PURDUE UNIVERSITY | Environmental and Ecological Engineering

EEE Research Seminar

Date: April 9, 2024, at 10:30AM
Location: POTR 234 (Fu Room)

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The Heat and How We'll Handle It.

Abstract

It's obvious by now that global warming means that many regions, especially in the tropics and subtropics, are going to get hot. Really hot. Hot enough to force humanity to rethink how and where it fulfills its most basic functions: providing food and water; permitting productive labor; supporting healthy learning and living environments. At times, even survivability will be an issue. In this talk, I will review the geological history of hot conditions and show that the nearest analogue for our most likely future is more than 7 million years ago and that many of our critical natural systems will face challenges rapidly transitioning to a climate state to which they are not currently adapted. I will then discuss the implications of much hotter conditions within the context of the physiological impact on humans, which requires considering the impacts of changes in moisture, atmospheric radiation, and wind speed, in addition to the more common focus on temperature alone. From there, we will explore the downstream implications for food, water, labor productivity, energy, built-infrastructure, migration, institutions, and policy. It will be clear by the end of this talk that minimizing warming, by minimizing greenhouse gas emissions is a necessary and important action, but building out adaptive capacity at the same time as mitigation is also necessary.

Bio

Matthew Huber is a professor in the Earth, Atmospheric, and Planetary Sciences Department at Purdue University and the inaugural David E Ross Director of the Institute for a Sustainable Future (ISF). Purdue's ISF is a new 310 faculty-member strong, transdisciplinary institute working on both fundamental and applied research in areas aligned with the United Nations Sustainable Development Goals. Professor Huber's scholarship has been internationally recognized for its far-reaching global conclusions on Earth's habitability, resilience, and sustainability on long time horizons. His research areas include the physical processes generating tropical "thermostats", the polar amplification of warming, and the environmental, economic, ecological, and evolutionary implications of these processes.

Over the past decade, Huber's has shifted focus to emphasize more applied and solutions-oriented research to help society build a better future. Planning for future needs requires seeing energy, environment, economics, climate, health, politics, and society as linked systems and considering risk, resiliency, and security in all of these areas concurrently. Any sustainability and resiliency strategy therefore requires a multi-process systems-based approach to identifying, mitigating, and adapting to future risks. As a modeler of past and future environmental change, Huber sees exciting opportunities to predict future risks based on past observations and physically based simulations. Huber applies massive cyberinfrastructure capabilities to simulate futures on a >10 year horizon, including: climate-driven stress of infrastructure and societies resulting in powerful stressors and potentially mass migrations in the East and West Africa, the Middle East, Southeast Asia, China, Central and South America, and India; extraordinary—even existential—demands placed on power/cooling/water generation capabilities throughout these regions both for the populace and for the institutions that support them. Huber's current research has a special focus on predicting future risks of severe heat stress on human and agricultural health and productivity as well as the implied impacts on trade, built infrastructure, power, cooling systems, and transportation sectors, demographics, and migration.

Huber has published over 130 peer reviewed articles. He was twice recognized by *Discover Magazine* as author of one of the top 100 stories of the year. He is currently an Editor-in-Chief of the AGU journal *Paleoceanography and* Paleoclimatology, and is formerly: topical editor of EGU Journal *Earth System Dynamics* and associate editor of AGU Journal *Geochemistry, Geophysics and Geosystems*. His work has been featured in the *Reuters*, *CNN*, *New York Times*, *Washington Post*, *Discover Magazine*, *New Scientist*, *USA Today*, *Bloomberg*, *The Walrus*, and on national television news. His research was featured in a *Discovery Channel* documentary, Super Comet: After the Impact.