Erasmus+ Programme of European Commission

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Erasmus+ 2021-2027: overview
Erasmus+ Programme in Short

Erasmus+ is the European Union's (EU) programme to support education, training, youth and sport in Europe via different Actions in the 2021-2027 period.

Erasmus+ includes a strong international dimension (i.e. cooperation with third countries not associated to the Programme) in mobility, cooperation and policy dialogue activities.

It supports European organisations in facing the global challenges brought about by globalisation, climate change and the digital transition through notably an intensification of international mobility and cooperation with third countries.

It enhances societal links through mobility, exchanges and capacity building, nurturing social resilience, human development, employability, active participation and ensuring regular channels for people-to-people cooperation by promoting values, principles and interests around common priorities.

Activities offer a response to the challenges of quality, modernisation and employability through an increased relevance and responsiveness of education for a green and sustainable socio-economic recovery, growth and prosperity.
### Erasmus+ 2021-2027: overview (II)

<table>
<thead>
<tr>
<th>General objective</th>
<th>Supporting educational, professional and personal development of people of all ages in education, training, youth and sport, in Europe and beyond</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participating countries</td>
<td>33 Programme Countries + international activities open to the rest of the World</td>
</tr>
<tr>
<td>3 Key Actions</td>
<td>Mobility – Cooperation – Policy Development</td>
</tr>
<tr>
<td>Implementing mode</td>
<td>Indirect (National Agencies) and Direct (EAC/EACEA)</td>
</tr>
</tbody>
</table>
Horizontal priorities

INCLUSIVE

DIGITAL

GREEN
Programme Actions (1): Education and Training

**Mobility**
- mobility of higher education students and staff
- mobility of VET learners and staff
- mobility of school pupils and staff
- mobility of adult education learners and staff
- language learning opportunities

**Cooperation**
- partnerships for cooperation, including small-scale partnerships
- partnerships for excellence, in particular European universities, Centres of Vocational Excellence, Erasmus Mundus Joint Master Degrees
- partnerships for innovation
- online platforms and tools for virtual cooperation

**Policy development**
- preparation and implementation of the EU general and sectoral policy agenda in education and training
- quality, transparency and recognition of skills and competences
- policy dialogue and cooperation with stakeholders
- qualitative and inclusive implementation of the programme
- cooperation with other EU instruments and support to other policy areas
- dissemination and awareness-raising activities

**Jean Monnet actions**
Jean Monnet in the field of higher education
Jean Monnet in other fields of education and training
Programme Actions (2): Youth

**Mobility**
- mobility of young people
- Youth participation activities
- DiscoverEU activities
- mobility of youth workers

**Cooperation**
- partnerships for cooperation, including small-scale partnerships
- partnerships for innovation
- online platforms and tools for virtual cooperation

**Policy development**
- preparation and implementation of the EU general and sectoral policy agenda in education and training
- quality, transparency and recognition of skills and competences
- policy dialogue and cooperation with stakeholders
- qualitative and inclusive implementation of the programme
- cooperation with other EU instruments and support to other policy areas
- dissemination and awareness-raising activities
Programme Actions (3): Sport

Mobility
- mobility of sport staff

Cooperation
- partnerships for cooperation, including small-scale partnerships
- not-for-profit sport events

Policy development
- preparation and implementation of the EU policy agenda on sport and physical activity
- policy dialogue and cooperation with relevant stakeholders
- qualitative and inclusive implementation of the programme
- cooperation with other EU instruments and support to other policy areas
- dissemination and awareness-raising activities
Current Research at Gebze Technical University in Water Infrastructure

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ADVANTAGEOUS LOCATION

GEBZE TECHNICAL UNIVERSITY

8 TECHNOLOGY DEVELOPMENT ZONES
18 INDUSTRIAL ZONES
35 RESEARCH AND DEVELOPMENT CENTERS (R&D CENTERS)
IT’S OFFICIAL: GTU IS ONE OF THE TEN RESEARCH UNIVERSITIES OF TURKEY

Out of 206 universities in Turkey, GTU is among the 10 universities that were officially designated by the Turkish Council of Higher Education as “research universities of Turkey” as of September 26, 2017.

