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Measuring Amazon rainforest resilience from remotely sensed data

Da Nian¹, Lana Blaschke¹, Yayun Zheng², and Niklas Boers^{1,3,4}

¹Potsdam Institute for Climate Impact Research, Potsdam, 14412, Germany

²School of Mathematical Sciences, Jiangsu University, Zhenjiang 212013, China

³School of Engineering & Design, Earth System Modelling, Technical University of Munich, Germany;

⁴Department of Mathematics and Global Systems Institute, University of Exeter, United Kingdom

The Amazon rainforest has a major contribution to the bio-geochemical functioning of the Earth system and has been projected to be at risk of large-scale, potentially irreversible, dieback to a savanna state. Measuring the resilience of the Amazon rainforest empirically is critical to helping us understand the magnitude and frequency of disturbances that the rainforest can still recover from. Different means to quantify resilience in practice have been proposed. Here we determine the Amazon rainforest resilience based on a space-for-time replacement, and then estimating the average residence time in the forest state. This 'global' notion of resilience is different from local measures based on variance or autocorrelation and thus provides complementary information. We study the dependence of the exit-time-base resilience on total rainfall and, in order to study the evolution of the Amazon rainforest, we also estimate changes in their resilience over the years.