CIMEE'26

Theme : Materials & electrochemistry for clean energy & environmental sustainability
Online Event

September 24-26, 2026 | LEBANON

CALL FOR ABSTRACTS & MANUSCRIPTS

The conference serves as a dynamic platform for presenting innovative research, exploring practical applications, and fostering interdisciplinary collaboration and provides a unique forum to explore the topics through a diverse range of sessions, including keynote lectures, invited Speakers, technical presentations, workshops, and poster sessions. More than 100 researchers from 23 countries will gather around the theme: "*Materials & Electrochemistry for Clean Energy & Environmental Sustainability.*"

More information at the website: https://cimee-science.org/program-sessions-list/

SUBMIT YOUR MANUSCRIPT TROUGH THE CONFERENCE WEBSITE:

https://cimee-science.org/cimee26/

Celebrating 10 years



Celebration

10TH Anniversary CIMEE conference celebration

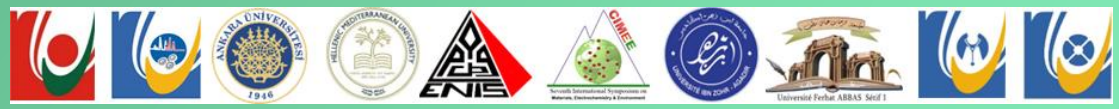
CIMEE'26

Online Event

10 YEARS ANNIVERSARY Celebration

Materials, Electrochemistry & Environment

CONFERENCE 2026





Theme : Materials & Electrochemistry for Clean Energy & Environmental Sustainability

September 24-26, 2026 | Tripoli, LEBANON

SAVE THE DATE

10TH Anniversary CIMEE conference celebration

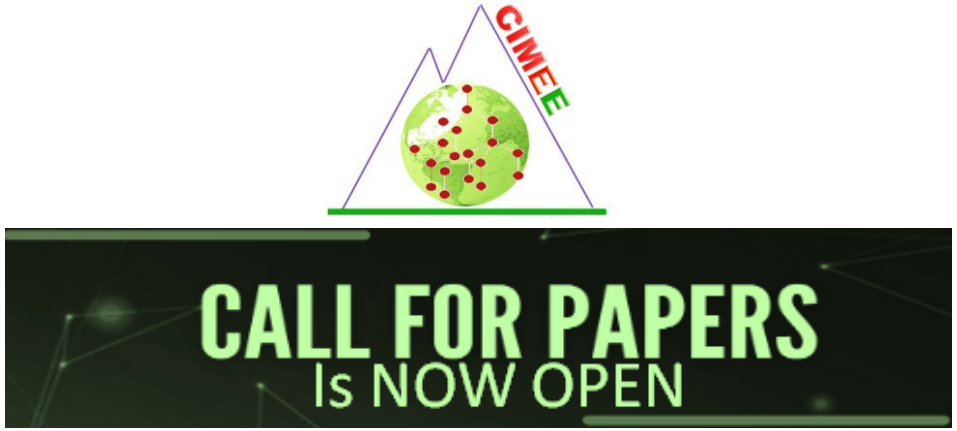
CONFERENCE WEBSITE: https://cimee-science.org/cimee26/

CALL for Papers

Materials, Electrochemistry & Environment

CIMEE'26 Special Session





SPECIAL SESSIONS. Call for Papers – Special session, CIMEE'26

SS0: Strategies & Technological Solutions for Climate Change Mitigation
SS1: Climate change mitigation: the potential role of materials electrochemistry
SS2: Climate change, Aerosol chemical complexity, modeling and Monitoring combination
SS3: Mitigating atmospheric hydrocarbon pollutants from initial emission to final removal: the potential role of Innovative technologies

SS4: Energy transition pathways: The strategic role of electrochemistry
SS5: Combining electrochemical processes with renewable energy as an Emerging paradigm for environmental sustainability
SS6: Agro-geochemistry, Agro-geoEnvironment & Sustainability: Challenges & Solutions
SS7: Improving water governance for long-term sustainability by integrating decentralized systems, nature-based solutions (NBS), and circular economy approaches.

Strategies & Technological Solutions for Climate Change Mitigation



Mitigating atmospheric hydrocarbon pollutants from initial emission to final removal: the potential role of Innovative technologies

Climate change mitigation: the potential role of materials electrochemistry

Climate change solutions, from Aerosol chemical complexity, to modeling and Monitoring combination

Dear colleagues,

we are pleased to invite you to contribute to our upcoming Special session entitled “Clean energy innovation and Climate change: challenges opportunities”, which will be organized during the CIMEE26 conference as well as the 7 others Special sessions. If you are interested in contributing, you are welcome to send us your abstracts and preliminary information about your proposed manuscript at : aelmoll@ul.edu.lb, aelmoll@yahoo.fr
https://cimee-science.org/program-sessions-list/
We would also appreciate it if you could share this invitation with colleagues or members of your research group who may be interested in submitting their work.
Thank you for considering our invitation.
We look forward to the possibility of receiving your valuable contribution.
Best regards,

Strategies & Technological Solutions for Climate Change Mitigation

As part of the CIMEE’26 conference, the 8th International Symposium, a premier gathering from September 24-26 in Lebanon, we are pleased to announce a special online session: Strategies & Technological Solutions for Climate Change Mitigation. Special session information
Combating climate change is indeed an absolute global priority given the accelerating pace of its impacts It’s requires urgent global action to reduce greenhouse gas emissions, transition to renewable energy, and protect natural ecosystems. To build a climate-resilient future, Mitigation strategies and Technological Innovations will be studied to addressing these new environmental realities. Together, these technological and natural solutions reduce greenhouse gases and build a safer future

8th International Symposium on Materials,
Electrochemistry & Environment



Special Session CIMEE’26

1) Main Mitigation Strategies
Decarbonizing Energy: Transitioning power grids to solar, wind, geothermal, and next-generation nuclear energy.
Electrifying Transportation: Replacing internal combustion engines with electric vehicles (EVs) and expanding mass transit.
Industrial Transformation: Using green hydrogen and clean electricity for steel, cement, and chemical production.
Agricultural Reform: Shifting to regenerative farming and reducing food waste
Special attention will be paid to innovative technology: Main Technological Innovations
Carbon Capture & Storage (CCS): Smokestack technologies that trap carbon dioxide before it enters the atmosphere.
Direct Air Capture (DAC): Industrial facilities that actively scrub carbon dioxide directly out of ambient air.
Smart Grid Infrastructure: AI-driven software that balances renewable energy supply and demand in real time.
Long-Duration Energy Storage (LDES): Advanced grid-scale batteries, pumped hydro, and thermal storage for multi-day energy backup
3) Integrated Solutions:
Nature-based solutions: Restore wetlands to absorb storms.
Circular economy: Reduce resource waste and consumption.
Join us in this special session under the theme " Strategies & Technological Solutions for Climate Change Mitigation " the session captures our dedication to uniting diverse. This session offers hope and a forum for exchanging ideas on concrete solutions. We aim to foster a high-level dialogue that showcases recent innovations in mitigation strategies, as well as regional actions for the coming decades.
All expertise is needed for practical climate solutions. Engage with scientists, and researchers in exploring innovations and holistic approaches that drive global sustainability. Through dynamic sessions and collaborative dialogues, acquire fresh insights and actionable strategies toward a balanced and resilient future. Together, we create a global coalition to inspire and support a sustainable, inclusive future.
Programme
1) Technological Solutions for Climate Change Mitigation
2) Climate resilience by merging technological innovation with ecological responsibility.
3) Technology and climate change Innovation to address the environmental emergency. (Carbon Capture & Storage (CCS), Direct air capture)
4) Artificial intelligence and climate resilience.
4 bis) Artificial intelligence for the energy transition
5) strengthen climate-resilient development in Mediterranean region.
Speakers: will be announced soon
More information at the website: https://cimee-science.org/program-sessions-list/

cimee-science.org/cimee26/

Special Session “Climate change mitigation: the potential role of materials electrochemistry”

