and socio-economic factors

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The relationship between climate change and migration has gained significant attention in recent years from both scholars and policymakers, particularly with regard to regions highly exposed to climate stressors such as North Africa. This study investigates how environmental and socio-economic factors drive migration patterns, with a specific focus on North Africa's climate-induced vulnerabilities. The region is facing increased water scarcity, desertification, and rising sea levels, which all reduce agricultural productivity and threaten livelihoods. These environmental pressures have accelerated migration flows within and across borders, reshaping demographic and socio-economic landscapes.

Traditional linear models often fail to capture the complex, non-linear relationships inherent in climate-induced migration. To effectively model these dynamics, the study applies a range of dynamic linear and nonlinear regression models, including autoregressive, polynomial, logarithmic approaches, and Random Forest (RF) models. The RF model, in particular, demonstrated superior performance, making it highly effective in modeling the multifaceted nature of climate-driven migration. Key variables examined include temperature anomalies, the Human Development Index (HDI), water stress, and the agricultural sector's contribution to Gross Domestic Product (GDP), all of which significantly influence migration flows in the region. These factors are crucial in understanding how climate stressors translate into mobility pressures.

The study's findings highlight water stress and socio-economic fragility as primary drivers of migration in North Africa. Decreasing water availability, worsened by declining precipitation and over-exploitation of aquifers, has critically impacted agricultural output and food security, compelling communities to seek more stable conditions. Political instability and limited economic opportunities further amplify these migration pressures, particularly in conflict-affected area.

The research underscores the urgent need for targeted adaptation strategies and effective migration management policies to address climate-driven displacement. Strengthening regional cooperation, enhancing water resource management, and investing in climate-resilient infrastructure are crucial steps towards mitigating displacement risks and improving resilience in North African communities.

P1.13 - Assessing the socio-economic impacts of medicanes using machine learning and news-based information

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Medicanes (Mediterranean tropical-like cyclones) are high-impact weather events occurring in the Mediterranean region. These complex systems cause significant socio-economic damages through natural hazards, affecting key sectors in this culturally and environmentally rich area. Despite their consequences, systematic assessment of their socio-economic impacts remains limited. To address this gap, we propose a tool for extracting and monitoring these impacts using AI-based techniques applied to diverse textual sources, such as news articles and media reports.

Newspapers act as real-time recorders of societal responses and reactions to extreme events, providing a unique opportunity to capture both immediate and evolving impacts. Our approach leverages this issue by employing natural language processing (NLP) techniques applied to a continuously monitored global open news database. These unstructured texts are processed using machine learning (ML) algorithms trained to automatically identify and classify the socio-economic impacts of these extreme events. This integration of NLP and ML with geolocation tools enables the automatic tracking of event-related damages while reducing reliance on manual and subjective sorting of impacts from text-based information.

This work provides, for the first time, a novel approach to systematically extract the socio-economic impacts of cyclones in the Mediterranean basin. The spatial and temporal stratification data achieved by our methodology offers new opportunities to advance impact-based research, improve risk understanding, and support community resilience to future extreme events.

P1.14 - Climate health vulnerability of immigrants to heat-related risks in Europe

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Across Europe, the climate health vulnerability to high temperatures and heatwaves is not evenly distributed for all urban residents, and those with a migration background experience higher levels of heat-associated morbidity and mortality. However, much of the research at the nexus of climate, health and migration focuses on climate as a push-factor for migration, often leaving immigrants out of the discourse, or treating them as mere vessels to extract knowledge from. Drawing on postcolonial discourse, this research argues for the importance of migrant-centric epistemologies and feminist methodologies to not only inform response capacities of Majority World (MW) migrants to heatwaves, but also offer crucial insights on climate urbanism and just adaptation. Situating this debate in the cities of Athens and Berlin –hotspots of immigration from beyond the Mediterranean and neocolonial politics of migration– this research explores how the situated and embodied knowledges of migrants is employed in their daily lives to cope with heat stress. This approach will inform pioneering scholarship on heat-related health vulnerability of MW migrants in Europe, which the rise in right-wing populace has made more precarious than ever.

P1.15 - Implications of applying a common Climate Risk Assessment Framework at the regional scale: Insights from the CLIMAAX implementation in Crete

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The increasing frequency and intensity of climate-related hazards across Europe highlights the pressing need for a harmonised approach to climate risk assessment (CRA). In response, the CLIMAAX project introduces a common methodology for Climate Risk Assessment (CRA) across Europe, supporting regional authorities in evaluating key climate-related hazards. This paper presents findings from the first implementation phase in Crete, where the Region applied the standardised CRA framework to assess drought and flood risks using openly available datasets and workflows.

The results identified high-risk areas across the island, particularly in water-stressed agricultural zones. Under a high-emissions scenario, eastern Crete shows a substantial increase in drought severity, with projected revenue losses for olive cultivation exceeding €500/ha. Simultaneously, flood exposure is pronounced in urban centers where natural drainage systems have been disrupted by land use changes.

The application of the common CRA framework revealed several methodological limitations. Coarse-resolution datasets did not adequately capture local hydrological features, particularly flash floods in small catchments. Furthermore, vulnerability assessments lacked critical information on intersectoral water competition and local infrastructure exposure. These constraints limited the ability to fully tailor adaptation strategies to local conditions.

Despite these challenges, the process enabled regional stakeholders to establish a baseline risk profile and inform future adaptation planning. Stakeholder engagement was central to the process, highlighting the importance of inclusive risk communication and local data integration.