GTU in the World League of Universities

Listed for the first time in:

THE WORLD UNIVERSITY RANKINGS

RANKED IN THE 601-800 BAND

One of the world’s most prestigious university rankings

The 2nd highest-ranked university among the Turkish state universities that succeeded in being listed for 2018

Emerging Economies University Rankings 2019

GTU RANKS IN THE 250-201 BAND

GTU AMONG TURKEY’S MOST ENTREPRENEURIAL AND INNOVATIVE UNIVERSITIES

In the Ranking of The Entrepreneurial and Innovative University Index, prepared in the leadership of TÜBİTAK (The Scientific and Technological Research Council of Turkey), GTU has risen to the 3rd position

2017 Top 3rd

2016 Top 7th

2015 Top 11th

2014 Top 12th
Student Numbers

Undergraduate Students: 6129
Graduate Students: 2886
Total: 9114 Students

748 TOTAL ACADEMICIANS (2021/2022)

113 PROFESSOR
79 ASSOC. PROF.
121 ASSIST. PROF.
12 INTERNATIONAL FACULTY
120 LECTURERS
303 RES. ASSIST.
International Collaborations Exchange Programs

The International Relations Office at GTU handles the operations related to the Erasmus+ programme and the Farabi and Mevlana programmes, and other bilateral agreements.
DISTRIBUTED INFRASTRUCTURE SYSTEMS

- Lifelines - Transportation Systems
- Lifelines - Utility Systems
  - Potable Water
  - Waste Water
  - Oil (crude or refined)
  - Natural Gas
  - Electric Power
  - Communication
Continuous Long Lines or Networks over a Populated Area
Los Angeles Water Supply System Damage, 1994 Northridge Earthquake (O’Rourke and Toprak, 1997)
Recent disasters in Turkey and Europe have shown that the scale and extent of the devastations from disasters have exceeded the expectations. As an example, in only one case, 82 of citizens (71 Kastamonu, 10 Sinop, 1 Bartın) lost their lives as a result of the floods that occurred in the cities of Bartın, Kastamonu and Sinop after the heavy rains that started in the Western Black Sea region on August 11, 2021.

This recognizable level of increase in the effects of disasters has been linked to climate change and extreme weather conditions and this new situation is expected to become a norm rather than exception in the coming years.
GLOBAL CHANGES IN DISASTER ISSUES

Disasters caused substantial damages not only to structures and the environment, but also to human life and all other living things.

The response and recovery stages from these catastrophic events took longer than planned and required prolonged efforts by governments, local authorities and volunteers.

Those disasters also proved awareness, preparedness and the needs for volunteer activities as the human resources of the authorities have been limited compared with the size of calamities.
SOLUTIONS REQUIRE MORE PRAGMATIC APPROACHES

Digital content, technologies and practices

Disaster prevention, preparedness and recovery

Environment and climate change

Social
PROWAT- PLANNING AND IMPLEMENTING A NON-REVENUE WATER REDUCTION STRATEGY IMPROVES THE PERFORMANCE OF WATER SUPPLY AND DISTRIBUTION SYSTEM

**INTRODUCTION**

**Importance of water loss reduction**

- Ecological aspects
- Hygienic aspects
- Economic aspects (water export, production costs)
- Security of supply:
  (for example, a 5 mm hole and 5 bar pressure can induce 32,000 litres of daily water losses. This corresponds to a daily drinking water demand for 266 persons at an average consumption of 120 l/P*d)
New Sources of Water
1. New Dams
2. River Sharing
3. Rain Water Harvesting
4. Desalination
5. Icebergs
# IWA ‘BEST PRACTICE’ STANDART WATER BALANCE

