Set of Online Tutorials

Recordings for CLUVEX trainings & course modules

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This document is the "Set of online tutorials/ recordings for the CLUVEX training and course modules" for moderators and students participating in Virtual Exchanges (CLUVEX) week.

This document is the submitted version of the "Initial test of the Climate University's pilot course". The document has been written by the CLUVEX teams of the University of Helsinki (UH, Finland), Mechnikov Odessa National University (ONU, Ukraine), Taras Shevchenko National University of Kyiv (TSNUK, Ukraine), Yerevan State University (YSU, Armenia), University of Copenhagen (UCPH, Denmark), and the Bioart Society, Finland.

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1. CLUVEX Moderators' Trainings

The WP3 on "Virtual Exchanges (VEs) for staff (Moderators/ Facilitators - University teachers, researchers, advanced students/ young researchers) was focused on online training of interested persons (from the CLUVEX project Partners/Teams) to serve as the moderators during the Virtual Exchange Weeks for Students.

During May - September 2024, the CLUVEX project prepared, arranged and carried out 5 main trainings (TR) online: TR1 - CLUVEX concept & technical skills - 8 May 2024 (started at 14:00 EET time) - [65 participants]; TR2 - Climate University MOOCs - 14 May 2024 (same time as above) - [44]; TR3 - Soft skills - 27 May 2024 (same time as above) - [30]; TR4 - CLUVEX handbooks & materials – 5 Sep 2024 (same time as above) - [40]; and TR5 - CLUVEX Climate Horizon exercise & tools for climate data – 12 Sep 2024 (same time as above) - [46].

Moreover, the last TR6 - Moderators-get-together took place on 27 Sep 2024 (same time as above) - [34 participants], when the moderators had an opportunity to meet online and to ask questions remaining questions before the start of the 1st VE Week (14-18 Oct 2024).

All the CLUVEX Tutorials and Materials for the registered Moderators and Students are openly distributed on the DigiCampus platform. Students and Moderators have their own DigiCampus e-platform(s).

Moderators: https://digicampus.fi/course/view.php?id=5195

Students: https://digicampus.fi/course/view.php?id=5193

For the wider distributions the materials are also public available on the website "based on request" at https://www.atm.helsinki.fi/cluvex/?page_id=119

1.1. Training 1: CLUVEX concept and technical skills

The 1st training for moderators included presentations/ oral talks: (1) CLUVEX project & Virtual Exchange (VE) concept overview (by Hanna K. Lappalainen, UHEL); (2) VE Week Programme (by Alexander Mahura, UHEL); (3) Registration & DigiCampus for materials (by Aleksi Vauhkonen, UHEL); and (4) How to use Zoom for moderating the discussion in a break-out rooms (by Petri Clusius, UHEL). Each presentation was followed by questions and answers.

The presentation "**CLUVEX project & VE concept overview**" includes the following topics: the CLUVEX project (https://www.atm.helsinki.fi/cluvex) basic info, partners/ teams, general aim, online learning - future of education, project stages in workflow for VEs, dissemination, upscaling, and international networking; project staff members; welcome to act as a CLUVEX moderator, 1st VE Week for students 14-18 October 2024, CLUVEX moderators' training programme - 5 events/trainings; what moderators will gain; Climate University online courses - as bonus for students (BSc, MSc, PhD, PostDocs) who have participated in CLUVEX VE Weeks and became the Climate Messengers are encouraged to take the CU online courses (https://climateuniversity.fi); next steps to follow.

- TR1_slides_CLUVEX_Concept_HKLappalainen.pdf
- videorecording of the TR1 for moderators : CLUVEX-TR1_2024-05-08.mp

The presentation "**VE Week Programm**e" includes the following topics: Virtual Exchange (VE) Week for students – approach; Outlined programme – Days 1-5 (Mon-Fri); Preparatory materials - 3 guidebooks (VEG, CLG, CMC) – as a pre-task; Lectures (1-8) on climate related

data; Web-based tools (1-3) for visualisation, analysis and interpretation for climate related data; Work in groups on "Climate Horizon" group exercise; Learning outcomes (competencies and skills obtained); Earned bonuses for students; Welcome to Climate University Online Courses (relevant to CLUVEX project).

