Cloud cover points to threatened habitats, study says

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Clouds over small Caribbean islands.

The search for endangered species is leading scientists to an unexpected place for information—the clouds that shift and swirl around the planet.

In a new study, researchers from Yale and the University at Buffalo (UB) say that satellite data about global cloud cover is a useful tool for

identifying the size and location of threatened animal and plant habitats. The findings appear in the March 31 online edition of the journal *PLOS Biology*.

Previously, scientists had relied upon weather station observations for climate data regarding specific ecosystems. Unfortunately this meant that large areas of land were unmonitored.

"Understanding the spatial patterns of biodiversity is critical if we want to make informed decisions about how to protect species and manage biodiversity and its many functions into the future," said co-author Walter Jetz, a Yale associate professor of ecology and evolutionary biology, and director of the Yale Program in Spatial Biodiversity Science & Conservation. "But for the regions that harbor most biodiversity, there's a real lack of data on the ground."

Jetz and first author Adam Wilson, who conducted the majority of the research at Yale and now is an assistant professor of geography at UB, examined 15 years of data from NASA's Terra and Aqua satellites for the study. They built a database containing two images per day of cloud cover for nearly every square kilometer of the planet, from 2000 to 2014. They also created interactive maps at www.earthenv.org/cloud that allow anyone to pinpoint and compare changes in cloud cover patterns for any location.

"When we visualized the data, it was remarkable how clearly you could see many different biomes on Earth based on the frequency and timing of cloudy days over the past 15 years," Wilson said. "As you cross from one ecosystem into another, those transitions show up very clearly, and the exciting thing is that these data allow you to directly observe those patterns at 1-kilometer resolution."

Cloud cover affects a number of important ecological processes, from

behavior to survival, and influences habitat factors such as sunlight, rain, surface temperature, and leaf wetness—dictating where animals and plants live and grow.

Using cloud pattern data, the researchers were able to determine the size and location of habitats for two species at unprecedented detail: a South American bird called the montane woodcreeper and a South African shrub called king protea.

"This work demonstrates the remarkable insights offered for science and conservation when remote sensing technology is teamed up with ecology," Jetz said. "With the right models, not only can we better delineate habitats and their species, we also have a tool to help monitor them over time."

Provided by Yale University

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