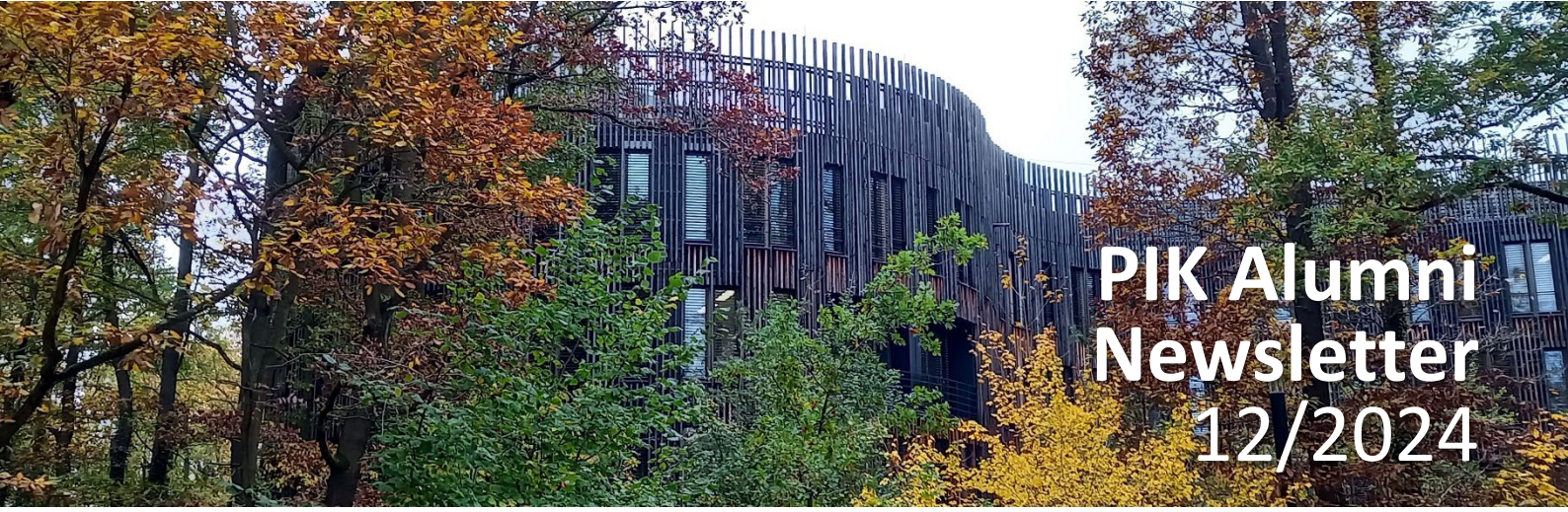

PIK Alumni Newsletter 12/2024

Dear PIK Alumni,

Welcome to the winter newsletter 2024. What's been going on at PIK over the last six months? We take a look back at some of the scientific highlights and look forward to new developments in 2025.

It is part of PIK's mission to leverage science for evidence-based policy advice. One key achievement in this respect was a recent ground-breaking analysis of what climate policy measures actually work. The study in *Science* (Stechemesser et al. 2024) led by researchers from PIK and MCC together with global partners evaluated 1,500 climate policy measures from 41 countries over 20 years. The analysis considered the entire range of interventions - from energy-related building regulations to purchase premiums for climate-friendly products and CO_2 taxes - but identified only 63 cases of successful climate policy, achieving an average 19% emissions reduction. The researchers identified the inclusion of tax and price incentives as a key component of effective policies, highlighting the importance of well-designed policy mixes over standalone measures. "Subsidies or regulations alone are insufficient; only in combination with price-based instruments, such as carbon and energy taxes, can they deliver substantial emission reductions," explained Nicolas Koch from MCC. Success stories include Norway's tax incentives for electric cars and the UK's carbon pricing for coal power. The interactive Climate Policy Explorer offers insights for policymakers and sectors worldwide. Read more…

Director Johan Rockström, together with the new Planetary Boundaries Science (PBScience) team at PIK and international partners, recently launched the **first-ever edition of the annual Planetary Health Check report** (PHC), a first-of-its-kind scientific report and tool for the health of the Earth's vital organs that serve as humanity's life support system. The PHC combines pioneering Earth science, Earth observation data and multidisciplinary thinking to quantify the planet's health and inform solutions to reverse the impact of human activity on the planet. The report will be published annually in recognition of the importance of regular updates on the Earth's health, representing a significant advancement in providing consistent insights for stakeholders globally. Read more ...