<u>Chairperson:</u> Prof. Ahmad El Moll, Faculty of Public Health, Faculty of science, Doctoral School for Science and Technology. Lebanese university, Lebanon

We are happy to announce a Special Session entitled “Climate change mitigation: the potential role of materials electrochemistry” at CIMEE’26 Conference.
Materials electrochemistry serves as a crucial scientific pillar for global **Climate Change Mitigation** by enabling the conversion of renewable electricity into clean fuels, chemical feedstocks, and stable storage solutions. By replacing traditional fossil-fuel-driven thermal processes with localized, electron-driven chemical transformations, materials electrochemistry offers a scalable framework to fully decarbonize heavy industry, transportation, and grid infrastructure.

The session will focus on recent advances associated with the conversion of renewable electricity into clean fuels processes as well as Electrochemical CO2 Reduction (CO2RR). They include all aspects of decarbonization such as Advanced Batteries, Green Hydrogen and Fuel Cells, real-time environmental sensing and remediation. The scalable solutions framework to fully decarbonize heavy industry, transportation, and grid infrastructure will be exposed. In addition to the experimental studies, theoretical aspects will be discussed. Participation from PhD students, senior researchers, regulators, and mitigation experts is highly welcomed.
This session covers the critical pillars of modern electrochemical energy engineering, Materials chemistry and industrial decarbonization.

Contents lists available at cimee-science.org

VIII International Symposium on Materials, Electrochemistry & Environment

https://cimee-science.org/cimee26/

Climate Change mitigation: The potential role of Materials Electrochemistry

Special Session

• Center of Materials Technology and Photonics, Hellenic Mediterranean University, Heraklion, Crete, Greece
• Laboratory of Applied Chemistry & Environment, ENSA, University of Ibn Zohr, Morocco
• Laboratory of Environmental Engineering & Ecotechnology, LGEET, ENIS, University of Sfax, Tunisia.
• Department of analytical Chemistry, Faculty of Pharmacy, Ankara University, Turkey.
• Laboratory of Electrochemistry, LEIMCR, Faculty of Technology, University of Ferhat Abbas Sétif-1, Algeria
• Faculty of Public Health, Faculty of Science, Doctoral School for Science & Technology, DSST, Lebanese University, Lebanon

Special Session, Call for paper

June 30, 2026 – Deadline for FP and WP (Second round)

August 31, 2026 – Deadline for FP and WP (Final round)

Freely accessible

Keywords: Materials electrochemistry, climate change, decarbonizing, renewable energies, Carbone capture and utilization, Graphene & Carbon Nanotubes, Metal-Organic Frameworks, green energy storage, monitor pollutants, environmental sensing and remediation, clean fuel production, value-added chemicals.

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Key Elements & Essential Information of the Session

Materials electrochemistry is a major technological pillar for decarbonizing our society and combating climate change. It enables the storage of renewable energies, the transformation of the chemical industry, and the capture of greenhouse gases. It allows also to monitor pollutants and address environmental pollution while sustainably transforming our energy systems. Materials electrochemistry drives climate change mitigation by enabling green energy storage, carbon dioxide conversion clean fuel production, and value-added chemicals. These electrified processes convert renewable electricity into vital chemical energy carriers to decarbonize heavy industry and transport. In addition, Materials electrochemistry serves as the backbone for climate change mitigation by enabling highly precise, real-time environmental sensing and remediation. By designing advanced electrode materials, scientists can detect pollutants, monitor greenhouse gases, and actively clean ecosystems. **I - Energy Storage and Grid Integration**: A- Advanced Batteries: Lithium-ion, sodium-ion, and solid-state batteries balance unstable renewable grid loads and electrify transport. (ii) Material Innovations: Porous carbon frameworks, transition-metal oxides, and organic electrodes boost charge capacity and cycle life. (iii) Quantified Impact: Grid storage deployment reduces peak fossil-fuel peaker plant reliance, cutting sector emissions by up to 30–40% during high-wind/solar intervals. B - Carbon Capture and Utilization (CCU). Electrochemical CO2 Reduction (CO2RR): Transforms captured CO_2 from industrial point sources or air into feedstocks like carbon monoxide, formate, and methanol using renewable electrons. Catalyst Design: Utilizes metal-organic frameworks (MOFs), MXenes, and single-atom transition metals (Cu, Bi) for precise reaction selectivity. **II - Green Hydrogen and Fuel Cells:** (i) Water Electrolysis: Cleaves water molecules using advanced earth-abundant catalysts (phosphides/oxides) to generate zero-emission hydrogen fuel. (ii) Energy Vectors: Serves as a heavy-industry and long-duration storage medium to abate hard-to-electrify sectors like steel and shipping. On the other hand, materials electrochemistry serves as the backbone for climate change mitigation by enabling highly precise, real-time environmental sensing and remediation. **I- Key Environmental Monitoring Applications:** Advanced materials allow for the continuous tracking of critical climate and pollution vectors. (i) Greenhouse Gases: Sensors monitor carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). (ii) Water Quality: Electrodes track heavy metals like lead (Pb^{2+}), mercury (Hg^{2+}), and arsenic (As^{3+}). (iii) Agricultural Runoff: Devices detect excess nitrates (NO_3^-) and phosphates (PO_4^{3-}) to prevent water suffocation. (iv) Air Pollutants: Continuous monitoring tracks toxic gases like sulfur dioxide (SO_2) and nitrogen oxides NOx. **II - Advanced Materials Driving the Technology:** The performance of an environmental sensor depends directly on the nanoscale architecture of its electrodes. (i) Graphene & Carbon Nanotubes: Provide ultra-high surface area and rapid electron transfer. (ii) Metal-Organic Frameworks (MOFs): Offer highly porous, customizable structures to trap specific gas molecules. (iii) Transition Metal Dichalcogenides (TMDCs): Exhibit high catalytic activity for sensitive redox reactions. (iv) Conducting Polymers: Deliver flexible, biocompatible matrices for organic pollutant detection. (v) Single-Atom Catalysts: Maximize atom efficiency, ensuring extreme sensitivity to trace toxins. **III - The Sensing-to-Remediation Loop.** Monitoring directly informs and automates active climate mitigation and cleanup strategies. (i) Smart Grids: Real-time CO_2 tracking optimizes the deployment of carbon-capture systems. (ii) Automated Water Treatment: Sensor feedback triggers electrochemical oxidation to destroy organic toxins. (iii) Precision Agriculture: Nitrate sensors prevent fertilizer overuse, curbing soil-driven greenhouse emissions. (iv) Early Warning Systems: Flash sensors detect industrial chemical leaks before widespread ecological damage occurs. All authors and researchers interested in making a scholarly contribution at the conference are invited to submit an abstract by following the procedure described on the CIMEE'26 information website. The accepted papers considered of having enough quality can be further considered by Advisory and review committee for publication in International Journals.

