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*Climate Services: Science and Education*

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Odesa, Ukraine



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'CLIMATE SERVICES:  
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The proceedings of the international research-to-practice conference on 'Climate Services: Science and Education' are presented in the collected volume. The reports cover the principle results of researches in the field of issues of climate services in the climate-sensitive economic sectors; education in climate services; climate risks and adaptation to climate change on regional and local levels.



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***EDUCATION IN CLIMATE SERVICES***

## **TRAINING COURSE FOR EXPERTS IN CLIMATOLOGY AND METEOROLOGY “INTRODUCTION TO CLIMATE CHANGE”**

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Climate change is one of the deepest and complex issues affecting our society and economy change may turn out to be even more serious than previously thought. Despite the continuing uncertainty about the detailed relationships, extreme weather events are increasingly associated with human intervention, and there is growing emphasis on the need to prepare for and adapt to climate change. To gain an understanding of the impacts of climate change, it is important to identify the vulnerabilities and opportunities for the region.

This course (<https://re.climed.network/course/view.php?id=5&section=3>) will be of interest to all staff in meteorological services organizations, especially managers and leaders who are responsible for understanding the challenges of climate change, its impact on the environment and its associated risks. Government officials, civil society wishing to learn about the issue of climate change were also welcomed.

The aim of this course is to educate meteorological professionals, senior and mid-level meteorological leaders, and empower them to gain a deeper understanding of climate change processes for forecast and warning services in a way that will allow users to fully understand the impact of hazardous extreme weather events as well possible adoption of appropriate mitigation measures.

At the end of the course, students will be able to:

1. Analyze causes and effects of climate change
2. Use knowledge about the physical mechanisms of climate system formation and scenarios of its development to assess the possible consequences of climate change.
3. Use research databases on climate time series.
4. Provide consumers with information on hazardous weather conditions and risk factors for decision-making.

The main target of this training - to give an introduction to climate change, its impacts on the natural environment and human societies, and possible strategies for mitigation and adaptation. On completion of this course, students will be able to:

The course has the following contents:

1. Introduction to Climate Science and Climate Change:
  - The climate system and its components.
  - The Carbon cycle.

- Climate variability and climate change.
  - *Climate change scenarios and pathways.*
  - Trends in global and regional climate.
2. Causes of Climate Changes and Intensification.
- Past climate investigations and tools to detect its change over time
  - Natural causes and factors contributing to climate change.
  - Human activities contributing to climate change.
  - Climate Intensification: floods, droughts, heat waves, rainfalls etc.
3. Impacts of Climate Change on People and Environment
- Adaptation to climate change at various levels.
  - Climate change and biodiversity.
  - Climate change and agriculture.
  - The economics of climate change.
  - IPCC Assessment Reports and mitigation strategies.

Classroom course is for the main topics of lectures and practices. Some of the practical exercises the students may do at home or in groups in the classrooms helping each other. Reading materials will be distributed online and the lecturer will be available online at the dedicated time for consultation.

Learning activities will mainly consist of theoretical lectures (in group, may be online) and classroom practice exercises and case studies that will be done individually or as a group study. Case studies will be used past, real-time and future time series to let the students get the spatiotemporal distribution on climate indicators to analyze the climate extremes and climate changes.

Practice exercises will be suggest to retrieve climate data from different sources and generate special purpose time series (e.g. using Climate Explorer database). Main tasks in exercises will be devoted to computation of the basic climate products, such as normals, anomalies and climate Indices, such as those defined by the WMO. Students will be use the software applications for produce graphics, maps and reports based on the climate forecasts and projections.

In the first lesson planned Online Test Input Control, which will be used to identify the level of participants. This test task will be one option, which will contain 10 questions for each topic of the course.

At the end of each topic (3 topics), there will be an oral interview of students and a discussion on problematic topics. At the end of the training, Control Tests are conducted on each topic. Both theoretical and practical questions will be included in the testing.

The course will be conducted by blended learning. Online test input control, which will be used to identify the level of participants. The theoretical course will be carried out online for availability of training materials and student mobility.

In order to help us better evaluate the effectiveness of the training curriculum and improve our training activities, students will invite to complete the Post-Training Questionnaire.

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Наукове електронне видання

**МІЖНАРОДНА НАУКОВО-ПРАКТИЧНА  
КОНФЕРЕНЦІЯ «КЛІМАТИЧНЕ ОБСЛУГОВУВАННЯ:  
НАУКА І ОСВІТА»**

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22-24 вересня 2021

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