

The Energy, Environment and Water Research Center (EEWRC)



THE CYPRUS
INSTITUTE

RESEARCH • TECHNOLOGY • INNOVATION

Introduction

The Energy, Environment and Water Research Center (EEWRC) was launched in December 2007 as the first research center of The Cyprus Institute, a non-profit research and educational institution with a scientific and technological focus.

EEWRC works in close collaboration with the Massachusetts Institute of Technology (MIT), the Max Planck Institute for Chemistry in Mainz, Germany, the Cyprus Research Promotion Foundation (RPF), and many national institutions and organizations in Cyprus and the region on societally relevant issues related to Energy and Renewables, Environment and Climate, and Water and Natural Resources. Over the past few years, EEWRC has proven to be a leader in the area of Environmental and Climate research. The Atmospheric and Climate Research Group in particular, in close co-operation with the Max Planck Institute for Chemistry (MPIC) in Mainz, Germany, has established Cyl as a key player of Climate Research in the region and beyond.

EEWRC has been instrumental in providing evidence that the Eastern Mediterranean and Middle East region (EMME) is a climate change “hotspot” and how this impacts public health, ecosystem development, and water resources. The research has been nationally embedded through strong collaborations with the Ministry of Health, the Ministry of Agriculture, Natural Resources and Environment, and the Ministry of Energy, Commerce, Industry and Tourism.

Over the same period, EEWRC has established a number of unique and cutting edge environmental monitoring facilities that include an Unmanned Systems Research Facility with a fleet of unmanned aerial vehicles (UAVs) for atmospheric and earth surface observations that is unique to Cyprus and the region, an advanced analytical Laboratory for trace gases and aerosol analyses, and an evolving ground-based observatory in the Peristerona watershed in cooperation with a number of government research establishments.

Mission and Vision

Our world faces numerous challenges of political, economic and of societal nature. However, there is an increasing understanding that changing climatic conditions and associated impacts will pose additional risks and uncertainties for the coming decades.

Interactions and feedbacks between rapidly increasing multiple pressures on water supply, energy generation and food security can drive societal and environmental systems across critical thresholds in countries of the Eastern Mediterranean, the Middle East and North Africa (i.e., the MENA region). These pressures, including climate change, growing demand of resources and resource degradation, urbanization and globalization, cause unprecedented challenges for humanity. In addition, far-reaching political and societal changes have resulted in additional challenges for governments and populations in the MENA region, exacerbating the aforementioned problems. The MENA region being home to a combined population of approximately 350 million people is characterized by strong environmental gradients, climate extremes and diverse economic, social and cultural identities. From a global perspective, the region is a climate change “hot spot”. Adverse impacts of climate change throughout the 21st century are expected and major challenges in energy, water, food security and threats to environmental integrity are anticipated.

Given these perspectives, EEWRC’s research agenda has – from its beginning- been driven by a number of societal challenges that are closely related to climate changes and their impacts in the MENA region. The research agenda, aims at a comprehensive and integrated research program to address these challenges through the thorough understanding of regional climate and environment, the development of sustainable technologies, economic policies and efficient adaptation strategies aimed at ameliorating impacts.

Areas of Research

Research at EEWRC strives to be interdisciplinary and issue-driven, embracing the physical, chemical, biological and human/socio-economic sciences and is related to three major focus areas:

- Achieving a low carbon economy via the adoption of measures for energy efficiency and the employment of renewable energies to reduce the dependence on hydrocarbon energy sources;
- Understanding environmental integrity and global/climate change through observations, analytical analyses, and numerical modeling to derive effective mitigation and adaptation strategies;
- Enabling a sustainable management of water and other natural resources in arid and semi-arid environments.