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Scalable Decarbonization Frameworks

Heavy Industry: Solutions for hard-to-abate sectors like steel, cement, and chemical manufacturing.

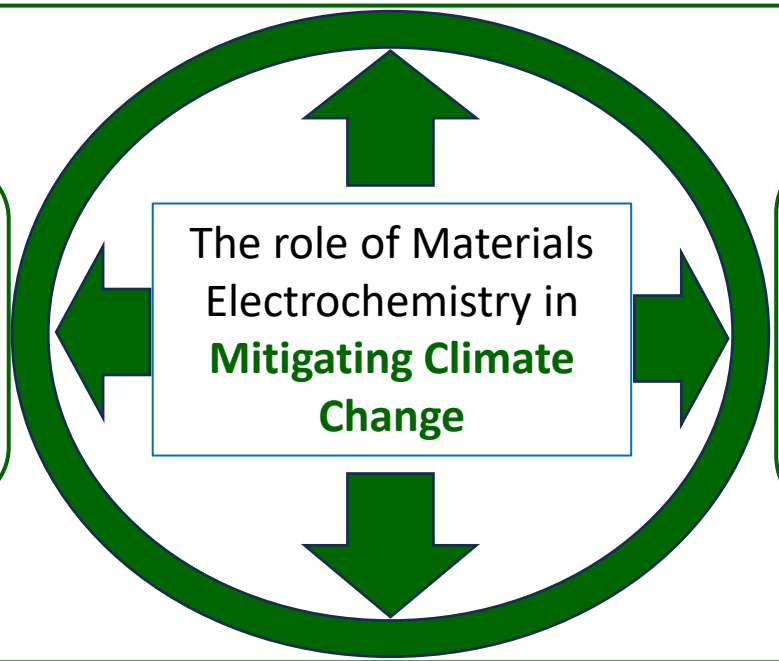
Transportation: Scalable alternative fuels and infrastructure for aviation, maritime, and heavy-duty trucking.

Grid Infrastructure: Frameworks to integrate intermittent renewable energy into a stable, decarbonized electrical grid.

Environmental Monitoring & Remediation

Real-Time Sensing: Deployment of advanced sensors for continuous, live monitoring of environmental pollutants and greenhouse gases.

Remediation Technologies: Active electrochemical or chemical processes to clean up contaminated ecosystems and capture emissions at the source.



Carbon Utilization & Power-to-X

CO2 Reduction Reaction (CO2RR): Electrochemical conversion of captured carbon dioxide into value-added chemicals and synthetic fuels (e.g., ethylene, methanol, syngas).

Clean Fuel Synthesis: Processes transforming renewable electricity into liquid or gaseous energy carriers to replace fossil fuels.

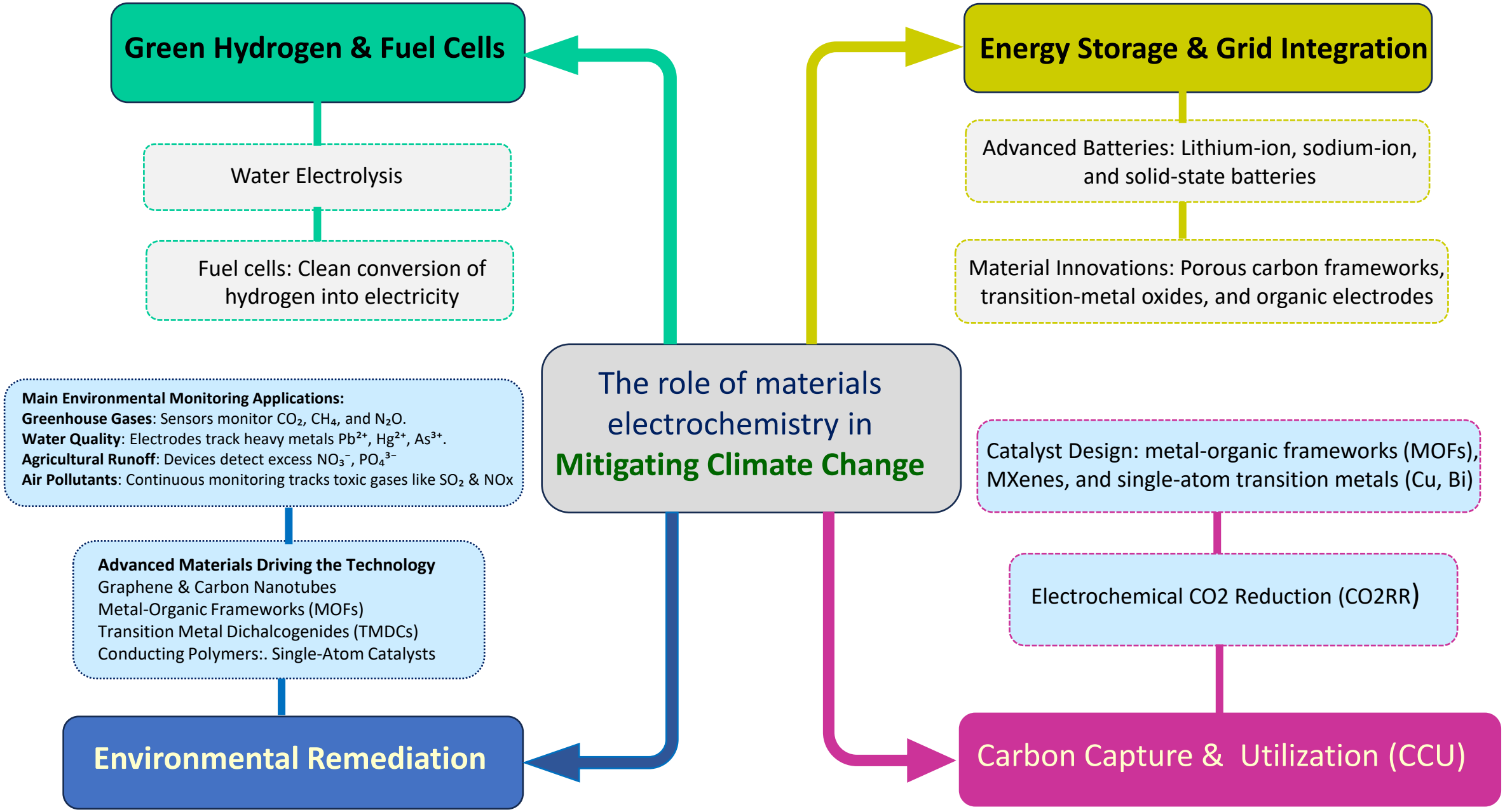
Advanced Energy Storage & Conversion

Next-Generation Batteries: Advanced battery chemistries designed for grid-scale storage and electric mobility, moving beyond standard lithium-ion limitations.

Green Hydrogen: Production of hydrogen via water electrolysis using 100% renewable electricity.

Fuel Cells: High-efficiency conversion of hydrogen or clean fuels back into electricity with zero local emissions.

