UC SANTA BARBARA

THE Current

March 8, 2022

Harrison Tasoff

A Model Scientist

Today's forests face a litany of threats that are being exacerbated by anthropogenic climate change: drought, heat, fires, and pest and pathogen outbreaks. Meanwhile, understanding and forecasting the sylvan response to these issues has become trickier than ever.

Fortunately, UC Santa Barbara ecologist Anna Trugman is hard at work on this task, an effort that has attracted the attention of her peers. Trugman, an assistant professor in the Department of Geography, was awarded the 2021 Tansley Medal from the New Phytologist Foundation. The annual award recognizes outstanding contributions to research in plant science by an individual in the early stages of their career. Trugman was selected based on her work developing models to predict how forests may react to environmental stresses.

"I was very excited and humbled," Trugman said of learning that she had won the medal. "The scholars that have been shortlisted or won it over the years are some of the people I really admire in the field."

"When we hired Anna, one of her references summarized simply: 'Anna is a rockstar,'" said department chair Stuart Sweeney. "All of her colleagues share that sentiment. She is blazing a path of cutting-edge research that is having tremendous impact, within and beyond geography, and it is foundational in our understanding of climate change impacts on forests. It is fantastic to see her work getting recognized with the Tansley Medal."

Trugman is a global change ecologist who uses numerical models to investigate how forests respond to environmental pressures like climate change. She takes a bottom-up approach, building her models around plant physiology and geography. “Our ability to model forest mortality events really reflects our understanding of the mechanisms driving them,” she said. “We don’t fully understand the system if we’re not able to model it.”

Researchers apply for the Tansley Medal competition, and finalists are asked to write a review article in their area of expertise, which is featured in the foundation’s namesake journal. For her review, Trugman discussed the strengths and limitations of this bottom-up approach, including areas where scientists could improve their predictive capabilities and understanding of forest systems.

As the eminent statistician George Box said: “All models are wrong, but some are useful.” Ironically, simpler models can sometimes provide more insights into how a system works than comprehensive ones. Complicated models can be hard to understand, even if their outputs are a closer match to the patterns seen in the real world.

In contrast, the outputs from a simple model can be easier to interpret, making it a useful tool for evaluating hypotheses. “If we can choose the right processes to include, then models can really help us target the most important things that we want to investigate,” Trugman said.

Plant physiology has been a good guide for predicting the results of controlled experiments; however, scientists have had less success applying the technique on a broader scale. In her review, Trugman puts forward several hypotheses to explain some of the mismatch between the predictions of bottom-up models and observations at large spatial scales.

Trugman also suggests areas of research that could help inform modeling in the future. For instance, she claims models would benefit from a better account of processes underground as well as the way traits vary within a species. She also calls for better representation of insect disturbance, which isn’t currently included in most models.

The award, review article and a Q&A published by the journal will all help publicize the work that Trugman and her lab conduct. “We do a lot of cross-disciplinary research,” she said, “so connecting with the readers of New Phytologist is very

meaningful.”

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.