The case of Crete demonstrates the potential of the CLIMAAX framework to support evidence-based adaptation, while underscoring the need for methodological refinement to reflect local complexity and planning needs.

POSTER PRESENTATIONS (Session 2)

P2.1 - Assessing climate risks and adaptation pathways in Albania

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Albania, situated within the Mediterranean basin, is increasingly vulnerable to climate extremes, including intense heatwaves, prolonged droughts, flooding events, and coastal erosion. These hazards are exacerbated by ongoing socio-economic changes, urbanization pressures, and limitations in institutional adaptive capacities. This abstract outlines a comprehensive assessment of Albania's climate risk landscape, emphasizing empirical and theoretical approaches to vulnerability and resilience.

Firstly, it addresses the physical drivers of climate extremes impacting Albania, drawing upon recent climate modeling and forecasting results. These models underline increasing trends in extreme heat, precipitation variability, and the intensification of flooding events, significantly affecting agriculture, infrastructure, and public health. Secondly, it critically examines existing adaptation measures and policies, identifying gaps related to their effectiveness, equity implications, and sustainability. A particular emphasis is placed on evaluating (mal)adaptation practices that may inadvertently exacerbate existing vulnerabilities.

Furthermore, the study explores participatory approaches to enhancing resilience, particularly focusing on stakeholder engagement and co-creation practices at local and national levels. Case studies from urban and rural Albanian communities illustrate successful examples and identify challenges such as institutional barriers, limited public awareness, and constrained financial mechanisms. Lastly, the abstract discusses the effectiveness of climate communication strategies in Albania, exploring tools and approaches for improved science-policy-community interfaces. It argues for strengthened institutional capacities to facilitate climate risk communication and implement evidence-based adaptation strategies.

Overall, this abstract contributes to the broader FutureMed dialogue by offering an integrated perspective from Albania, highlighting pathways towards more sustainable, inclusive, and resilient adaptation policies and practices. The findings have significant implications for Mediterranean-wide initiatives aimed at bridging climate science and societal impacts.

P2.2 - The distribution of adaptation measures in climate action plans and their implications on social justice – The case of New York City

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In the era of climate change, cities increasingly recognize the interconnection between adaptation and social justice. As a result, many are developing adaptation policies, with some explicitly incorporating justice considerations into their approaches. While scholarship on integrating social justice into adaptation planning has expanded, there remains a need for a tangible understanding of how justice is embedded in practice, particularly regarding the distribution of adaptation initiatives among neighborhoods and communities, particularly on the scale of planning and targeted groups. Drawing on the frameworks of Jabareen (2013) and Abo Elassal and Jabareen (2025), this paper presents a new methodology for assessing the integration of social justice in New York City's climate action plans by examining their vision, procedural processes, and distribution of adaptation measures, through the lens of social justice. The findings reveal an evolving pattern in the vision of plans that emphasizes equity, justice, and addressing the underlying inequalities of historically disadvantaged groups. However, this rhetorical shift is not reflected in the procedural processes or the actual distribution of adaptation measures. Most plans remain top-down in nature and show limited evidence of meaningful public engagement, with only a few exceptions. Adaptation initiatives are predominantly designed at the citywide level, targeting the general population without clear guidelines for implementation in ways that could enhance the adaptive capacity of social and physical systems. The spatial distribution of these measures carries critical implications for social justice. Ultimately, the gap between vision, process, and distribution undermines the purpose of adaptation and risks exacerbating the vulnerabilities of already disadvantaged communities.

P2.3 - Social Innovation for Climate Adaptation: Citizen-Led Energy Initiative within Positive Energy Districts

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As the impacts of climate change intensify across the Mediterranean, cities are increasingly seeking adaptation strategies that are both effective and socially equitable. This paper explores how citizen-led energy initiatives developed within Positive Energy Districts (PEDs1) can support local, inclusive, and just approaches to climate adaptation. Using the case of Tel Aviv, it examines how community engagement in energy transition contributes to climate goals while strengthening the role and capacity of local communities.

PEDs are urban neighbourhoods or clusters of buildings designed to generate more renewable energy than they consume. These districts also emphasise energy efficiency and the use of smart systems to optimise energy use. However, the full potential of PEDs is realised when residents actively participate. Citizen-led energy initiatives involve community members in the planning, ownership, or management of energy systems, increasing the likelihood that solutions will reflect local needs and enhance public acceptance.

The analysis highlights the importance of awareness, behaviour, and accessibility in shaping the success of these initiatives. While public interest in sustainable energy is growing, significant gaps remain in knowledge, access, and participation—particularly among marginalised communities. Community engagement efforts within PEDs can help bridge these challenges through financial incentives, co-ownership models, and simplified technologies. Nevertheless, challenges persist, including low participation rates, unequal distribution of benefits, limited funding, and institutional barriers.

The Tel Aviv case study uses survey data and stakeholder interviews to assess both the barriers and key drivers of citizen engagement. Findings show that community participation improves the responsiveness of energy solutions to local needs and strengthens public ownership of adaptation strategies. However, this progress depends on supportive policy frameworks, ongoing civic engagement, and trust-building between institutions and residents.

Citizen-led energy initiatives within PEDs represent more than a technological shift—they reflect a rethinking of how climate adaptation is regulated and implemented. By focusing on participation and equity, such models contribute not only to emissions reduction but also to the development of more resilient, cohesive

urban communities. These insights offer practical guidance for other Mediterranean cities aiming to scale socially innovative, place-based adaptation.