The faculty of Engineering of the Vrije Universiteit Brussel and the School of Law of the University of Warwick invite you to attend the public defense leading to the degree of

DOCTOR OF ENGINEERING SCIENCES (VUB)
DOCTOR OF PHILOSOPHY (UNIVERSITY OF WARWICK)

of **Rosa Pietroiusti**

The public defense will take place on **Friday 6th November 2026 at 5pm** in room **D.2.01** (Building D, VUB Main Campus)

To join the digital defense, please click here
Meeting ID: 358 106 777 079 968 1
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UNEQUAL FUTURES: INTERGENERATIONAL EXPOSURE TO CLIMATE EXTREMES IN A WARMING WORLD

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Abstract of the PhD research

Intergenerational inequity is inherent in climate change. Every additional degree of global warming makes extreme weather events more frequent, intense and longer lasting, and causes slow-onset changes such as sea level rise and glacier mass loss. As warming continues, young people will face more of these consequences during their lives, even though they are least responsible for historical emissions. This thesis combines quantitative climate science methods and qualitative methods, including interviews with legal practitioners, to study the intergenerational inequity of climate change. It provides new scientific evidence on how climate change affects different age groups, and examines how this kind of evidence has been used in lawsuits brought by children and young people.

The first chapter analyses how many people of different ages are already exposed to potentially dangerous combinations of heat and humidity that would not occur without human-caused climate change. Using climate models, weather data and population data, we find that young people are most exposed. Many children live in hot, tropical regions, where heat stress is already high and where climate change has increased it the most. We find, for instance, around 3 times more children aged 0-9 exposed to 20 additional heat stress days per year attributable to anthropogenic climate change, compared to people aged 60-69.

The second chapter presents *dem4cli*, a free software tool that can be used to combines population and climate data and estimate how often people of different ages are exposed to any climate hazard, in a given year and over their lifetime. The third chapter uses this approach to study how much extreme fire weather people of different generations will experience in Europe during their lifetimes. Fire weather represents hot, dry and windy conditions in which wildfires start and spread more easily. Under current climate policies, people born in 2025 are expected to live through 3.2 more years of extreme fire weather than people born in 1950, which is 84% more, with the gap largest in Southern Europe. In Portugal, young people are expected to face almost twice as much extreme fire weather as older people. The chapter also shows how much of this could be avoided if countries cut emissions enough to meet the Paris Agreement goal of limiting warming to 1.5ºC.

The final chapter turns to studying legal action on climate change. As current climate action is inadequate to halt warming, children and young people have taken governments and companies to court to demand stronger action, based on children's rights and demands for greater fairness between generations. We reviewed documents and interviewed lawyers involved in 10 key cases brought by children and youth. We compared how scientific evidence was used across these cases, including how future harm was framed. We find that evidence of future harm for younger generations is most effective when paired with evidence of harm already happening, tied to existing rules such as environmental impact assessments, or when courts broaden their conceptions of time.

Overall, this thesis explores how climate change already affects different age groups today in different ways, how unfairness between generations is expected to increase in the future, and how this kind of evidence has been used in legal cases. In this way, it helps connect climate science with law and policy on questions of climate change and intergenerational equity.