Climate Change Mitigation: The potential role of Materials Electrochemistry



Contents lists available at cimee-science.org

VIII International Symposium on Materials, Electrochemistry & Environment

https://cimee-science.org/cimee26/

Climate change solutions: from Aerosol chemical complexity to modeling and Monitoring combination

Special Session

• Center of Materials Technology and Photonics, Hellenic Mediterranean University, Heraklion, Crete, Greece
• Laboratory of Applied Chemistry & Environment, ENSA, University of Ibn Zohr, Morocco
• Laboratory of Environmental Engineering & Ecotechnology, LGEET, ENIS, University of Sfax, Tunisia.
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Keywords: Materials electrochemistry, climate change, decarbonizing, renewable energies, Carbone capture and utilization, Graphene & Carbon Nanotubes, Metal-Organic Frameworks, green energy storage, monitor pollutants, environmental sensing and remediation, clean fuel production, value-added chemicals.

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Key Elements & Essential Information of the Session

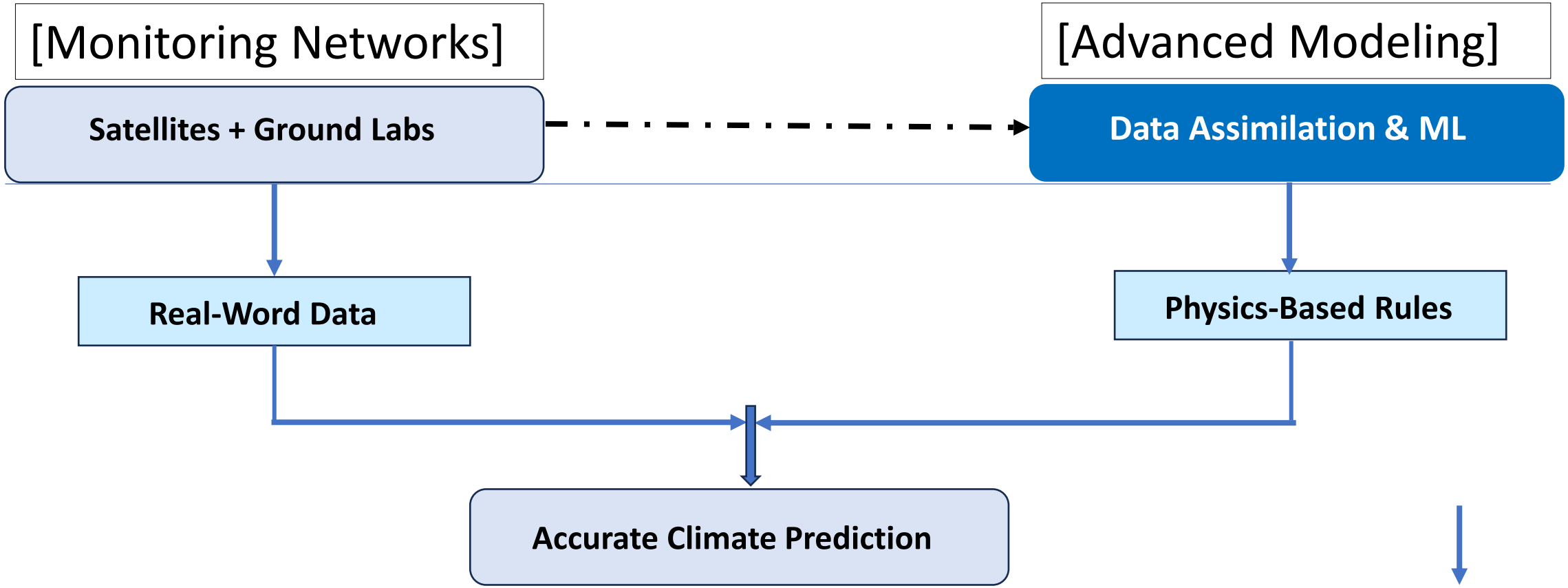
Human activities, primarily fossil fuel combustion, industry, and deforestation, are profoundly altering the chemical composition of the atmosphere. These actions are generating two waves of interdependent problems: local air pollution and climate change. The combination of aerosol monitoring and climate modeling provides a powerful three-pronged framework (integrating satellites, ground-based sensors, and simulations) essential for quantifying how even minute atmospheric particles offset global warming and influence cloud physics. Combating climate change requires combining cutting-edge atmospheric science with modern monitoring technologies. Studying the interaction of aerosols with the atmosphere allows for the development of better models and the creation of more effective monitoring systems. **I - Monitoring Methods:** (i) Satellite Remote Sensing: Advanced sensors (like multi-angle polarization and active lidars) measure global aerosol optical depth (AOD), vertical distribution, and scattering properties from space. (ii) Ground Networks: Surface instruments provide highly accurate, continuous local data to calibrate satellite signals. (iii) In-Situ Sampling: Aircraft and surface campaigns capture the precise chemical composition, microphysics, and size distribution of fresh airmasses. **II- Modeling Approaches** (i) Emission Inventories: Simulators ingest human and natural source data (like dust, fires, and sea salt) to estimate baseline particle loads. (ii) Radiative Transfer Codes: Models calculate how specific aerosols scatter or absorb shortwave and longwave radiation. (iii) Cloud Parameterizations: Numerical schemes simulate how aerosols act as cloud condensation nuclei (CCN), altering cloud lifetime and brightness. **III - Synergies and Challenges** (i) Data Assimilation: Continuous blending of real-time monitoring data into climate models corrects dynamic biases and tracks pollution transport. (ii) Uncertainty Reduction: Discrepancies between predicted and observed aerosol-cloud interactions remain the largest source of error in climate sensitivity estimates. All authors and researchers interested in making a scholarly contribution at the conference are invited to submit an abstract by following the procedure described on the CIMEE'26 information website. The accepted papers considered of having enough quality can be further considered by Advisory and review committee for publication in International Journals.

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Climate change, Aerosol chemical complexity, modeling and Monitoring combination

The Power of the Modeling & Monitoring Combination

Historically, field data struggled with spatial gaps, while numerical models suffered from chemical over-simplification. Modern frameworks rely on **data fusion and assimilation** to capture real-time chemical evolutions



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Mitigating atmospheric hydrocarbon pollutants from initial emission to final removal: the potential role of Innovative technologies

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Keywords: Mitigating atmospheric hydrocarbon pollutants, advanced catalysts, transition to Renewable Energy and Electrification, Cleaner Fuels, Catalytic Converters, Carbon Capture and Storage, Atmospheric Removal and Remediation, Direct Air Capture, Bioremediation, Biofiltration, Photocatalytic Oxidation (PCO) System, Nature-Based Solutions

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Key Elements & Essential Information of the Session