Research activities are carried out within the framework of EEWRC's three established divisions, namely:

- Atmosphere and Climate
- Energy and Renewables
- Water and Marine Resources

The research agenda of the Centre is realized through a number of flagship and other projects, that are largely funded through external, competitive funds and revolve around the following themes:

- Environmental Research and Monitoring;
- Solar Energy and Desalination;
- Climate Change and Impact;
- Water Research and Management;
- Sustainability and Built Environment

Main projects/infrastructure

Environmental Monitoring

Within the framework of several French research projects (ENVI-MED “CyAr”, MISTRALS “ChArMEx”) and in collaboration with the Department of Labor Inspection of Cyprus, starting in 2015, a fully equipped atmospheric station is being setup at Agia Marina Xyliatou. This station measures in near-real-time key atmospheric pollutants in the gas and aerosol phase. Currently, there is no equivalent infrastructure in the Eastern Mediterranean that allows investigation of long-range transport from three continents (Europe, Africa, Middle East).

Over the course of 2015, this station has been integrated to international networks (EU-ACTRIS, <http://actris2.nilu.no/>; NASA-AERONET, <http://aeronet.gsfc.nasa.gov/>) and is an active component of Cyl EU projects (FP7-BACCHUS, H2020-ACTRIS2). The increasing visibility of this Cyl infrastructure represents a major asset for attracting international research teams working on hot scientific topics such as long-range transport of pollution, dust-cloud interactions, etc.

A joint ChArMEx-BACCHUS field campaign took place at Agia Marina Xyliatou in March 2015 with more than 30 scientists involved in an intensive (1-month) field study, the largest field campaign organized by Cyl in Cyprus.

Efforts are currently under way to perform long-term quality-controlled observations in close collaboration with CNRS in France, while trying to secure some strategic atmospheric equipment for the station that will become property of Cyl. Cyl has acquired for free (via donation), five Air Quality instruments (CO, SO₂, O₃) which will be installed at Agia Marina Xyliatou and will represent the first Cyl instruments deployed at Agia Marina Xyliatou.



Temporary runway for UAV platforms from Cyl and Meteo-France at Agia Marina Xyliatou (March 2015)



View of the station (September 2015)



Scientific instruments installed (March 2015)



View of the LIDAR sky screening from the roof platform of Cyl premises in Athalassa, Nicosia

People

EEWRC Scientific Expert Panel

The Cyprus Institute relies on the expert advice of a Scientific Expert Panel (SEP) to exercise scientific overview and steering for EEWRC. The SEP provides the Institute with independent scientific advice of the highest possible caliber on scientific issues and policy necessary for the development of EEWRC.

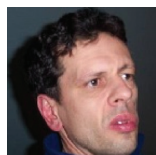
Chairman:



Ghislain de Marsily (France; Hydrology) is Professor Emeritus at the University Pierre et Marie Curie and a pioneer in the development of stochastic hydrogeology and inverse methods.



Loucas Christophorou (Greece; Energy) is a Member of the Academy of Athens where he holds the Chair of Physical Science-Experimental Physics.



Philippe Davy (France; Hydrogeology) is Director of Research at French National Centre for Scientific Research (CNRS) and a faculty member at the Department of Geosciences at the University of Rennes.



John Georgiadis (USA; Desalination) is Chair of the Department of Biomedical Engineering and the R. A. Pritzker Professor of Biomedical Engineering at the Illinois Institute of Technology.

Joanna D Haigh (UK; Climate and Environment) is Professor of Atmospheric Physics at Imperial College London, and co-director of the Grantham Institute for Climate Change and the Environment.



Zev Levin (Israel; Climate & Atmospheric Sciences) is the Goldenberg Chair Emeritus Professor in Atmospheric Physics at the Department of Geophysics and Planetary Science, Tel Aviv University.



Robert Pitz-Paal (Germany; Solar Energy) is the Co-Director of the Institute of Solar Research of the German Aerospace Center in Cologne, and professor of solar technology at RWTH Aachen.



Euripides Stephanou (Cyl Vice President for Research, ex-officio) is Professor of Environmental Organic Chemistry and Vice President for Research of Cyl.



The Cyprus Institute

P.O. Box 27456

1645 Nicosia, Cyprus

Tel. +357 22208600

Fax. +357 22208625

Email: info@cyi.ac.cy

www.cyi.ac.cy