<table>
<thead>
<tr>
<th>System Input Volume (corrected for known errors)</th>
<th>Authorised Consumption</th>
<th>Billed Authorised Consumption</th>
<th>Billed Metered Consumption (including water exported)</th>
<th>Billed Unmetered Consumption</th>
<th>Revenue Water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unbilled Authorised Consumption</td>
<td>Unbilled Metered Consumption</td>
<td>Unbilled Unmetered Consumption</td>
<td>Non-Revenue Water (NRW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Losses</td>
<td>Apparent (Commercial) Losses</td>
<td>Unauthorised Consumption</td>
<td>Customer Metering Inaccuracies</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Real (Physical) Losses</td>
<td>Leakage on Transmission and/or Distribution Mains</td>
<td>Leakage and Overflows at Utility’s Storage Tanks</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Leakage on Service Connections up to point of Customer metering</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Water losses of water supply networks in the EU (%) (as averages of volume supplied)

(Source: National sources (Country Fiches). This figure gathers the national data available for different years, according to availability. * For Romania, Greece, Cyprus and Poland the figure presents average ranges)
Four Basic Methods of Managing Real Losses
Risk: Consequences x Likelihood of Failure

(from Thomson and Wang, 2009)
Aging Lifelines: Denizli Water Supply System

Pipelines before the replacement program (Gungor, 2009)
A JOINT EFFORT TO REDUCE HAZARDS TO THE ENVIRONMENT AND WATER RESOURCES BY REHABILITATING OPEN DUMPS
**PROJECT PROMOTER**

**PARTNERS**

Pamukkale University  
Denizli, Turkey

Silesian University of Technology  
Gliwice, Poland

Sofia University  
St. Kliment Ohridski  
Sofia, Bulgaria

Research and Development Center Biointech  
Sofia, Bulgaria

Petroleum-Gas University of Ploieşti  
Ploieşti, Romania

Denizli Metropolitan Municipality  
Denizli, Turkey

Comune di Fano  
Fano, Italy

**Associated Partners:**

- Chamber of Civil Engineers, Gebze, (Turkey)
- Chamber of Environmental Engineers, Denizli (Turkey)
- Unione Montana del Catria e Nerone-Network of Municipalities in the Apennine Mountains (Italy)
- ECO Knowledge GT and Research (Bulgaria)
- Organization and Manufacture of Bioproducts (Bulgaria)
- Polish Society of Circular Economy (Poland)
Worldbank (2021) states that open dumping accounts for at least 33 percent of waste in the world—extremely conservatively—not managed in an environmentally safe manner.

Global Treatment and disposal of Waste in the World

Global treatment and disposal of waste in percentages (Worldbank, 2021).
Before the landfill applications, solid wastes were disposed randomly to any area outside the city by open dumping. Even in the countries which started to use the landfill method, abandoned open dump sites continue to danger the environment and human health.

There are three significant and vital problems in the open dumps:

1) CH₄ gas, a greenhouse gas that’s 28 times more potent than carbon dioxide,

2) Leachate and the change in soil properties,

3) Structural stability in open dump sites.
## INTELLECTUAL OUTPUTS

<table>
<thead>
<tr>
<th>Output No</th>
<th>Intellectual Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>O1</td>
<td>Smart Decision Tool for Rehabilitation of Open Dumps</td>
</tr>
<tr>
<td>O2</td>
<td>Multilingual e-learning-platform</td>
</tr>
<tr>
<td>O3</td>
<td>Competence Tool</td>
</tr>
<tr>
<td>O4</td>
<td>Learning Modules</td>
</tr>
<tr>
<td>O5</td>
<td>Smart Guidance Manual</td>
</tr>
</tbody>
</table>

- The target groups benefit from these outputs and develop competences in various sustainability-relevant sectors so that they will be able to handle issues related to rehabilitation of open dumps.
## Multipler Events

<table>
<thead>
<tr>
<th>Workshop number</th>
<th>Workshop title</th>
<th>Responsible Partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>E5</td>
<td>Workshop IT</td>
<td>Italy</td>
</tr>
<tr>
<td>E1</td>
<td>Workshop TR</td>
<td>Turkey</td>
</tr>
<tr>
<td>E2</td>
<td>Workshop PL</td>
<td>Poland</td>
</tr>
<tr>
<td>E3</td>
<td>Workshop BG</td>
<td>Bulgaria</td>
</tr>
<tr>
<td>E4</td>
<td>Workshop RO</td>
<td>Romania</td>
</tr>
</tbody>
</table>
MULTILINGUAL E-LEARNING-PLATFORM

• The multilingual e-learning-platform includes the competence path of the learning process in smart devices and web platform according to Learning Outcomes (LO) and Training Units (TU) forming personalized training paths for specific professional competence and reference level.