Mitigating atmospheric hydrocarbon pollutants requires a comprehensive approach, ranging from source reduction to active atmospheric removal of these pollutants. Innovative technologies are transforming this continuum, using advanced catalysts, AI-driven monitoring, biodegradation, and greenhouse gas mineralization to drastically reduce the environmental impact of volatile organic compounds (VOCs) and hydrocarbons. This approach involves a combination of preventative strategies, point-source capture, and environmental remediation. **Initial Emission Prevention:** The primary focus is on preventing the formation and release of hydrocarbons in the first place through process optimization and alternative energy sources. (i) Transition to Renewable Energy and Electrification: Shifting from fossil fuels to renewable energy sources (solar, wind, hydrogen fuel cells) for power generation, heating, and transportation is a fundamental preventative measure. (ii) Process Efficiency and Automation: In industries like oil and gas, innovations such as directional drilling (reducing the number of well pads and associated traffic), centralized production facilities, and well automation via telemetry significantly reduce fugitive methane/VOC emissions and traffic-related pollutants. (iii) Cleaner Fuels and Catalytic Converters: Developing and using cleaner fuels (e.g., low-sulfur gasoline, biofuels, hydrogen) and advanced catalytic converters in vehicles convert toxic exhaust hydrocarbons and other pollutants into less harmful substances like water vapor and CO_2 before they leave the tailpipe. (iv) VOC-free Products: Developing and utilizing low-emitting or VOC-free consumer products, paints, and building materials reduces a major source of indoor and general urban air pollution. **Point-Source Capture and Treatment:** For unavoidable emissions from industrial processes, innovative technologies capture and treat the pollutants before they are released into the atmosphere. (i) Adsorption Systems: Activated carbon filters are widely used to adsorb hydrocarbon vapors, VOCs, and odors from industrial exhaust streams. Novel adsorbents and advanced regeneration techniques (thermal or chemical) are improving efficiency and reducing waste disposal issues. (ii) Oxidizers and Scrubbers: (a) Thermal Oxidizers (including Regenerative Thermal Oxidizers, RTOs) achieve high temperatures to break down VOCs into harmless CO_2 and water vapor, often using the heat generated by the process itself to be energy efficient. (b) Catalytic Oxidizers perform a similar function at lower temperatures by using a catalyst, requiring less energy. (c) Wet/Dry Scrubbers wash harmful gases from exhaust streams using liquid sprays or dry reagents to neutralize pollutants. (iii) Carbon Capture and Storage (CCS): For major point sources of CO_2 (a primary hydrocarbon combustion product), innovative CCS technologies capture the gas and store it permanently underground, preventing atmospheric release. **Atmospheric Removal and Remediation**: Once hydrocarbons enter the atmosphere, removal is more challenging, but emerging technologies and natural processes play a role. (i) Direct Air Capture (DAC): This technology acts like a "giant vacuum" to remove CO_2 directly from the ambient air using specialized filters or sorbent materials. (ii) Bioremediation and Biofiltration: Harnessing the power of microorganisms (bacteria and fungi) to naturally degrade or transform hydrocarbon pollutants into benign byproducts is an increasingly popular, low-cost, and environmentally friendly approach. Biofilters use immobilized microbes to treat contaminated air streams. (iii) Photocatalytic Oxidation (PCO) Systems: These systems use UV light and a catalyst (like titanium dioxide) to break down airborne VOCs and other organic pollutants into harmless substances, suitable for both indoor and outdoor (e.g., in specialized paints or building materials) applications. (iv) Nature-Based Solutions: Reforestation and conserving ecosystems like wetlands and mangroves naturally sequester carbon and filter air pollutants. Overall, innovative technologies provide solutions across the entire pollutant lifecycle, but their effectiveness is maximized when integrated into a comprehensive strategy that includes robust policies and community action. All authors and researchers interested in making a scholarly contribution at the conference are invited to submit an abstract by following the procedure described on the CIMEE'26 information website. The accepted papers considered of having enough quality can be further considered by Advisory and review committee for publication in International Journals.

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Energy transition pathways : The strategic role of electrochemistry

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Keywords: energy transition, Electrochemistry, decarbonization, renewable sources, scalable storage solutions, Flow Batteries & Fuel Cells, Green Hydrogen, Power-to-X, Water Electrolysis, CO2 Reduction, Circular Economy, Resource Recovery.

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Key elements & essential information of the session

Electrochemistry serves as the foundational science driving the global energy transition. By directly converting chemical energy into electrical energy (and vice versa), it underpins the technologies needed to decarbonize the power, transportation, and industrial sectors, while solving the intermittency challenges of renewable sources. The strategic role of electrochemistry spans four vital pathways that enable a decarbonized and circular economy: **Energy Storage and Grid Integration:** The variability of renewable sources like solar and wind requires robust, scalable storage solutions. (i) Advanced Batteries: Lithium-ion and emerging sodium-based or solid-state batteries provide short-to-medium-term storage essential for Electric Vehicles (EVs) and power grid stabilization. (ii) Flow Batteries & Fuel Cells: Large-scale electrochemical flow cells and fuel cells help balance long-duration power fluctuations, converting stored hydrogen back into electricity when demand outstrips supply. **Green Hydrogen and Power-to-X**. Not all sectors can rely on direct electrification; hard-to-abate industries (e.g., aviation, maritime shipping, and steel manufacturing) need high-density energy carriers. (i) Water Electrolysis: Using renewable electricity to split water into oxygen and green hydrogen, which serves as both a clean fuel and an industrial feedstock. (ii) Derivatives: Further electrochemical processes turn green hydrogen into ammonia or methanol, creating easily transportable, carbon-neutral fuels. **Decarbonization of Chemical Manufacturing:** Traditional chemical manufacturing is a massive greenhouse gas emitter, heavily reliant on high heat and pressure. (i) Electrosynthesis: Electrifying the chemical industry replaces fossil-based utilities with renewable electricity, offering precise control over reaction selectivity to create essential base chemicals. (ii) CO2 Reduction: Electrochemical processes can capture and convert waste carbon dioxide into value-added chemicals like formic acid, syngas, or ethylene, completely circumventing fossil inputs. **Circular Economy and Resource Recovery:** As the transition advances, managing the waste of new green technologies is equally critical. (i) Direct Recycling: Electrochemical processes are increasingly used to directly repair and recycle spent lithium-ion and other advanced batteries, avoiding the high energy consumption and emissions of traditional metallurgical recycling. (ii) Environmental Remediation: Electrochemical techniques like electrocoagulation and electrooxidation are deployed to extract heavy metals, treat wastewater, and recover valuable materials needed for the energy transition. This session demonstrates that electrochemical research plays a strategic role in preparing for the future: developing new materials for energy, batteries, and catalysts, and creating processes for biofuel production. All authors and researchers interested in making a scholarly contribution at the conference are invited to submit an abstract by following the procedure described on the CIMEE'26 information website. The accepted papers considered of having enough quality can be further considered by Advisory and review committee for publication in International Journals.

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Energy Storage & Grid Integration

The variability of renewable sources like solar and wind requires robust, scalable storage solutions. (i) Advanced Batteries: Lithium-ion and emerging sodium-based or solid-state batteries provide short-to-medium-term storage essential for Electric Vehicles (EVs) and power grid stabilization. (ii) Flow Batteries & Fuel Cells: Large-scale electrochemical flow cells and fuel cells help balance long-duration power fluctuations, converting stored hydrogen back into electricity when demand outstrips supply.

Green Hydrogen and Power-to-X

Not all sectors can rely on direct electrification; hard-to-abate industries (e.g., aviation, maritime shipping, and steel manufacturing) need high-density energy carriers. (i) Water Electrolysis: Using renewable electricity to split water into oxygen and green hydrogen, which serves as both a clean fuel and an industrial feedstock. (ii) Derivatives: Further electrochemical processes turn green hydrogen into ammonia or methanol, creating easily transportable, carbon-neutral fuels.