- TR1_slides_Programme_VEWeek_AMahura.pdf
- videorecording of the TR1 for moderators : CLUVEX-TR1_2024-05-08.mp

The presentation "**Registration & DigiCampus for materials**" includes the following topics: DigiCampus main opening page; How to register for Open University and on DigiCampus for: (i) students from Finnish Universities/ educational institutions (through Haka), and (ii) foreign students, physically residing in other countries (open new account); for assessing course (the Virtual Exchange (VE) Week for students) - use a course key. After accessing/login into DigiCampus, you will be redirected to the source domain. Materials in this domain are downloadable and include lectures, tools, exercises, supporting materials. Credits can be registered in the system for students (1 ETCS) and for moderators (3 ETCS) including required submission of individual reports prepared by students and moderators at the end of the VE Week.

- TR1_slides_Registration_DigiCampus_AVauhkonen.pdf
- videorecording of the TR1 for moderators : CLUVEX-TR1_2024-05-08.mp4

The presentation "**Managing Zoom**" in a high stress environment includes the following topics: several rules: Rule #1 - Keep it simple, Rule #2 - Practise in advance, and Rule #3 - Invest in good audio. The focus is on break-out rooms: such rooms have only the basic Zoom features: camera/microphone (as host also mute/stop for others), gestures (raise/lower hand for questions etc.); chat; screen sharing (and start/stop participant's share); moving to another room. Practise in advance (general, act as a speaker, act as moderator/host with guest speakers); and invest in good audio. Additional guides: Basic Zoom Meeting Settings (https://www.youtube.com/watch?v=mHt2sZUYEx4); Joining a Zoom Meeting (https://www.youtube.com/watch?v=pAMDxH_H_Cs); Basic In-Meeting Navigation (https://www.youtube.com/watch?v=Dcd6nNmtGo0); A playlist of Zoom guides (https://www.youtube.com/playlist?list=PLKpRxBfeD1kGl3UM5cE6oOOFf67mZN0fg).

- TR1_slides_Managing_Zoom_PClusius.pdf
- videorecording of the TR1 for moderators : CLUVEX-TR1_2024-05-08.mp4

1.2. Training 2: Climate University MOOCs

The 2nd training for moderators included presentations/ oral talks: (1) Climate University MOOCs (by Laura Riuttanen, UHEL); (2) DigiCampus registration (by Maria Dominguez, UHEL). Each presentation was followed by questions and answers.

The presentation "**Climate University MOOCs**" includes the following topics: Climate University (CU) and Partners of CU; Climate University mission 2023-2027 including CU values;

CU for Virtual exchanges (link to CLUVEX); CU course online learning materials, solid pedagogy, multidisciplinary collaboration and reflective; examples of CU courses; who can take the courses; content of CU MOOC courses such as Climate.now, Sustanable.now, Biodiversity.now; examples of activities on online courses (independent study, teacher-led sessions, peer-reviewed exercises, and group work)

- TR2_slides_Climate_University_LRiuttanen.pdf
- TR2_slides_Climate_University_LRiuttanen.mp4

The presentation "**DigiCampus registration**" includes the following topics: DigiCampus for moderators; welcome area, list of trainings for moderators (in May and Sep 2024); switching roles between student and moderator; announcements and moderators' discussion forum; credits for moderators; training materials (video-recordings and slides); additional materials for the VE Week (CLG, CMC, VEG).

- TR2_video_DigiCampus_Registration_MDominguez.mp4

1.3. Training 3: Soft skills

The 3rd training for moderators included presentations/ oral talks: (1) Soft Skills in Facilitating Online Classrooms (by Liisa Kalkowski, UHEL); (2) Soft skills for the VE week (by Arsen Aproyan, YSU); and (3) Procedure for unexpected situations (by Valeriay Ovcharuk, OSENU). Each presentation was followed by questions and answers.

The presentation "**Soft Skills in Facilitating Online Classroom**" includes the following topics: introducing Reflection Exercise; how to prepare; beginning of a session; how to give Instructions; oral activation; facilitating free flow conversation; taking and giving space; the end of a session; what to do if there is a problem; navigating English as a foreign language; trust the process; Reflection Exercise summary.

