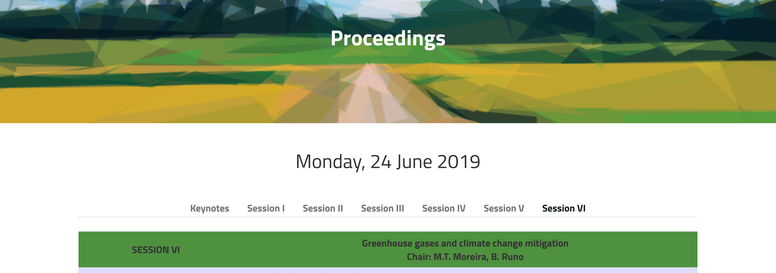

# Proceedings

## Monday, 24 June 2019

Keynotes | Session I | Session II | Session III | Session IV | Session V | **Session VI**

| SESSION VI | Greenhouse gases and climate change mitigation<br>Chair: M.T. Moreira, B. Runo |
|---|---|
| 16.15-16.30 | I. Camara-Salim, S. Bello, G Feijoo, MT Moreira<br>Identifying new sugar sources and their environmental impacts<br>PDF |
| 16.30-16.45 | B. Ruffino, S. Borzooei, G. Campo, A. Cerutti, D. Panepinto, V. Riggio, G. Scibilia, E. Lorenzi, M.C. Zanetti<br>Sludge management and greenhouse gas (GHG) emissions at a wastewater treatment plant (WWTP): getting some clues on a possible nexus<br>PDF |
| 16.45-17.00 | M.T. Moreira, L. Lijó, I. Noya, O. Piñeiro, L. López-Carracelas, B. Omil, M.T. Barral, A. Merino, G. Feijoo<br>Environmental implications of honey production in three dierent Galician natural parks<br>PDF |
| 17.00-17.15 | M.P. Papadopoulou, E. Chalepli, A.-C. Papadopoulou, A. Lekka, N. Mellios, C. Laspidou<br>Assessing Climate Change impacts of Greek energy mix based on LCA<br>PDF |
| 17.15-17.30 | K. P. Tsagarakis<br>GHG Emissions Analysis for Alternative Wastewater Byproduct Disposal Practices<br>PDF |
| 17.30-17.45 | Yoomi Kim, Katsuya Tanaka, Shunji Matsuoka<br>Environmental and Economic Impact of the Kyoto Protocol<br>PDF |
| 17.45-18.00 | É. Erdélyi<br>Carbon dioxide emission, possibilities of reducing it in the food chain<br>PDF |
| 18.00-18.15 | S. Theodoridou<br>In the service of Responsible consumption and production (Goal 12) & Climate action (Goal 13): Development of a Local Agenda 2030: a case study<br>PDF |

## Tuesday, 25 June 2019

Keynotes | Session VII | Session VIII | Session IX | **Session X** | Session XI | Session XII

| SESSION X | Climate projections and impacts on the water sector: Part B<br>Chair: M. Zachariou-Dodou, M. Papadopoulou |
|---|---|
| 14.30-14.45 | S. Guggenberger, W. Hafner, L. See, S. M. Oswald, B. Hollosi, M. Zuvela-Aloise, A. Storch, G. Prokop, W. Schieder<br>Using Urban Climate Modelling to Support Climate Change Adaptation in Small- to Medium-sized Cities in Austria<br>PDF - Presentation |
| 14.45-15.00 | G. Kitsara, T. van der Schriek, C. Giannakopoulos, B.E Psiloglou<br>Future climate change: projections of indices relevant to agriculture in the Aegean region<br>Presentation |
| 15.00-15.15 | H. Kaufmann, M. M. Blanke<br>Can forcing partially substitute for lack of chilling?<br>PDF - Presentation |
| 15.15-15.30 | D. Charchousi, M.P. Papadopoulou, C. Papadaskalopoulou, A. Karali, C. Giannakopoulos, M. Loizidou<br>Assessing climate change impacts on drought severity in Mediterranean islands using the Standardized Precipitation Evapotranspiration Index (SPEI)<br>Presentation |
| 15.30-15.45 | S.D. Nerantzaki, N.P. Nikolaidis, D.T. Hristopulos<br>Evaluation of the uncertainty of the impact of climate change on ow, sediment and nitrate predictions at the Koiliaris Critical Zone Observatory<br>PDF |
| 15.45-16.00 | Ch. Doulgeris, V. Pisinaras, E. Tziritis, E. Hatzigiannakis, A. Panagopoulos<br>Climate change impact assessment on the establishment of maximum water level in Lake Vegoritida, Greece<br>PDF - Presentation |
| 16.00-16.15 | S. Nabih, O. Tzoraki, L. Benaabidate, P. Zanis<br>Assessment of the vulnerability and the climate change impact on the water resources of an insular Mediterranean Watershed<br>PDF |
| 16.15-16.30 | A.G. Koutroulis<br>Vulnerability of Mediterranean water resources under high-end climate change. Recent development and challenges ahead, from regional to local scales<br>PDF - Presentation |
| 16.30-16.45 | M. Elhag, J. A. Bahrawi<br>Sedimentation Mapping in Shallow Shoreline of Arid Environments Using Active Remote Sensing Data<br>PDF - Presentation |