Dealing with the rising climate hazards of a planet in questionable health, PIK researchers from the FutureLab Security, Ethnic Conflicts and Migration, in collaboration with external partners, developed a new tool to help assess and map security risks, the Climate Conflict Vulnerability Index (CCVI). The CCVI, which aims to support decision-makers in identifying and managing a wide range of risks related to aspects such as food and water security, health, peace and migration, was presented by German Minister of Foreign Affairs Annalena Baerbock at the Berlin Climate and Security conference in August.

Looking at another sort of risk, PIK researchers Miodrag Stevanović, Patrick von Jeetze and Alexander Popp worked with colleagues from the European Central Bank and the University of Minnesota on developing a modelling framework that illustrates the interconnections between climate change and nature degradation. Their recent report "Climate nature scenario development for financial risk assessment " emphasises the importance of addressing risks to climate and nature in an integrated manner to provide a more accurate view of their combined economic and environmental impacts. Read more ...

Several PIK scientists attended the COP19 in Baku. Among others, the update on the 10 New Insights in Climate Science was presented (other themes included loss and damage, just transformation pathways, and the governance and finance of CO_2 removal). The assessment of PIK's directors on this year's COP can be read here.

At a regional level, Hermann Lotze-Campen, Head of research department 'Climate Resilience', was recently appointed Chair of the new scientific Climate Council of the State of Brandenburg (WKB). The WKB will make an important contribution to the implementation of the Brandenburg Climate Plan, which was adopted in March

2024 and contains over 100 measures designed to set a path for the state of Brandenburg to achieve climate neutrality by 2045. The board, comprised of 12 experts covering all fields of action of the climate plan, will regularly review the progress of implementation and develop further measures. Read more ...

At PIK, preparations are ongoing for the transition to the institute's new structure starting in 2025. The Mercator Research Institute on Global Commons and Climate Chance (MCC) becomes part of PIK as Research Department 5 'Climate Economics and Policy - MCC Berlin' as of January. The new department is led by Sabine Fuss and Matthias Kalkuhl and will remain based at MCC's present premises in Berlin. Over the autumn a series of events were organized for the staff of both institutes to help connect with each other and to introduce MCC members to processes and people such as the Human Resources team, the IT team, and the Employees Council. Task forces comprising members of both institutes have been working on joint issues like internal communication and interdisciplinarity.

Further, the new funding will enable the development of additional capacities on three topics: Earth Resilience, Machine Learning, and Inequality and Well-being. PIK will also establish a "Policy Unit" as part of the Board of Directors' staff, with responsibility for the science–policy interface. PIK will be starting 2025 with an expanded staff of around 460 employees and with a new level of interdisciplinary capacity, as well as additional expertise on policy dialogue. Read more here ....

Further structural developments are the recent establishment of the Earth Resilience Science Unit (ERSU) under the leadership of Johan Rockström and Ricarda Winkelmann (in collaboration with the Max Planck Institute of Geoanthropology in Jena). The ERSU aims to develop a framework to characterize the resilience of the Earth System in the Anthropocene, exploring stability landscapes of critical geophysical, ecological and societal components, which are only fragmentarily known so far. This includes the identification of critical conditions and tipping points for these subsystems, their capacity to resist to and recover from disruptions, as well as the risk of cascading interactions between them.

Publication Highlights

Green Growth: 30% of Regions Achieve Economic Growth While Reducing Carbon Emissions

A study in *PNAS* by Maria Zioga, Maximilian Kotz and Anders Levermann from research department 'Complexity Science' revealed that 30% of 1,500 regions analysed have decoupled economic growth from CO_2 emissions over the past 30 years. Regions with advanced economies, service sectors, and strong climate actions—especially in Europe—showed the highest decoupling rates. The accelerating trend marks significant progress towards achieving the carbon emissions reductions; however, the pace is insufficient to meet net-zero targets by 2050. Subnational climate actions, such as EU mitigation plans and financial support, drive success, but most regions globally lag behind. The authors caution that the current pace of decoupling is insufficient to meet the global climate target of net-zero carbon emissions by 2050 and that developed countries must enhance energy transition efforts, particularly in developing regions, to achieve global climate goals. Read more ...