- TR3_slides_Soft_Skills_LKalkowski.pdf
- TR3_slides_Soft_Skills_LKalkowski.mp4

The presentation "**Soft skills for the VE week**" includes the following topics: basic definitions; soft skills for the VE Week for students: Communication (active listening, verbal and nonverbal communication, written communication, presentation skills); Leadership (Problem-solving, Coaching and mentoring, Management, Strategic thinking); Teamwork (conflict resolution, mediation, accountability, collaboration); Creativity (brainstorming, imagination, curiosity, experimentation); Time management (planning, goal-setting, delegation, time blocking); Adaptability (flexibility, resilience, growth mindset, analysis); Problem-solving (critical and strategic thinking, analysis, initiative); Work ethic (punctuality, reliability, professionalism, discipline); Critical thinking (analysis, evaluation, deductive reasoning, synthesis); Conflict management (empathy, negotiation, mediation, conflict resolution); Emotional intelligence (self-awareness, empathy, social skills, motivation).

- TR3_video_Soft_Skills_AAproyan.pdf
- TR3_video_Soft_Skills_AAproyan.mp4

The presentation "**Procedure for unexpected situations**" includes the following topics: time matters; targeted instructions on different alerts or what to do in cases of air raid, artillery shelling, finding explosives devices, chemical threat, radiation hazard and algorithms of actions; importance of obtaining accurate information, applications of receiving operational information; rules of conduct in shelters; what not to do in situations of military threat; how to survive in a crisis and stay calm; tips for coping (getting out of a stressful situation).

- TR3_video_Soft_Skills_VOvcharuk.pdf
- TR3_video_Soft_Skills_VOvcharuk.mp4

1.4. Training 4: CLUVEX handbooks and materials

The 4th training for moderators included presentations/ oral talks: (1) Virtual Exchange Guidebook, VEG (by Alexander Mahura, UHEL); (2) Climate Literacy Guidebook, CLG (Alexander Mahura, UHEL); and (3) Climate Messenger Code of Conduct, CMC (Alexander Mahura). Each presentation was followed by questions and answers.

The presentation "**VEG**" includes the following topics: aspects on importance and challenges of VE in climate education and training, CLUVEX project as a reference for the lessons learnt on VEs, planning and implementation of VEs, incl. key considerations for planning VE (incl. work organization, education, students, moderators, technical e-setups, evaluation, assessment, studying and developing VE concept, science communication and scaling up).

- Slides: CLUVEX_Tr4_VEG_GuideBook_vfin.pdf
- Video: CLUVEX_Tr4_VEG_guidebook.mp4

The presentation "**CLG"** includes the following topics: aspects on how to use the guidebook, VE Week (programme, lectures, tools, group exercise, questionnaires), lectures' short description, tools for visualisation and analysis of climate related data, climate change related concepts and terminology , as well as appendixes (incl. recommended reading, environmental data visualization tools and databases, description of the CLUVEX VE Week – as a course, and Climate University online courses).

- Slides: CLUVEX_Tr4_CLG_GuideBook_vfin.pdf
- Video: CLUVEX_Tr4_CLG_guidebook.mp4

The presentation "**CMC**" includes the following topics: aspects of the CLUVEX Climate Messenger's education material and exercise, code of conduct during Climate Messenger education, instructions for interaction and communication during the VE Week, instructions for unexpected situations, code of conduct as Climate Messengers after the CLUVEX project completed.

- Slides: CLUVEX_Tr4_CMC_GuideBook_vfin.pdf
- Video: CLUVEX_Tr4_CMC_guidebook.mp4

1.5. Training 5: CLUVEX Climate Horizon exercise and tools for climate data

The 5th training for moderators included presentations/ oral talks: (1) Climate Horizon exercise and your role as a moderator (by Julia Karhumaa, UHEL); (2) Instructions for Individual/ personal and common/collective Climate Horizon exercises (by Julia Karhumaa, UHEL); (3) ERA-5 Past Climate Explore (PCE) tool (by Alexander Mahura, UHEL); (4) Shared Socioeconomic Pathways (SSPs) Tool (by Stefan Fronzek, SYKE); and (5) Intergovernmental Panel on Climate Change (IPCC) Atlas Tool (by Risto Makkonen, UHEL/FMI). Each presentation was followed by questions and answers. The tools were also demonstrated online (i.e., on how these work in practice) to all participants of the training, and then participants had an opportunity to practice as well.