• Training material is developed according to learning modules and units.
LEARNING MODULES

• The learning modules which are the part of specialized training curriculum focuses on key issues regarding rehabilitation of open dumps for environmental health and ecology.
• There are new developments and technologies available in the assessment and rehabilitation of open dumps.
• This intellectual output produces training modules covering basics, fundamental and the new developments and technologies (e.g., Toprak, et al., 2013).
• The target groups are expected to learn and apply these up to date information by using the training modules produced in this output.
• The output comprises nine modules including case studies from each country.
1. Adverse environmental effects of open dumps
2. Characteristics and important features of open dumps
3. Rehabilitation methods and engineering applications
4. Landfill gas and leachate management for rehabilitated sites
5. Monitoring of the rehabilitated sites
6. Financial aspects of rehabilitation
7. Re-use of rehabilitated sites
8. Risk-Assessment and safety measures
9. Case Studies (up to two for each country)
COMPETENCE TOOL

• The competence tool is based on modern learning outcomes (LO) which satisfy up to date and most recent requirements of the environmental regulations, rules, EQF and ECVET.

• This innovative tool is designed as smart adjusted according to pace and needs of individuals with free source of online education in the field of open dump rehabilitation.

• The output is expected to be influential in the way the learning content is produced.
Developing competences in sustainability-relevant sectors

There are different EU standards and tools to describe competences (e.g., Vassilev, et al., 2015). Some principal ones are:

- the e-competence framework (e-CF);
- the European qualifications framework (EQF);
- the European credit system for vocational education and training (ECVET);
- the European multilingual classification of skills, competences, qualifications and occupations (ESCO);
- the digital competence framework for citizens (DigComp);
- the entrepreneurship competence framework (EntreComp).
The Smart Decision Tool?

• There are many components and risk evaluations in deciding the best way for the rehabilitation of open dumps.

• The legal, technical, technological, environmental, and economical dimensions should be taken into account.

• These multi dimension considerations and complexity of the problem makes it a requirement to apply smart digital systems in the solution.

• Therefore, this study develops a smart decision tool for rehabilitation of open dumps which will be beneficial for decision makers, engineers, technicians, and vocational trainers.
SMART DECISION TOOL

• This smart tool guides them interactively through the open dump rehabilitation assessment process and help them for risk based optimum decisions.

• As the tool will be functioning in web platform and smart devices (e.g. android), it will be accessible worldwide a large number of people will benefit.

• The tool incorporates the algorithm and methodology developed in this output with available input from the user to guide the users to choose the best decision for the rehabilitation.
The process considers assessment of current environmental footprint, assessment of environmental impact of defined options of rehabilitations, and different types of impact resulting from emission to air, emission to waters (leachates), structural stability including slope failures, waste, use of resources, land occupation, relevance to circular economy concept.

Some airborne technologies, such as LiDAR can be integrated for monitoring and assessment purposes (e.g. Toprak, et al., 2018).

Some soil improvement techniques are available to enhance the stability conditions at sites against multiple hazards (Manav, et al., 2019).
VULNERABILITY OF THE SOUTH-WESTERN BLACK SEA COASTS TO SEA LEVEL RISE
Introduction

• Growing concerns about probable hazardous effects of the climate change led scientists to work about the topic from the perspective of various different scientific disciplines.

• Sea level rise is a major and popular concern, and its behaviour is in need of a better understandment.

• **Vulnerability** defined as «the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes» (IPCC, 2001).

• Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity (IPCC, 2001).