Decarbonization of Chemical Manufacturing

Traditional chemical manufacturing is a massive greenhouse gas emitter, heavily reliant on high heat and pressure. (i) Electrosynthesis: Electrifying the chemical industry replaces fossil-based utilities with renewable electricity, offering precise control over reaction selectivity to create essential base chemicals. (ii) CO_2 Reduction: Electrochemical processes can capture and convert waste carbon dioxide into value-added chemicals like formic acid, syngas, or ethylene, completely circumventing fossil inputs

Circular Economy & Resource Recovery

As the transition advances, managing the waste of new green technologies is equally critical. (i) Direct Recycling: Electrochemical processes are increasingly used to directly repair and recycle spent lithium-ion and other advanced batteries, avoiding the high energy consumption and emissions of traditional metallurgical recycling. (ii) Environmental Remediation: Electrochemical techniques like electrocoagulation and electrooxidation are deployed to extract heavy metals, treat wastewater, and recover valuable materials needed for the energy transition.

CIMEE'26

Energy transition pathways : The strategic role of electrochemistry

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Combining electrochemical processes with renewable energy as an Emerging paradigm for environmental sustainability

Special Session

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Freely accessible

Keywords: electrochemical processes, renewable energy, environmental sustainability, circular economy, Green Hydrogen Production, Wastewater Treatment & Remediation. Resource recovery, Microbial Electrochemical Systems.

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Key elements & essential information of the session

Combining electrochemical processes with renewable energy is revolutionizing environmental sustainability by shifting from energy-intensive, fossil-reliant manufacturing to modular, zero-emission electrified systems. This synergistic paradigm directly decarbonizes heavily polluting sectors, repurposes greenhouse gases into valuable commodities, and closes critical waste and circular economy loops. Why This Convergence Matters: Traditionally, electrochemical techniques were bottlenecked by their reliance on carbon-heavy, grid-based electricity. By directly integrating solar, wind, and other renewable energy sources, electrochemistry becomes entirely green. (i) Precision Control: Instead of relying on extreme heat and pressure, electrochemical reactions are tuned via applied electrical potential, making them intrinsically safer, highly selective, and adaptable to smaller, localized manufacturing scales. (ii) Energy Storage: They offer solutions to the intermittency of renewable grids, converting surplus solar/wind power into chemical energy for long-term storage. **Key Applications & Environmental Benefits: A-** Decarbonizing Chemical Manufacturing: The chemical sector is responsible for roughly 7% of global CO_2 emissions. Electrosynthesis and paired electrolysis allow industries to synthesize value-added feedstocks and commodity chemicals using renewable electrons. (i) Green Hydrogen Production: Water electrolysis powered by renewables produces clean hydrogen, serving as both an energy carrier and a critical raw material for sustainable ammonia and biofuel manufacturing.(ii) Circular Manufacturing: Electrified processes can incorporate biomass derivatives and captured carbon as feedstocks, effectively neutralizing the carbon footprint of industrial production. **B - Carbon Capture and Utilization (CCU):** (i) Electrochemical CO_2 Conversion (ECO_2R): Using renewable electricity, captured CO_2 is reduced to valuable platform chemicals like carbon monoxide, formic acid, and methanol, establishing a carbon-neutral (or negative) cycle. **C - Advanced Wastewater Treatment & Remediation:** Conventional water treatment requires vast amounts of energy and centralized infrastructure. Coupling electrochemical oxidation and electrocoagulation with off-grid renewable power provides a decentralized, low-carbon solution. (i) Resource Recovery: Electrodialysis and electrolysis selectively extract and concentrate pollutants from wastewater so they can be reused as agricultural fertilizers, eliminating secondary chemical contamination. (ii) Microbial Electrochemical Systems (MES): Systems like microbial fuel cells consume organic waste from wastewater to directly generate usable electricity or green hydrogen. Ongoing research and life cycle analyses aim to optimize electrode durability and reduce capital expenditures to fully align these systems with the United Nations Sustainable Development Goals. For this, overcoming current limitations in catalysis, reactor architecture, and system scalability is crucial for widespread industrial adoption; this session will be organized around these three points. All authors and researchers interested in making a scholarly contribution at the conference are invited to submit an abstract by following the procedure described on the CIMEE'26 information website. The accepted papers considered of having enough quality can be further considered by Advisory and review committee for publication in International Journals.

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VIII International Symposium on Materials, Electrochemistry & Environment

https://cimee-science.org/cimee26/

Agro-geochemistry, Agro-geoEnvironment & Sustainability: Challenges & Solutions

Special Session

• Center of Materials Technology and Photonics, Hellenic Mediterranean University, Heraklion, Crete, Greece
• Laboratory of Applied Chemistry & Environment, ENSA, University of Ibn Zohr, Morocco
• Laboratory of Environmental Engineering & Ecotechnology, LGEET, ENIS, University of Sfax, Tunisia.
• Department of analytical Chemistry, Faculty of Pharmacy, Ankara University, Turkey.
• Laboratory of Electrochemistry, LEIMCR, Faculty of Technology, University of Ferhat Abbas Sétif-1, Algeria
• Faculty of Public Health, Faculty of Science, Doctoral School for Science & Technology, DSST, Lebanese University, Lebanon

Special Session, Call for paper

June 30, 2026 – Deadline for FP and WP (Second round)

August 31, 2026 – Deadline for FP and WP (Final round)

Freely accessible

Keywords: Agro-Geochemistry, Agro-Geo-Environment, Sustainability, Precision Agriculture, soil structure, biodiversity, Agrominerals, Biogeochemistry, fertilizer application, Precision Agriculture, sensors, biodiversity.

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Key elements & essential information of the session

To optimize food production while protecting natural resources, agro-chemistry, agro-environmental science, and sustainable development form an interdisciplinary field that effectively contributes to understanding the chemical, geological, and biological processes within agricultural systems. This interdisciplinary field links soil science, geology, and environmental science to address challenges such as soil degradation, nutrient depletion, and water pollution caused by intensive farming. This session is based on three points: **Essential elements and key areas:** (i) Agro-Geochemistry: Focuses on the chemical composition of rocks, soil, water, and atmosphere, and how these affect soil fertility and nutrient uptake by plants. It involves managing the geochemical cycling of nutrients (nitrogen, phosphorus, potassium) and tracking potentially toxic elements (PTEs) like cadmium, lead, and arsenic. (ii) Agro-Geo-Environment: Refers to the physical and chemical setting of agricultural land, including the pedosphere (soil) and water resources, and how agricultural activities impact these environments. (iii) Sustainability: Aims to maintain the long-term productivity and health of agroecosystems, minimizing negative environmental impacts and reducing reliance on excessive synthetic inputs. **Key Concepts in Agro-Geochemistry and Sustainability.** (i) Soil Organic Matter (SOM) Dynamics: SOM is critical for the ecological functioning of agroecosystems, playing a significant role in biogeochemistry and controlling the mobility of contaminants. (ii) Agro-minerals and Soil Amendments: The use of natural mineral amendments is growing to correct nutrient deficiencies, reduce soil acidity, and improve water-holding capacity. (iii) Contaminant Mobility Control: Understanding geochemical conditions (such as pH) is essential to managing the mobility of contaminants like aluminum, iron, and manganese, which can be toxic to plants. (iv) Nutrient Management: Sustainable practices focus on the "right source, rate, time, and place" for fertilizer application to minimize nutrient runoff (eutrophication) and leaching into groundwater. (v) Precision Agriculture: Using data analytics, sensors, and GPS to optimize input usage, enhancing yield while decreasing the environmental footprint. **Sustainability Challenges & Solutions:** *Challenges:* Intensive agriculture has led to widespread soil degradation, nutrient runoff causing dead zones, and biodiversity loss. Climate change further complicates this by altering nutrient availability. *Solutions:* (i) Integrated Nutrient Management: Combining organic methods (manure, compost) with chemical inputs to improve soil structure and biodiversity. (ii) Integrated Pest Management (IPM): Combining biological, cultural, and chemical methods to minimize pesticide usage.(iii) Remediation: Using geochemistry to identify and treat contaminated agricultural land and water. (iv) Microbial Bio-stimulants: Employing beneficial microorganisms to enhance plant growth, nutrient absorption, and stress resistance. All authors and researchers interested in making a scholarly contribution at the conference are invited to submit an abstract by following the procedure described on the CIMEE26 information website. The accepted papers considered of having enough quality can be further considered by Advisory and review committee for publication in International Journals.