## Poster Session

1. Wenchao Wu, Gen Li
Distributional impact of elevated $CO_2$ on the deciency of zinc, iron, and protein
PDF

2. A. Chrysargyris, O. Antoniou, I. Ioannou, P. Xylia, M. Stavrinides, N. Tzortzakis
Heat and drought stress can alter the physiology of Marathefiko local Cyprian grapevine variety
PDF

3. A. Kakouri, M. B. Korras Carraca, T. Kontos, C. Matsoukas, N. Hatzianastassiou, A. A. Floutsi, E. Kostopoulou
An 11 - year global 3D climatology and trends of aerosol optical depth using satellite data from CALIOP
PDF

4. D. Xevgenos, M. Argyrou, M. Marcou, M. Mortou, F. Kupper
Desalination in view of environmental and climate change impacts: the case study of Cyprus
PDF

5. K. Kerpely, V.M. Farkas, Zs. Hercig
Natural Water Retention Measures Harnessed for Climate Change Adaptation in Rural Hungary
PDF

6. R. Ionce, N. Ardeleanu, Legal
Institutional and Financial Aspects of Romanian State's Approach to Climate Change
PDF

7. D. Skrzypczak, K. Mikula, A. Witek-Krowiak
Hydrogel composites as eco-friendly materials for water storage
PDF

8. V. Pisinaras, G. Sismani, A. Panagopoulos, G. Arampatzis
Investigating the potential effects of climate change on agricultur-al water management in two Mediterranean watersheds
PDF

9. H. Fraga, J. Santos
Climate change impacts and adaptation measures for viticulture in Portugal
PDF

10. A.R. Fonseca, J. Santos
Potential impacts of climate change on hydrology and water resources of the Tâmega River, Portugal
PDF

11. H.K. Kim
Impacts of land use and climate changes on the optimal selection of best management practices in agricultural areas
PDF

12. M. Mikos-Szymańska, M. Wyzińska, J. Grabiński, A. Sulek
The effect of superabsorbent polymer application on spring wheat productivity
PDF

13. M. Katzy, I. Kłosok-Bazan, A. Rak, M. Wzorek
Environmental impact of nitrogen use in agriculture: Case study of selected farms characterized by various types of animal production
PDF

14. E. Arnone, G. Stavridis, L. Ortolani, A. Rammos, M. Cucchi, A. Gkiourou, S. Dal Gesso, M. Petitta, V. Psomas
The Drought-Alert Decision Support System for water resources management
PDF

15. A.H.Faiz, F.I. Abbas, I.Z. Faiz
A Rhetoric to Climate change Fashion: base of the biomass pyramid is an underestimated carbon sink ; A case study of Toli Pir National Park Azad Kashmir, Pakistan
PDF

16. D. Ghorbani, M. Raeini-Sarjaz, M. Nadi
Evaluation of the effect of global warming on the trend of chilling requirement hours of walnut trees in southern aspect of Alborz mountain range in north of Iran (case study Shahrud region)
PDF

17. A. Karditsa, A. Tsapanou, M. Hatzaki, S.E. Poulos
Meteorological forcing and coastal flooding: The case of Evros River delta
PDF