Literature:
Coastal vulnerability analysis methods

• Index based methods
  • Coastal vulnerability index (CVI)
  • Composite vulnerability index
  • Multi-scale coastal vulnerability index

• Indicator-based approach

• Geographic Information Systems (GIS) based decision support systems
  • DESYCO (DEcision Support SYstem for Coastal Climate Change Impact Assessment)
  • DITTY-DSS

• Methods based on dynamic computer models
  • RACE
  • DIVA (Dynamic Interactive Vulnerability Assessment Model)
  • SimClim (Simulator of Climate Change Risks and Adaptation Initiatives)
  • RegIS
  • Delft3D

Study area: South-western Black Sea

- 517 km coastline
- 7 provinces
- ~19 millions of population
- Two of the most important river discharges:
  - **Sakarya river**
    - Discharge: 137.47 m³/sn
    - Sediment discharge: 10662.5 ton/day
  - **Filyos river**
    - Discharge: 94.128 m³/sn
    - Sediment discharge: 50113 ton/day
- Highly sensitive locations: İğneada, Terkos, Karaburun; Riva, Ağva and Şile beach areas.
Method:
Index formula and parameters

• Data about physical and social condition of the SW BS has been collected from reliable data sources; and with remote sensing techniques. A grid system which is covering the entire study area (SW BS) is used for several reasons: spatially visualisation & interpretation of all the data, running the analysis and visualisation & interpretation of the results.

Coastal vulnerability index (CVI):

\[
CVI = \frac{(a \times b \times c \times d \times e \times f \times g)}{7}
\]

- \(a=CVI_{\text{geomorphology}}\)
- \(b=CVI_{\text{coastal slope}}\)
- \(c=CVI_{\text{shoreline change}}\)
- \(d=CVI_{\text{wave height}}\)
- \(e=CVI_{\text{beach width}}\)
- \(f=CVI_{\text{population density}}\)
- \(g=CVI_{\text{land use}}\)

Analysis parameters, their sources, data resolutions and vulnerability classes

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Source</th>
<th>Resolution</th>
<th>Vulnerability classes (1: least vulnerable, 5: most vulnerable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geomorphology</td>
<td>Manually</td>
<td>-</td>
<td>1: High cliff (&gt; 20 m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: Medium cliff (10-20 m)</td>
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<td></td>
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<td></td>
<td>3: Low cliff (&lt; 10 m)</td>
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<td></td>
<td></td>
<td></td>
<td>4: Cobble beach, estuary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5: Sandy beach, delta, bay, mangrove</td>
</tr>
<tr>
<td>Coastal slope (percent)</td>
<td>GEBCO</td>
<td>30 arc second</td>
<td>1: &gt; 0.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: 0.2 ~ 0.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: 0.07 ~ 0.04</td>
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<td></td>
<td></td>
<td></td>
<td>4: 0.04 ~ 0.025</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5: &lt; 0.025</td>
</tr>
<tr>
<td>Shoreline change (m/year)</td>
<td>Analysis based on LANDSAT satellite images</td>
<td>-</td>
<td>1: &gt; 2 (accretion)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: Between 2 and 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: Between +1 and -1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4: Between -1 and -2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5: &lt; -2 (erosion)</td>
</tr>
<tr>
<td>Significant wave height (m)</td>
<td>MIKE 21 SW Model</td>
<td>0.25 degree</td>
<td>1: &lt; 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: Between 2 and 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: Between 4 and 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4: Between 5 and 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5: &gt; 6</td>
</tr>
<tr>
<td>Mean beach width (m)</td>
<td>Beach database</td>
<td>-</td>
<td>1: No beach</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: &gt; 150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: 100 ~ 150</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4: 50 ~ 100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5: &lt; 50</td>
</tr>
<tr>
<td>Population density (person/km²)</td>
<td>Turkish Ministry of Environment and Urban Planning, Turkish Statistical Institute</td>
<td>1 km</td>
<td>1: Water bodies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: Vegetation, forests</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3: Wetlands, green urban areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4: Agriculture, construction</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5: Urban, industry, sensitive areas</td>
</tr>
<tr>
<td>Land use</td>
<td>Corine Land Cover 2012</td>
<td>100 m</td>
<td>1: Water bodies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2: Vegetation, forests</td>
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<td>3: Wetlands, green urban areas</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>5: Urban, industry, sensitive areas</td>
</tr>
</tbody>
</table>
Conclusions

• Highly vulnerable areas are located in Karaburun, Kilyos, Riva, Sahilköy, Şile, Kefken, Sakarya River mouth-Kocaali coasts where low-lying sandy beaches exists.