The presentation "**Climate Horizon exercise and your role as a moderato**r" includes the following topics: exercise is based on an approach of Utopian pedagogy; What does this mean for you as moderators? "Communicate to students that the aim of the exercise is to use their imagination and to dream, brainstorm; and that students need to abandon too realistic and 'rational' ways of thinking for a moment"; example: guidelines for the discussion; work with Miro collaborative tool; individual Climate Horizon (multidisciplinary approach); options for implementation (description of own living environment in a hopeful future; a free-style text as a letter or a diary entry, an artistic presentation, etc.); Group Exercise (based on the group members' own Climate Horizons; on Miro Board / PowerPoint).

The presentation "**Instructions for Individual/ personal and common/collective Climate Horizon exercises**" includes the following topics: instructions for the VE Week for students on how to work on the Climate Horizon Group Exercise; Climate Horizon process on day-by-day basis; individual and group Climate Horizons are created in a week-long process during the exchange; Climate Horizon tasks: reports on Personal/Individual and on Common Collaborative Climate Horizon exercise(s).

- TR5_Climate_Horizon_Concept_JuliaKarhumaa.pdf
- TR5_Climate_Horizon_Exercise_JuliaKarhumaa.pdf
- TR5_Climate_Horizon_Concept_Exercise_JuliaKarhumaa.mp4

The presentation "**ERA-5 Past Climate Explore (PCE) tool**" included the following topics: how to visualize historical climate statistics for any geographical location around the world (https://era5.lobelia.earth/en); interactive map; user-friendly menu for selecting location on a globe, meteorological parameter, and calculating statistics on aggregate period - average year or month (*see more details in Chapter 3.1*).

- Slides: Tool1_ERA5_PCE_AlexanderMahura.pdf
- Video1: Tool1_ERA5_PCE_Intro_AlexanderMahura_P1.mp4
- Video2: Tool1_ERA5_PCE_Demo_AlexanderMahura_P2.mp4

The presentation "**Shared Socioeconomic Pathways (SSPs) Tool**" included the following topics: global scenario framework used in exercises on socioeconomic trajectories for

describing past and future socio-economic trends of chosen countries. Scenarios for climate change research and need for scenarios; using https://data.worldbank.org/indicator, https://tntcat.iiasa.ac.at/SspDb (*see more details in Chapter 3.2*).

- Slides: Tool2_SSP_StefanFronzek.pdf
- Video: Tool2_SSP_StefanFronzek.mp4

The presentation "**Intergovernmental Panel on Climate Change (IPCC) Atlas Tool**" included the following topics: interactive and novel tool for flexible spatial and temporal analyses of much of the observed and projected climate change information (https://interactive-atlas.ipcc.ch); explore global and regional observed data and model simulations and helps to investigate the effects of climate change in specific regions, to assess changes in mean climate at regional scales, in particular observed trends and their attribution and projected future changes (*see more details in Chapter 3.3*).

- Slides: Tool3_IPCC-Web-Atlas_RistoMakkonen.pdf
- Video: Tool3_IPCC-Web-Atlas_RistoMakkonen.mp4

2. Lectures on climate related topics

All lectures (slides and video-recordings) are available in the DigiCampus area for both registered moderators and students (available upon request), and after the end of the project will be freely available on the CLUVEX public website.

2.1. Navigating Planetary Boundaries: Our Blueprint for a Sustainable Future

Lecturer: **Inna Khomenko**, Odessa State Environmental University (now Mecnikov's Odessa National University), Ukraine

The main topics are: concept of Planetary Boundaries (PBs) – a scientific framework that delineates the safe operating space for humanity within the bounds of our planet's capacity to support life. Framework includes interlinked PBs – ranging from climate change and biodiversity loss to freshwater use and ocean acidification. For ensuring a sustainable future for generations, you need to see warning signs provided by PBs. This means adopting measures to mitigate climate change, protect biodiversity, conserve freshwater resources, and safeguard oceans.