Increasing Effects of Global Warming on Fire Dynamics and Public Health

Two new attribution studies in *Nature Climate Change* with PIK involvement reveal rising global fire risks and health impacts from climate change. The first study found a 15.8% increase in burned areas for the period 2003–2019 (compared with a situation without climate change) with hotspots in Australia, Western North America, South America, and Siberia, driven by warmer, drier conditions. Despite decreases in global total burned area due to land-use changes, reducing available areas for fires by about 19%, the effect of climate change is growing. The second study links climate change to a rise in deaths from fire-related air pollution, from 669 annually in the 1960s to over 12,500 in the 2010s. PIK's Christopher Reyer, one of the co-authors, stressed the need for emissions cuts and fire management to protect public health. Read more ...

Three Pathways to Achieve Global Climate and Sustainable Development Goals

A study by PIK scientists in *Environmental Research Letters* highlights three possible paths to meet the UN SDGs and Paris Agreement: sustainable lifestyles, green-tech innovation, and government-led transformation. These strategies could reduce extreme poverty by two-thirds by 2030 and curb global warming.

The study systematically compared three alternative sustainable development pathways (SDPs) that reflect different societal strategies, analysing results from two

integrated assessment models and two sectoral models of the buildings and materials sectors across a broad set of indicators for sustainable development and climate action. Each pathway offers distinct benefits and challenges, with the sustainable lifestyle approach emphasizing plant-based diets and reduced energy use, benefiting health and biodiversity. All three SDPs enable substantial progress towards the human development goals of the SDGs. However, Elmar Kriegler, head of research department 'Transformation Pathways' and one of the authors, stresses urgency: "We can still choose which sustainable path to pursue, but ignoring them is no longer an option." Read more …

There is an accompanying interactive web tool for exploration, visualization and download of the scenario data: https://shape.apps.ece.iiasa.ac.at/

More News

New HPC @ PIK

Installation of PIK's new high-performance computer system - named "foote" in honour of the American scientist Eunice Newton Foote - was finalized in October 2024 after an EU-wide competitive bidding and selection process. The principal contractor is pro-com DATENSYSTEME GmbH with main components produced and delivered by Lenovo, NVIDIA and IBM. The system has direct water-cooling infrastructure and waste heat is used to heat office building(s) during the winter season. Test model runs, e.g. with the LPJmL or REMIND models, exceeded the contractor's benchmarks. The system is funded by the Land Brandenburg and provides about five times the computing capacity of its predecessor.

New thinktank „Zukunft KlimaSozial" founded by Dr. Brigitte Knopf

In January this year, Dr. Brigitte Knopf (former Secretary General of MCC as well as former deputy head of RD3 (formerly) "Sustainable Solutions" and initiator of the working group on energy strategies at PIK), founded „Zukunft KlimaSozial" with the vision of a climate-neutral and socially just future. The new thinktank started its work in June with the publication of the paper "Securing a socially just and climate-neutral future – 11 Insights for a Social Climate Policy".

A just transformation toward climate neutrality can only be successful if it is designed in a socially just way from the outset. An integrated climate social policy builds on four pillars: (i) establishing a climate-friendly public infrastructure and public services, (ii) targeted promotion of technology switch for low and middle incomes, (iii) regulatory policy and (iv) redistributive use of revenues from carbon pricing via a climate dividend. These tasks require a modern welfare state that is able to organize simple payments to all citizens as well as climate-neutral social services.

The scientific institute contributes with expertise, ideas and concepts to the public debate. For further information visit the Website or join „Zukunft KlimaSozial" on LinkedIn and Bluesky.

Sina Lippmann, Zukunft KlimaSozial (PIK Alumna)

European Climate Risk Assessment

In spring 2024, the European Environment Agency (EEA) published the first European Climate Risk Assessment (EUCRA). This was a fast-track assessment conducted in less than 18 months. Current and former PIK scientists played a key role in EUCRA: Hans-Martin Füssel (EEA) was EUCRA coordinator at the EEA, Marc Zebisch (EURAC) and Richard Klein (SEI) were members of the EUCRA coordination team in the European Topic Centre for Climate Change Adaptation and LULUCF, and Christoph Müller was lead author for the chapter on food production and food security. The EUCRA publication was widely covered in the media in Europe and beyond. EUCRA also received considerable attention from policymakers across Europe, including the European Commission, the European Parliament, and the Council of the EU. The first EUCRA is mentioned as a key input to the European Climate Adaptation Plan, which the new European Commission shall develop, involving six different Commissioners. Initial reflections on a second EUCRA have recently started. We hope that the framework allows for wider contributions from PIK scientists, compared to the first assessment

Dr. Hans-Martin Füssel, EEA (PIK Alumnus)

Read more on the report here ....