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Agro-geochemistry, Agro-geoEnvironment & Sustainability: Challenges & Solutions

Agro-geochemistry, Agro-geoEnvironment, and Sustainability are critical, interconnected fields addressing the challenges of feeding a growing global population while managing environmental impacts on soil, water, and ecosystems. Key challenges involve heavy metal contamination, water scarcity, and climate-induced land degradation, while solutions focus on precision agriculture, nanotechnology, and circular economy approaches.

Challenges in Agro-geochemistry & Agro-geoEnvironment

Soil and Groundwater Contamination: Agricultural, industrial, and mining activities contribute to the contamination of soil and groundwater with toxic heavy metals such as As, Cd, Co, Cr, Cu, Pb, and Zn.

Water Scarcity and Salinity: Increased water demand for agriculture leads to depletion of freshwater resources and increasing salinity in soil and groundwater, particularly in arid regions.

Contaminant Transfer to Food: Hazardous heavy metals and metalloids accumulate in crops (bioaccumulation) from contaminated soil and water, posing risks to human health.

Emerging Contaminants: The widespread use of agricultural plastic films has increased microplastic pollution in farmland by 5%–8% annually.

Climate Change Impacts: Droughts, land degradation, and extreme events affect food quality and soil health, while increasing methane emissions, which can be mitigated to avoid significant warming.

Sustainabilitry

Solutions & Sustainable Approaches

Precision Agriculture and IoT: Using IoT-based smart irrigation systems and precision fertilization can enhance water-use efficiency by over 40% and improve nitrogen use efficiency from 30% to 60%.

Green Chemistry & Remediation: The application of natural minerals, nanomaterials, and carbonaceous materials can help treat contaminated soils and waters.

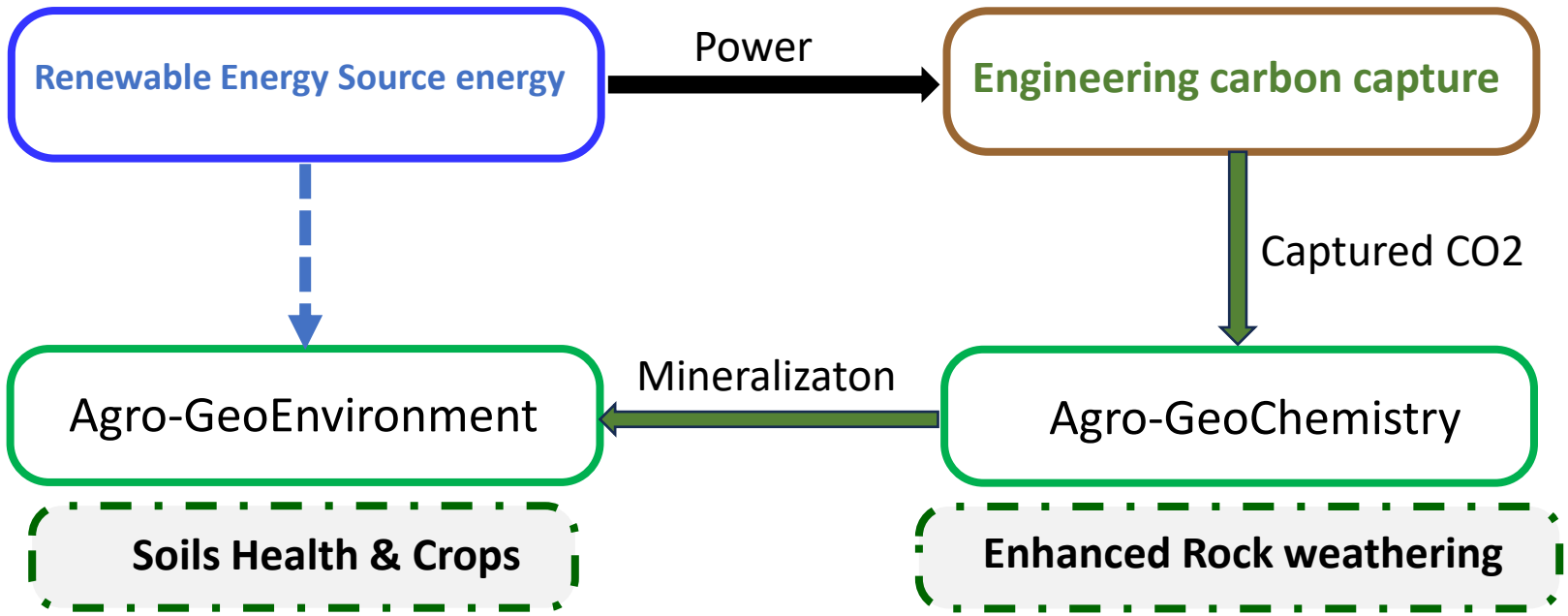
Circular Economy Solutions: Transforming agricultural and mining waste, such as fly ash, into useful, productive agricultural resources reduces environmental impact and improves sustainability.

Sustainable Farming Practices: Adopting agroecology and organic farming to improve biodiversity, enhance soil carbon sequestration (0.5–2.0 tons per hectare annually), and reduce synthetic chemical use.

Geochemical Mapping and Monitoring: Utilizing GIS and remote sensing to monitor soil geochemistry allows for better tracking of contaminant spread and better management of land use.

Sustainability & Future Outlook: Integrating geochemical insights into agricultural policy is crucial to ensure safety, such as monitoring soil-to-plant transfer of elements. Emerging research focuses on "One Health" approaches that link environmental geochemistry with animal and human health, ensuring that sustainable food systems do not jeopardize long-term environmental health.

Agro-geochemistry, Agro-geoEnvironment & Sustainability: Challenges & Solutions



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VIII International Symposium on Materials, Electrochemistry & Environment

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Improving water Governance for long-term sustainability by integrating decentralized systems, nature-based solutions (NBS), & circular economy approaches

Special Session

• Center of Materials Technology and Photonics, Hellenic Mediterranean University, Heraklion, Crete, Greece
• Laboratory of Applied Chemistry & Environment, ENSA, University of Ibn Zohr, Morocco
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Special Session, Call for paper

June 30, 2026 – Deadline for FP and WP (Second round)

August 31, 2026 – Deadline for FP and WP (Final round)

Freely accessible

Keywords: wastewater, decentralized systems, nature-based solutions, circular economy, water governance, resource recovery, constructed wetlands, agricultural fertilizers.