- Slides: L1_NavigatingPlanetaryBoundaries.pptx
- Video: L1_Video_NavigatingPlanetaryBoundaries.mp4

2.2. Climate Change, Disasters, Carbon-neutrality and UN Sustainable Development Goals

Lecturer: **Alexander Baklanov**, Niels Bohr Institute, Copenhagen University, Denmark

The main topics are: climate trend & future projections; large weather disasters: economic losses & mortality; climate change & sustainable development; main drivers of climate change; greenhouse gases (GHG): new records & trends; wildfires contribute to CO2 emissions; heat health risks, pollution & vector-borne/water-borne diseases increasing; climate change & food security; water availability & population growth 2050; GHG monitoring: from "Top-Down" to "Bottom-Up"; emission control: co-benefits for environment & climate; global warming and cities: towards climate-smart & sustainable urban developments.

- Slides: L2_ClimateChange_Disasters_Carbon_Neutrality_UN_SDGs.pdf
- Video: L2_ClimateChange_Disasters_Carbon_Neutrality_UN_SDGs.mp4

2.3. Climate Change Impact on Water Resources

Lecturers: **Sergiy Snizhko & Olga Shevchenko**, Taras Shevchenko National University of Kyiv, Ukraine

The main topics are: importance for society and ecosystems; need of water for agriculture, energy production, navigation, recreation, manufacturing, etc.; water distribution as seawater and freshwater (in glaciers, + groundwater, rivers, lakes); different ways of impacts of climate change on world's water; IPCC reporting (aspects of human-induced warming, climate-related extreme events, frequency of heavy precipitation events, extreme droughts, etc.); declining water resources availability and increasing climate refugees.

- Slides: L3_Climate_Change_Impact_on_Water_Resources.pdf
- Video: L3_Video_Climate_Change_Impact_on_Water_Resources.mp4

2.4. Nature Hazards – Floods

Lecturer: **Valeriya Ovcharuk**, Odessa State Environmental University, Ukraine (now at Mechnikov's Odessa National University, Ukraine)

The main topics are: weather and climate-related extremes: economic losses; consequences of catastrophic floods including floods of different origin, and their periodicity, affected population, etc.; causes of floods in different parts of the planet due to the main source of feeding: on plain rivers - snowmelt, in high mountains - melting of snow and glaciers, in monsoon and tropical zones - result of spring and summer precipitation, etc.; classification of floods (low, high, significant, catastrophic); databases on economic damage caused by weather and climate-related extreme events.

- Slides: L4_Nature_Hazards_Floods.pptx
- Video: L4_Video_Nature_Hazards_Floods.mp4

2.5. Impacts of Climate Change and Future Outlook

Lecturer: **Hasmik Movsesyan**, Yerevan State University, Armenia

The main topics are: anthropogenic activities contributing to climate change – climate change drivers – deforestation and land use changes, energy sector, industrial production, transport, waste management, agricultural practices; key impacts of climate change - rise in global temperatures, extreme weather events, sea-level rise, ocean acidification, loss of biodiversity, impact on agriculture, health impacts, social and economic impacts; research on future scenarios to predict climate change; knock-on effects for different communities and sectors that depend on natural resources, including agriculture, fisheries, energy, tourism, and water.

- Slides: L5_Impacts_of_Climate_Change_and_Future_Outlook.pdf
- Video: L5_Video_Impacts_of_Climate_Change_and_Future_Outlook.mp4

2.6. Climate Change, Mitigation and Adaptation Strategies

Lecturer: **Hasmik Movsesyan**, Yerevan State University, Armenia

The main topics are: mitigation and adaptation - 2 interconnected approaches people can take in addressing climate change; mitigation involves efforts to decrease greenhouse gas emissions and control the extent of global warming; adaptation focuses on initiatives to assist people in coping with both present and future impacts of climate change; climate change mitigation – clean and renewable energy, carbon capture and storage, carbon pricing, enhanced waste management, sustainable agriculture, afforestation and green infrastructure; climate change adaptation – water harvesting, improving irrigation efficiency, restoring degraded ecosystems, agroforestry adaptation, crop diversification, building sea walls.