Remembering ....

Appreciation of PIK Alumnus Prof. Cezar Ionescu
by Dr. Nicola Botta

Cezar Ionescu came to PIK in the late 90s as a young fellow of the Artificial Intelligence laboratory at ICI (National Institute for Research & Development in Informatics) Bucharest.

At that time, AI was well beyond the horizon of climate science and, after contributing to model coupling and typed data transfer, Cezar started working on applying functional programming and category theory to vulnerability studies. Between 2006 and 2009, he developed a mathematical model of parallel computations, a formal framework for vulnerability assessment and a mathematical theory of climate scenarios and simulations.

In 2009, Cezar obtained a PhD degree in Computer Science and Mathematics from FU Berlin with a thesis on "Vulnerability Modelling and Monadic Dynamical Systems" under the supervision of Prof. Rupert Klein. After postdoc studies at PIK (2009-2013) and at Chalmers University of Technology, Göteborg (2013-2015) on economic and multi-agent modelling, global systems science and synthetic population calibration, Cezar became Associate Professor of Data Science at the Department for Continuing Education and Director of Studies in Computing and Mathematics at the University of Oxford. Since 2019, he was Professor of Applied Computer Science at the Technische Hochschule Deggendorf.

Cezar was an outstanding scientist and an exceptionally gifted teacher. He passed away in October 2024 after a short, serious illness. You can find a short obituary here.

Appreciation of Prof. Vladimir Petoukov
by Dr. Andrey Ganopolski

Vladimir Petoukohov began his career in climate science when climate modelling was in its infancy. Trained as a physicist, Vladimir sought from the outset to find a solution to the problems based on understanding rather than brute force. To achieve this goal, Vladimir adopted a new statistical-dynamical approach to describing climate dynamics. The results of his theoretical investigations, which he started in Moscow and then continued at IIASA, and his truly encyclopedic knowledge of climatology were crucial for the development at PIK of the family of Earth system models of intermediate complexity, the novel and computationally efficient tool for studying past and future climate change. Of course, Vladimir was not only interested in the development of Earth system models, but also in many other problems, especially those related to atmospheric dynamics and extreme weather events. His contribution to climate science was significant and will be long-lasting.

A PIK News on Vladimir Petoukov can be read here.

Congratulations to ...

.... some members of PIK on their recent honours and appointments:

- Johan Rockström received the Virchow prize 2024 for his comprehensive approach to safeguarding both human and planetary health as well as for the introduction of the concept of planetary boundaries.
- Lisa Murken, co-leader of working group 'Adaptation in Agricultural Systems,' was awarded the prestigeous Hermann Eiselen Science Award for her work on land tenure in the context of climate change and its impact on the adaptation and resilience of smallholder farmers.
- Annika Stechemesser won the Potsdam Young Scientist Award for her outstanding research in the field of climate physics. In her interdisciplinary PhD dissertation she explored the impacts of climate change on human behaviour and its subsequent effects on the economy, communication, social cohesion, and mobility.
- The 2024 Leibniz Dissertation Award was awarded to Maximilian Kotz for his outstanding research on the economic costs of climate change. In his doctoral work he examinied the economic impacts of rising temperatures, and increased variability and frequency of extreme weather events like heavy rainfall. Max is now a Marie Curie Postdoctoral Fellow at the Barcelona Supercomputing Center.
- Once again, nine PIK researchers were among the top 1% of 'Highly Cited Researchers' in the annual ranking by Clarivate Analytics. Read more ....
- Norbert Marwan has been awarded an extraordinary professorship at the Faculty of Mathematics and Natural Sciences at the University of Potsdam. Norbert, who is deputy head of research department 'Complexity Science' is attached to the institutes of Geoscience & Institute of Physics and Astronomy at Potsdam University.

PIK's Alumni programme

Please keep us up to date: Send an update to alumni@pik-potsdam.de if you have changed your job or want to update your details in our Alumni database. We'd also welcome news about *your recent publications, personal achievements, or research activities.*
Best wishes to all! **Alison Schlums**, Alumni Officer

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