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Key elements & essential information of the session

Integrating decentralized systems, nature-based solutions, and circular economy approaches transforms water governance by shifting from centralized, linear models to resilient, localized loops. This triad maximizes resource recovery, reduces infrastructure stress, and empowers local stakeholders in decision-making. This session will be axing on 4 points: **I - Decentralized Systems:** (i) Localized treatment: Use small-scale neighborhood or building-level treatment units instead of massive centralized plants. (ii) Reduced energy costs: Cut down long-distance pumping energy needs. (iii) Scalable adaptation: Expand infrastructure incrementally as population needs grow. (iv) Risk mitigation: Prevent city-wide failures by isolating disruptions to single local nodes. **II - Nature-Based Solutions (NBS):** (i) ecological buffers: Implement constructed wetlands, rain gardens, and green roofs to manage stormwater naturally. (ii) Aquifer recharge: Direct treated runoff back into natural groundwater basins. (iii) Biodiversity support: Restore riparian zones to improve local river health and microclimates. (iv) Natural filtration: Use soil and plant root systems to remove heavy metals and excess nutrients. **III - Circular Economy Approaches:** (i) Resource recovery: Harvest nutrients like phosphorus and nitrogen from wastewater for agricultural fertilizer. (ii) Water reuse: Treat graywater on-site for toilet flushing, industrial cooling, or landscape irrigation. (iii) Closed-loop design: Eliminate the concept of "waste," treating spent water as a valuable regional asset. (iv) Economic incentives: Create local markets for reclaimed water and bio-based products. **IV - Governance & Policy Shifts:** (i) Polycentric management: Share decision-making power across municipal, community, and watershed levels. (ii) Inclusive participation: Involve local residents and farmers directly in managing local water budgets. (iii) Regulatory flexibility: Update rigid plumbing and health codes to safely permit decentralized reuse systems. (iv) Cross-sector collaboration: Link urban planning, agriculture, and environmental conservation into unified water policies. All authors and researchers interested in making a scholarly contribution at the conference are invited to submit an abstract by following the procedure described on the CIMEE26 information website. The accepted papers considered of having enough quality can be further considered by Advisory and review committee for publication in International Journals.

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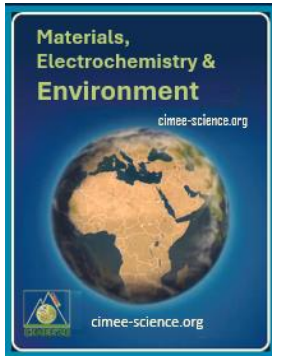
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D - Structural, Analytical & Physical Chemistry
E - Agro GeoEnvironment, Agrochemistry & Biogeochemistry
F - Biotechnology & phytochemistry for environmental sustainability
G - Climate change, Coastal & Marine Ecosystem
H - Bio-Green-Energy & Waste Treatment Technology

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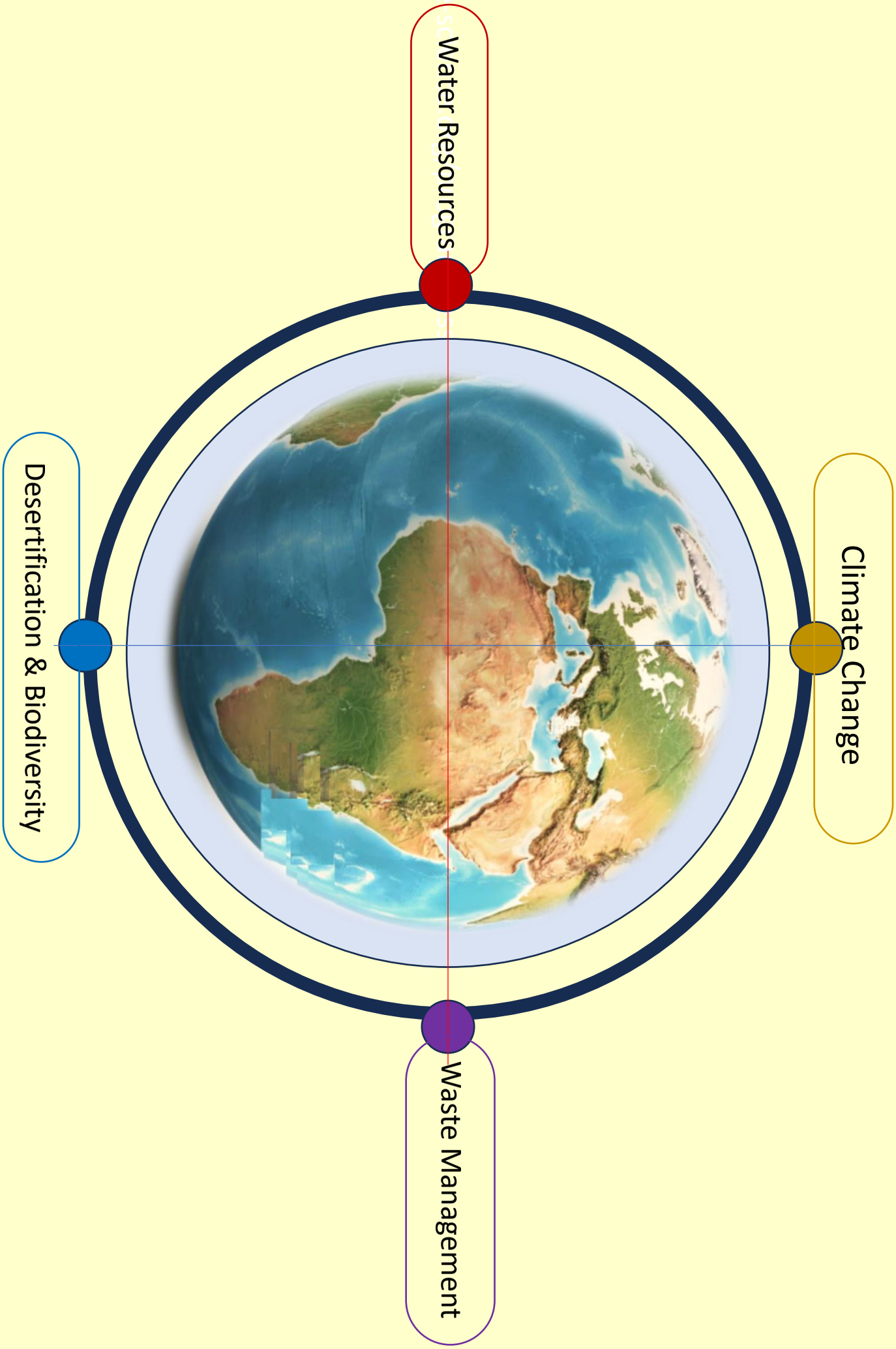
Important dates

Early Bird Registration
July 31, 2026

Abstract Submission Deadline:
Second Round Submission:
June 30, 2026
Final Round Submission:
August 31, 2026

General registration Deadline
September 10, 2026

The Mediterranean region is a global environmental HOTSPOT subjected to **extreme climatic & anthropogenic pressures**.



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