- Slides: L6_Climate_Change_Mitigation_and_Adaptation_Strategies.pdf
- Video: L6_Video_Climate_Change_Mitigation_and_Adaptation_Strategies.mp4

2.7. Artistic Research and Critical Thinking at Intersection of Art, Science and Society

Lecturer: **Yvonne Billimore**, Bioart Society, Finland

The main topics are: introduction to the field of art and science, sharing concepts and processes which encourage you to adopt your own methods of artistic and critical engagement within the CLUVEX Climate Horizon Group Exercises; encouraging students to engage in processes which combine scientific and artistic methods with embodied and situated knowledge. This lecture is offering some tools and exercises for fieldwork research that supports embodied, relational and critical thinking such as: (i) observational documentation, note taking and drawing; (ii) sensing and listening practices; (iii) prompts for asking the “other question” (leaning intersectional feminism) and considering other perspectives and less dominant narratives.

- Slides: L7_ArtisticResearchAndCriticalThinking.pdf
- Video: L7_Video_ArtisticResearchAndCriticalThinking.mp4

2.8. Towards Sustainable Futures: Pedagogy of Concrete Utopias

Lecturer: **Antti Rajala**, University of Helsinki, Finland

The main topics are: utopia revised, utopia as method: reflexive, provisional, dialogical, blueprint; concrete/ real utopias: concrete utopias leverage actual potentials for change in the existing activity, related with hope (Bloch, 1986); contrasted with abstract utopias, which express desire; real utopias (Wright, 2007); institutional innovations are crucial in preparing societies for more comprehensive and far-reaching transformations; real utopias as waystations: e.g., participatory city planning, Wikipedia, universal basic income; examples: Alternative forms of food production; Bicycles on the move!; Climate warriors. Model of a pedagogy of concrete utopias: Phase 1: Utopian archaeology - identifying and making utopias visible; Phase 2: building concrete utopias - envisioning, taking steps on vision in local context; Phase 3: critiquing and reflecting on utopias in democratic dialogue. Utopia project: https://www.utopiaproject.fi/en.

- Slides: L8_Towards_Sustanable_Future_Utopia.pptx
- Video: L8_Towards_Sustanable_Future_Utopia.mp4

3. Tools for climate related data visualisation and analysis

The main Tools introduced and demonstrated during the CLUVEX Trainings-for-Moderators in order to work jointly with students during the VE-Week-for-Students on individual and collective Climate Horizon exercises included: (1) the ERA-5 Past Climate Explore tool (https://era5.lobelia.earth) for Environment and Data Visualization | Mapping Past & Present; (2) the SSPathways tool (https://data.worldbank.org/indicator & https://tntcat.iiasa.ac.at/SspDb) for Socio-Economic Drivers of Climate Change | Mapping Past & Drafting Future; and (3) the Intergovernmental Panel on Climate Change (IPCC) Atlas tool (https://interactive-atlas.ipcc.ch) for Climate Scenarios | Mapping the Future.

All descriptions and demonstrations for tools (slides and video-recording) are available in the DigiCampus area for registered both moderators and students (available upon request), and after the end of the project will be freely available on the CLUVEX public website.

3.1. Past Climate Explorer (PCE) Tool

Lecturer: **Alexander Mahura**, University of Helsinki, UHEL, Finland

| Past & Present | Environment and Data Visualization | Past Climate Explorer (PCE) Tool (https://era5.lobelia.earth/en) is used to visualize historical climate statistics for any geographical location around the world. Click anywhere on the interactive map or search for a city to explore the typical monthly climate and discover how the climate has changed over the past years. The tool is driven by ERA5 (ECMWF Reanalysis v5) - the 5th generation ECMWF

(European Centre for Medium-Range Weather Forecasts) atmospheric reanalysis of the global climate. ERA5 describes the global history of the atmosphere, using a combination of forecast models and data assimilation systems to “reanalyse” past observations.

For the PCE tool, the user-selectable parameters include the following. The Geographical location: click by mouse on the interactive map at any geographical location over the globe OR manually edit the location's coordinates (longitude and latitude) to generate location-specific climate statistics. The Parameter: Global average fields (for 1981-2010 period) to visualize in the interactive map. The available options are average, maximum, and minimum air temperatures; frost days and warm nights; precipitation; rainy, heavy rainy, and very heavy rainy days; relative humidity; average wind speed and wind gusts; cloud cover. The Statistics: aggregation period: average “year” and average “month” (January – December) for parameters listed above.