• The least vulnerable areas are located on the Eastern part of the study area (Ereğli-Zonguldak) where cliffed coasts with high slope exists.

• CVI is an easy to apply method, but it should be applied by the researchers who is familiar with the study area or opinions of the experts should be taken into consideration.

• Although highest available resolution is used for the data, accuracy of the analysis expected to be rise together with the advancement in technology.

• This is the first vulnerability analysis study conducted on the SW Black Sea coast. For the future studies, analysis can be advanced using methods such as Analytic Hierarchy Process.

• Sediment transport models can be conducted on the highly vulnerable coasts. The effects of different management alternatives can be compared in these models.
Wave Power projections for the 21st century in the Black Sea

Ocean Renewables

OCEAN RENEWABLES

Installed Capacity Trends
Navigate through the filters to explore trends in renewable energy

©IRENA
Project goals

• MAIN GOAL: TO ESTIMATE THE WAVE ENERGY POTENTIAL AND ITS CHANGE THROUGHOUT THE 21ST CENTURY
  • TO DOWNSCALE THE WIND DATA WITH A COARSE RESOLUTION
  • TO CARRY OUT A SPECTRAL WAVE MODELLING FOR WAVE HEIGHT AND PERIOD
  • COMPUTING WAVE POWER: SPATIAL MAP, TIME CHARACTERISTICS ETC.
  • DIFFERENCES BETWEEN THE SCENARIOS AND CLIMATE MODELS
STUDY AREA:
BLACK SEA

**DATA**

**General Circulation Models (GCMs)** are primary tools to understand both the historical and future conditions of climate variables (Wu et al., 2017).

The wind data from two different CMIP5 GCMs by The Geophysical Fluid Dynamics Laboratory (GFDL) of United States National Oceanic and Atmospheric Administration (NOAA) are used to force the spectral wave model:

- GFDL-CM3
- GFDL-ESM2M

The horizontal resolution of the models is approximately 200 km (2.5° and 2.0 ° for longitudes and latitudes, respectively). The temporal resolution of these data is 3-hourly. The data is acquired for RCP 4.5 and RCP 8.5 scenarios.

To downscale the GCM data to the regional scale in the Black Sea, the **ERA-Interim** atmospheric reanalysis dataset is used as a reference. The spatial and temporal resolution of the data is 0.25° x 0.25°, and 6-hourly, respectively.
CONCLUSIONS

A basin-average value of 4.2 and 4 kW/m wave power calculated respectively for CM3 and ESM2M models in the historical period.

An increasing trend is seen in the CM3 model, where wave power showed to be increased by 0.5 kW/m in the middle-South part of the sea, for the 4th period and RCP 4.5 scenario. For the RCP 8.5 scenario, the increase happened earlier in the 2nd period.

For the ESM2M model, the increase in wave power is clearer for the 4th period for the RCP 4.5 scenario and the 1st period for the RCP 8.5 scenario. On the other hand, wave power decreases along vast areas of the basin, reaching to 1 kW/m comparing to the historical period.

Inter-annual variability is greater for the CM3 model, especially in the Eastern part of the basin. Inter-annual variability of differences between the models is greater for the RCP 4.5 scenario and the Eastern part of the basin.

Monthly average values calculated on the time series for thirteen selected points showed that December has the greatest wave power values, reaching even 20 kW/m in the 2080-2099 time frame for CM3 RCP 4.5 scenario at the central part of the basin.

Acknowledgments

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