18. J. Reihmanis, L. Zvingule, J. Kazotnieks, R. Rotbergs
Low emission farming and farm economic viability: multiple win-win solutions for farm resilience demonstrated within the project Climate Responsible Agriculture for Latvia (LIFE CRAFT)
PDF

19. E. Wheida
The benefits of sustainable water use in Libya
PDF

20. S. Kavoukis, E. Peleka, K. Triantafyllidis, A. Zouboulis
Valorization of Microalgae towards added value chemicals and fuels
PDF

21. S. Papadopoulos, N. Hliaoutakis, A. Kydonakis, M. K. Doula, N. Papadopoulos, A. Sarris
A web-based application for calculating environmental footprint of marketable products
PDF

22. A. Matiatos, Y. Troyanos, M. K. Doula
Pancratium maritimum, the sea daodil, under the threat of climate change
PDF

23. M. Elhag, I. Gitas, A. Othman, J. Bahrawi, A. Psilovikos
Time Series Analysis of Remotely Sensed Water Quality Parameters in Arid Environments, Saudi Arabia
PDF

24. M. Elhag, I. Gitas, A. Othman, J Bahrawi
Effect of Water Surface Area on the Remotely Sensed Water Quality Parameters of Baysh Dam Lake, Saudi Arabia

25. F. Doukalianou, M. Orfanoudakis, G. Spyroglou, K. Radoglou, S. Stefanou, K. Kitkidou, E. Milios, A. Lagomarsino
Annual effects of thinning intensities on litterfall production and nutrient concentration, and their correlation with soil GHG fluxes in a peri-urban forest in Greece
PDF

26. C. Dibari, G. Padovan, P. Merante, L. Leolini, J.C.A. Santos, M. Bindi, M. Moriondo
Transferring scientific knowledge of climate change impact on European viticulture: the ClimaVitis project
PDF

27. C. Giannakopoulos, A. Karali, V. Tenentes, J. Denman, H. Hamele, T. H. Zakonjšek, A. Cauchy, G. Dubois, S. Almond, C. Buontempo
Fire danger products in Copernicus Climate Change Service ($C_3S$) European Tourism

28. T. van der Schriek, C. Giannakopoulos , K. V. Varotsos
The impact of future climate change on bean cultivation in the Prespa Lake catchment

29. E. A. Varouchakis, G. A. Corzo, I. Trichakis, G. P. Karatzas
Groundwater quantity and quality improvement in Messara basin, Crete

30. V. Szűcs, GY. Dudás
Adapt to changes - Vision of the Hungarian food system
PDF

31. E. Cosenza, D. Luise
Presentation of the LIFE Veneto ADAPT project




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# Future climate change: projections of indices relevant to agriculture in the Aegean region

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Keywords: regional climate model, climatic indices, Aegean, climate change.
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In order to identify the most vulnerable regions and prioritize future interventions in the Aegean area, potential future climate changes are examined using projections derived from state-of-the-art Regional Climate Model (RCM) simulations developed within the framework of EURO-CORDEX (Coordinated Regional Climate Downscaling Experiment). In addition valuable information, based on observational data from installed meteorological stations, for selected areas in Andros island are used to provide a solid basis for comparisons with changes projected in frequency, duration and intensity for the future climate. This work is part of the LIFETERRACESCAPE project that aims to demonstrate at the Aegean island of Andros the use of drystone terraces as green infrastructures resilient to climate change impacts. The islands of the Aegean are characterised by strong relief and low vegetation cover and are listed as a region of high desertification risk (Giorgi, 2006; Zanis et al., 2008). The impacts of climate change such as decreased rainfall, temperature increases, and extreme weather phenomena, are expected to affect significantly agricultural production, biodiversity, soil structure, and, as a result, local economic activities (JRC, 2014). For millennia terraces allowed the cultivation of island areas with poor and dry soils, reducing soil erosion and wildfire risk.