- Slides: Tool1_ERA5_PCE_AlexanderMahura.pdf
- Video1: Tool1_ERA5_PCE_Intro_AlexanderMahura_P1.mp4
- Video2: Tool1_ERA5_PCE_Demo_AlexanderMahura_P2.mp4

3.2. Shared Socioeconomic Pathways (SSPs) Tool

Lecturer: **Stefan Fronzek**, Finnish Environment Institute, SYKE, Finland

| Past & Future | Socio-Economic Drivers of Climate Change | Shared Socioeconomic Pathways (SSPs) Tool is a global scenario framework used in exercises on socioeconomic trajectories for describing past and future socio-economic trends of chosen countries. Scenarios for climate change research and need for scenarios: (1) scenarios are alternative and plausible images of how the future can unfold; (2) scenarios are not forecasts or predictions, but can help to explore uncertain developments; (3) Future climate change impacts and responses depend on both changes in the climate and changes in socioeconomic conditions.

To use indicators from the World Bank Open data (https://data.worldbank.org/indicator) it is possible to indicate drivers of climate change by affecting GHG emissions and carbon storage, to determine the exposure or the vulnerability of society to climate change impacts. To describe future projections of GDP and population for selected SSPs own of country vs. other countries (https://tntcat.iiasa.ac.at/SspDb). To expand own already obtained results by additional socio-economic indicators from the SSP Extensions Explorer (https://ssp-extensions.apps.ece.iiasa.ac.at), and compare own results for population and GDP projections vs SSP 3.0 release (https://data.ece.iiasa.ac.at/ssp).

- Slides: Tool2_SSP_StefanFronzek.pdf
- Video: Tool2_SSP_StefanFronzek.mp4

3.3. Intergovernmental Panel on Climate Change (IPCC) Atlas Tool

Lecturer: **Risto Makkonen**, Finnish Meteorological Institute, FMI & University of Helsinki, UHEL, Finland

| Future | Climate Scenarios | **Intergovernmental Panel on Climate Change (IPCC) Atlas Tool** (https://interactive-atlas.ipcc.ch) is interactive and novel tool for flexible spatial and temporal analyses of much of the observed and projected climate change information underpinning the Working Group I contribution to the Sixth Assessment Report, including regional synthesis for Climatic Impact-Drivers (CIDs). It is a tool to explore global and regional observed data and model simulations and helps to investigate the effects of climate change in specific regions, to assess changes in mean climate at regional scales, in particular observed trends and their attribution and projected future changes.

Groups of CIDs are organized in the following six categories: (1) Heat and cold; (2) Wet and dry; (3) Wind; (4) Snow and Ice; (5) Coastal; and (6) Other (air pollution weather; atmospheric CO2 at the surface; radiation at the surface). The synthesis information available for each of the sub-continental reference regions corresponds to 2 categories for which there is evidence over the sub-continental reference regions: (1) Regional historical trends and attribution, indicating upward or downward trends, with or without attribution; and (2) Projected changes and confidence, indicating increasing/decreasing projected changes with low/medium/high confidence around 2050 if 2°C of global warming is reached.

- Slides: Tool3_IPCC-Web-Atlas_RistoMakkonen.pdf
- Video: Tool3_IPCC-Web-Atlas_RistoMakkonen.mp4

3.4. Additional tools

- **Climate Explorer** - tool to investigate the climate related data: https://climexp.knmi.nl/start.cgi & https://climexp.knmi.nl/plot_atlas_form.py
- **CDO (Climate Data Operators)** – tool set for working on climate and NWP model data: https://code.mpimet.mpg.de/projects/cdo
- **IDV (Integrated Data Viewer)** – 3D geoscience visualization and analysis tool: https://www.unidata.ucar.edu/software/idv
- **Metview** – application incl. powerful data access, processing, visualization: https://confluence.ecmwf.int/display/METV
- **Visualization with Python** – https://matplotlib.org & https://matplotlib.org/stable/gallery/index.html

4. Guidebooks

The main CLUVEX guidebooks prepared for moderators and students include: the Virtual Exchange Guidebook (VEG), the Climate Literacy Guidebook (CLG), and the Climate Messenger Code of Conduct (CMC). All guidebooks (slides and video-recordings) are available in the

DigiCampus area for registered both moderators and students (available upon request), and after the end of the project will be available on the CLUVEX public website. The deliverables as reports - the VEG (Del 2.1), CLG (Del 2.2), and CMC (Del 2.3) are publicly available on the CLUVEX website.

