

**Sustainable Water Management
Doctoral Programme (Water4All)**



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Title of the PhD Project	Investigation of the expected change in wheat yield under changing climatic conditions
Acronym	AGROCHANGE
Research Fields of the Project	Agricultural Science, Climate Science, Environmental Science, Food Security, Economics and Policy, Sustainability Studies
Keywords	Wheat yield, climate change
Host Institution, Department and Campus Location	Middle East Technical University, Civil Engineering Department, Ankara
PhD Awarding Institution and Graduate Programme	Middle East Technical University, Engineering Faculty/Graduate School of Applied and Natural Sciences
Name and Affiliation of Main Supervisor	Prof. Dr. M. Tugrul Yilmaz, Civil Engineering Department, Middle East Technical University
Name and Affiliation of Co-Supervisors	Assoc. Dr. Koray K. Yilmaz, Geological Engineering Department, Middle East Technical University Prof. Dr. İsmail Yücel, Civil Engineering Department, Middle East Technical University
Research Environment and Infrastructure	PhD candidate will have access to the research infrastructure available at Middle East Technical University and Water Resources Laboratory, including access to high performance computing systems (e.g. ULAKBIM).

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<p>Scientific Context of the Project</p>	<p>Understanding how climate change affects wheat yield is crucial due to its direct relevance to global food security. Wheat is a staple crop for a significant portion of the world's population, serving as a primary source of calories and nutrition. With climate change posing a substantial threat to weather patterns, temperature regimes, and precipitation levels, understanding how these shifts impact wheat yield is crucial. This study provides a nuanced examination of the potential consequences, shedding light on the adaptive strategies needed to ensure a stable and sufficient food supply in the face of a changing climate. The findings from this investigation can inform agricultural practices, policy decisions, and international collaborations aimed at mitigating the adverse effects of climate change on global food production.</p> <p>Moreover, this research contributes to our broader understanding of the intricate relationship between climate and agriculture. As climate change accelerates, the need for resilient and sustainable farming practices becomes increasingly urgent. By delving into the specifics of how changing climatic conditions affect wheat yield, the study offers valuable insights into the dynamics of crop responses to environmental stressors. This knowledge is not only pertinent to the agricultural community but also extends its significance to environmental scientists, policymakers, and stakeholders involved in shaping sustainable practices for the future. Ultimately, the study serves as a key building block in our collective efforts to address the complex challenges arising at the intersection of climate change, agriculture, and global food security.</p>
<p>Brief Workplan</p>	<p>Literature Review on climate change impacts on wheat yield. Identify gaps and key research questions related to the project.</p> <p>Data retrieval of existing historical and future climate data for the study region and past wheat yield data under different climatic conditions.</p> <p>Crop yield modeling of wheat to predict wheat yield change under different climate scenarios. Calibrate models using historical data and validate against observed yields.</p> <p>Statistical analysis to identify correlations between climate variables and wheat yield. Assess the significance of observed trends and variations.</p>

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	<p>Scenario Analysis to evaluate multiple climate change scenarios to understand the range of potential impacts. Assess the vulnerability of different wheat varieties to varying climatic conditions.</p> <p>Impact assessment to quantify the expected changes in wheat yield under different climate scenarios.</p> <p>Documentation and reports by compiling research findings into a comprehensive report. Prepare presentations for scientific conferences and stakeholders.</p> <p>Submit research findings to peer-reviewed journals for publication. Disseminate results to the scientific community and relevant stakeholders.</p>
<p>Innovative Aspects of the Project</p>	<p>Integrated climate and crop modeling, scenario analysis for adaptive strategies and incorporation of regional and global perspectives</p>
<p>Training Opportunities of the Project</p>	<p>The project can provide opportunities for training about crop yield modeling in important operational research centers.</p>
<p>Interdisciplinary Aspects</p>	<p>The topic of the project is directly relevant with agricultural science, climate science, environmental science, food security, economics and policy, and sustainability studies.</p>
<p>Intersectoral Mobility</p> <p><input type="checkbox"/> Short Visit</p> <p><input type="checkbox"/> Secondment</p>	<p>TBD</p>

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Intersectoral Mobility <input type="checkbox"/> Short Visit <input type="checkbox"/> Secondment	TBD
International Academic Secondment	TBD

Main Supervisor										
Brief CV	<p>Prof. Dr. M. Tuğrul YILMAZ</p> <p>E-mail: tuyilmaz@metu.edu.tr</p> <p>Academic Degrees</p> <table><tr><td>Ph.D.</td><td>Earth System Sciences, George Mason University, USA</td><td>2011</td></tr><tr><td>M.Sc.</td><td>Earth Systems, Vrije University Amsterdam, Türkiye</td><td>2005</td></tr><tr><td>B.Sc.</td><td>Civil Engineering, Middle East Technical University, Türkiye</td><td>2003</td></tr></table> <p>Professional Networks</p> <p>Google Scholar: https://scholar.google.com/citations?user=ogpRhhlAAAAJ&hl=tr&oi=ao</p> <p>ResearchGate: https://www.researchgate.net/profile/M-Yilmaz-7</p> <p>Scopus: https://www.scopus.com/authid/detail.uri?authorId=57191906140</p> <p>ORCID: https://orcid.org/0000-0001-5094-1878</p>	Ph.D.	Earth System Sciences, George Mason University, USA	2011	M.Sc.	Earth Systems, Vrije University Amsterdam, Türkiye	2005	B.Sc.	Civil Engineering, Middle East Technical University, Türkiye	2003
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Co-supervisors										

Brief CV	<p>Assoc. Prof. Dr. Koray K. YILMAZ</p> <p>E-mail: yilmazk@metu.edu.tr</p> <p>Academic Degrees</p> <p>Ph.D. Hydrology and Water Resources, Univ. of Arizona, USA 2007</p> <p>M.Sc. Geological Engineering, Middle East Technical University, Türkiye 1999</p> <p>B.Sc. Geological Engineering, Middle East Technical University, Türkiye 1996</p> <p>Professional Networks</p> <p>Google Scholar: https://scholar.google.com.tr/citations?user=olbhvrYAAAAJ&hl=tr&oi=ao</p> <p>ResearchGate: https://www.researchgate.net/profile/Koray-Yilmaz-5</p> <p>Scopus: https://www.scopus.com/authid/detail.uri?authorId=56568516600</p> <p>ORCID: http://orcid.org/0000-0002-6244-8826</p>
Brief CV	<p>Prof. Dr. İsmail YÜCEL</p> <p>E-mail: iyucel@metu.edu.tr</p> <p>Academic Degrees</p> <p>Ph.D. Hydrology, The University of Arizona, USA 2001</p> <p>M.Sc. Hydrology, The University of Arizona, USA 1996</p> <p>B.Sc. Meteorological Engineering, İstanbul Technical University, Türkiye 1993</p> <p>Professional Networks</p> <p>Google Scholar: https://scholar.google.com/citations?user=RGHnI3YAAAAJ</p> <p>ResearchGate: https://www.researchgate.net/profile/Ismail-Yucel-2</p> <p>Scopus:</p>

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