In order to study the micro-climate change in Andros after land-use modifications, seven automated meteorological stations were installed in representative locations during 2018 and five more will be installed during 2019, providing basic meteorological parameters such as air temperature and relative humidity. A time series analysis of the collected observational data will be performed, focusing on extreme events such as heatwaves and floods. For future projections, the RCA4 regional climate model SMHI (Collins et al., 2011; Martin et al., 2010) with boundary conditions from the global HadGEM- ES model of the Met Office Hadley Centre (MOHC) was found to give the best results for the Aegean region following detailed evaluation. Geographical maps for the Aegean were constructed for depicting changes in climatic indices based on model simulations of daily maximum - or minimum temperature (resp. Tmax and Tmin) and daily total precipitation (PR) at a horizontal resolution of approximately 12km. Model data spanning 1950 to 2098 were split into a control period (1971-2000) and two future periods, the “near future” period from 2031 to 2060 and the "distant future" period from 2069 to 2098, that were compared and evaluated. Changes in climate indices between control and future periods are examined under two new IPCC (2013) emissions scenarios, namely the RCP4.5 and the RCP8.5, representing the medium mitigation scenario and the high emission scenario with no climate mitigation policies, respectively. The selected climatic indices which directly or indirectly affect agriculture in the examined areas, are: mean Tmax or Tmin temperatures (absolute index); Number of days with: Tmax>30$^{o}$C (hot days), Tmax> 35$^{o}$C (heatwave), Tmin> 20$^{o}$C (tropical nights) and Total Precipitation -PR; Maximum length of dry spell (consecutive days with PR<1mm). The results show annual averaged Tmax and Tmin increases in the range of 4-6$^{o}$C across the wider Aegean region in the near- and distant future, especially under the RCP8.5 climate change scenario. All extreme temperature indices are projected to increase considerably in the future. Hot days show large increases, reaching up to 75-80 days/year in the E-N Aegean (Figure 1) in the distant future, while tropical nights are to double and triple in the near- to distant future for all Aegean Islands. Total annual precipitation is to decrease significantly in the distant future, by 15-25%, while the maximum length of dry spells shows large increases across the Aegean under both RCP scenarios with increases by 50% in the SE Aegean (Figure 1). These results generally are in agreement with studies focusing on changes in temperature and rainfall extremes (e.g. Diffenbaugh et al., 2007; Giannakopoulos et al., 2009). The future vegetation cover and composition is likely to change under influence of the declining annual PR and the increasing length of dry spells. Using the observational data from the meteorological stations installed throughout the project, the anticipated improvement of the micro-climate of the areas after the land-use changes will be 'quantified', providing information on how frequent, long or intense an extreme event was in the past and how will become in the future. In that case, the TERRACESCAPE project will take advantage of the Land Stewardship practices and their climate adaptation features to improve agricultural ecosystem resilience, promote sustainable and climate change adapted island economies and support a modern, extensive and climate smart agricultural sector for the Mediterranean islands, with benefits for local societies.