4.1. Virtual Exchange Guidebook (VEG)

VEG includes aspects on importance and challenges of VE in climate education and training, CLUVEX project as a reference for the lessons learnt on VEs, planning and implementation of VEs, incl. key considerations for planning VE (incl. work organization, education, students, moderators, technical e-setups, evaluation, assessment, studying and developing VE concept, science communication and scaling up).

- Report: https://www.atm.helsinki.fi/cluvex/wp-content/uploads/2024/09/CLUVEX_VEGguidebook_ver2.pdf
- Slides: CLUVEX_Tr4_VEG_GuideBook_vfin.pdf
- Video: CLUVEX_Tr4_VEG_guidebook.mp4

4.2. Climate Literacy Guidebook (CLG)

The content of CLG includes the following sections: Forewords; How to use the CLG guidebook; **Part1**: Virtual Exchange (VE) Week (programme, lectures, tools, group exercise, questionnaires); **Part 2**: Lectures (note, each lecture includes a summary description with representative illustration(s) with (a) take a look: link(s) to internet with relevant video-recording(s); (b) reflexive questions: a list of a few reflexive questions; and (c) read more: a list of a few references or relevant reading); **Part 3**: Tools (short descriptions of user-friendly tools to examine regions from local to global scales: i.e., for **(1)** Past Climate Explorer (PCE) Tool for Past & Present | Environment and Data Visualization; **(2)** Shared Socioeconomic Pathways (SSPs) Tool for Past & Future | Socio-Economic Drivers of Climate Change; and **(3)** IPCC Atlas for Future | Climate Scenarios; **Part 4**: Includes 3 principal CLUVEX thematic areas (Environmental and climate change, Climate action, environment, and nature protection; Green skills) and climate change related concepts and terminology (describes general concepts for a basic understanding of VE Week topics.

CLG also includes Appendixes: **(1)** Recommended reading (list of recommended reading, references); **(2)** Environmental data visualization tools and databases (SmartSMEAR and ERDA tools related to environmental and climate sciences); **(3)** the CLUVEX VE Week – as a course; and **(4)** Climate University and online MOOC courses (where you could learn free of charge more about climate change topics after the VE Week).

- Report: https://www.atm.helsinki.fi/cluvex/wp-content/uploads/2024/10/CLUVEX_CLGguidebook_ver2.pdf
- Slides: CLUVEX_Tr4_CLG_GuideBook_vfin.pdf
- Video: CLUVEX_Tr4_CLG_guidebook.mp4

4.3. Climate Messenger Code of Conduct (CMC)

CMC includes aspects of the CLUVEX Climate Messenger's education material and exercise, code of conduct during Climate Messenger education; instructions for interaction and communication during the VE Week, honest learning during the VE Week, guarantee working environment, excluding negative behaviour, language barrier (note that VE Week official working language is English), using tools such as Google Translator and Chat in zoom, using help of moderator or friends; instructions for unexpected situations: issues with remote connection, participants from Ukraine working in warlike conditions; code of conduct as Climate Messengers after the CLUVEX project completed. The CMC is prepared in English, Ukrainian, and Armenian languages. The obtained list of learning outcomes and skills. The main earned bonuses for students include: 1 ECTS credit by University of Helsinki, CLUVEX Certificate, Status of Climate Messenger, and Welcome to Climate University Online Courses.

After the VE Week the students as the Climate Messengers are ready to: **(1)** Communicate actively on topics like climate change and air quality interactions, weather and extreme events, nature hazards, impacts of climate change on society, and future outlook; **(2)** Discuss mentioned above topics at different arenas like scientific conferences, workshops, meetings and in own local communities; **(3)** Contribute competently to the climate awareness and sustainability strategies in own home organisations and work life; **(4)** Promote, integrate and follow environmentally friendly life- and working style; **(5)** Participate actively (with critical and science-based perspectives) in sustainable national and international policymaking, business, and nature resources´ uses.

- Report: https://www.atm.helsinki.fi/cluvex/wp-content/uploads/2024/04/CLUVEX_Del2.3_CMC_submitted-1.pdf
- Slides: CLUVEX_Tr4_CMC_GuideBook_vfin.pdf
- Video: CLUVEX_Tr4_CMC_guidebook.mp4