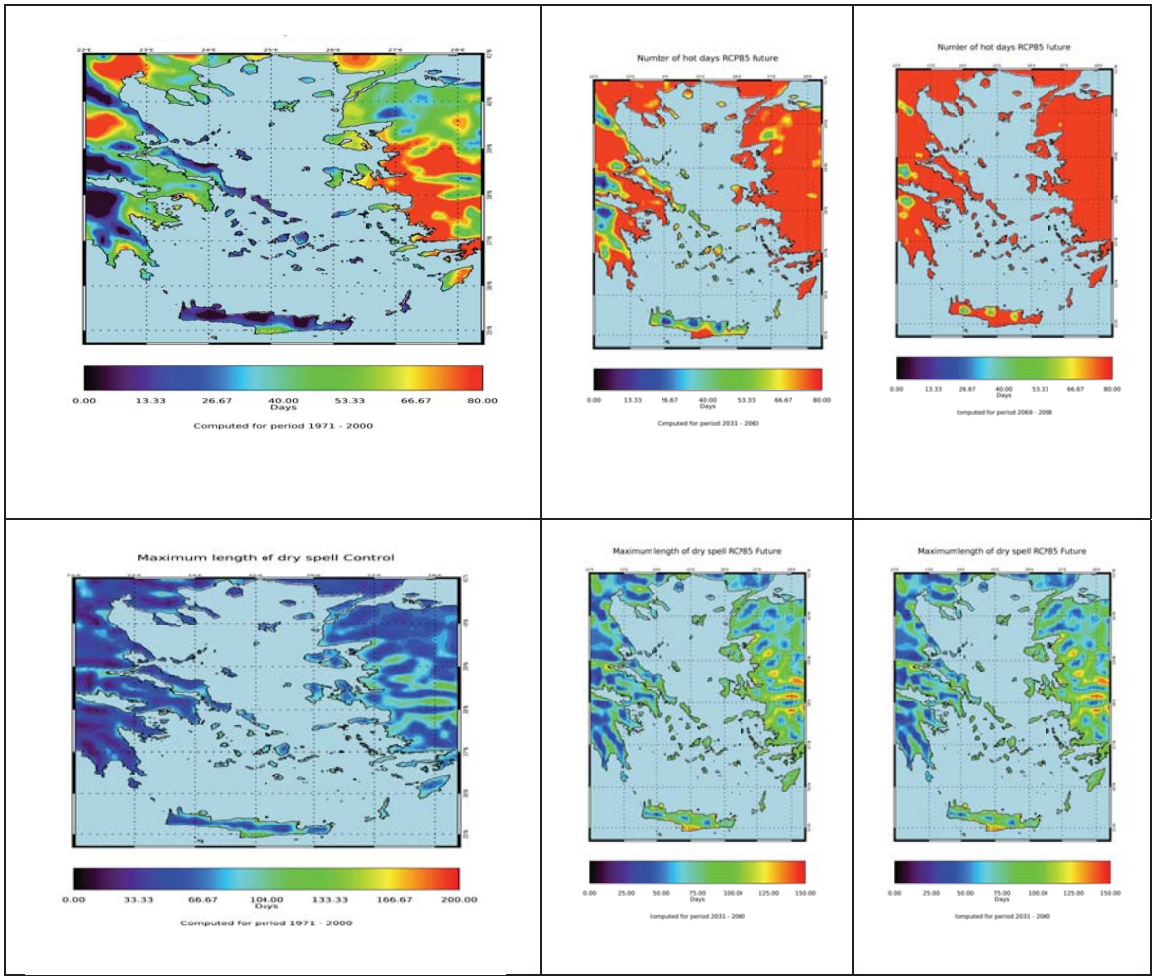


Figure 1. Average annual number of days with Tmax>30◦C/ hot days (top panel) and maximum length of dry spell /days with PR<1mm (bottom panel) for Aegean during the control period 1971-2000 (left column), the near future 2031-2060 (middle column) and the distant future 2069-2098 (right column) period, under the RCP8.5 scenario.

## Acknowledgements

The authors gratefully acknowledge funding from the European Commission under the LIFE and Climate Change Adaptation programme through the LIFETERRACESCAPE project (LIFE16 CCA/GR/000050) titled as “Employing Land Stewardship to transform terraced landscapes into green infrastructures to better adapt to climate change'.

## References

Collins W. J., Bellouin N., Doutriaux-Boucher M., Gedney N., Halloran P., Hinton T., Woodward, S. 2011: Development and evaluation of an Earth-System model – HadGEM2, Geosci. Model Dev., 4(4), 1051–1075.

Giannakopoulos, C., Le Sager, P., Bindi, M., Moriondo, M., Kostopoulou, E., Goodess, C. M., (2009). Climatic changes and associated impacts in the Mediterranean resulting from a 2 C global warming. Global Planet. Change 68(3), 209-224.

Giorgi, F., (2006). Climate change hot-spots. Geophys. Res. Lett. 33(8). http://dx.doi.org/10.1029/2006GL025734

Goubanova, K., and L. Li (2007). Extremes in temperature and precipitation around the Mediterranean basin in an ensemble of future climate scenario simulations, Global Planet. Change, 57, 27–42, doi:10.1016/j.gloplacha.2006.11.012.

Martin G. M., Milton S. F., Senior C. A., Brooks M. E., Ineson S., Reichler T., Kim J. 2010: Analysis and Reduction of Systematic Errors through a Seamless Approach to Modeling Weather and Climate, Journal of Climate, 23(22), 5933–5957.

IPCC: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.

JRC (European Commission’s Joint Research Centre). (2014). Climate impacts in Europe. The JRC PESETA II Project. JRC Scientific and Policy Reports, EUR 26586EN.

Zanis, P., Kapsomenakis, I., Philandras, C., Douvis, K., Nikolakis, D., Kanellopoulou, E., Zerefos, C. and Repapis, C. (2008). Analysis of an ensemble of present day and future regional climate simulations for Greece. Int. J. Climatol., 29: 1614–1633.