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Remotely-Sensed Global Mapping of Biodiversity Resilience

Babak Naimi (1), Antoine Guisan (2), Andrew Skidmore (3), and Jaboury Ghazoul (1)

(1) ETH Zurich, Terrestrial Ecosystems, Environmental Systems Science, Switzerland (naimi.b@gmail.com), (2) Group of Spatial Ecology, University of Lausanne, Switzerland, (3) Faculty of Geo-information science and Earth observations, University of Twente, the Netherlands

Global environmental changes are driving species and populations to extinction and eventually biodiversity loss while altering the distributions of many others and modifying the functioning and composition of communities worldwide. The bi-directional link between biodiversity and the stability of ecosystems has been tested and discussed in many studies. Biodiversity loss affects the resilience of ecosystem functions and increases the risk of abrupt and potentially irreversible ecosystem collapse, that constitutes a global threat to both human welfare and global stability. In response to such threats, global environmental authorities have made substantial efforts to strengthen the preservation and sustainable use of biodiversity. Successful international collaborations, however, require systematic assessment and monitoring of the status of biodiversity and ecosystems. Remote sensing datasets with appropriate spectral and temporal resolution are now enabling scientists, in conjunction with quantitative data processing methods and modelling tools, to shed more lights on characterising the state of biodiversity and ecosystem functions and services. There has been some progress to define the concept and introduce essential biodiversity variables (EBVs) for measuring and monitoring the state of biodiversity, a set of which are specifically measured by remote sensing. This research relies on the combination of these two capabilities, in conjunction with the mathematical models, to assess the state and resilience of biodiversity and ecosystem functions and services using time series of remotely sensed EBVs. The ultimate goal is to prepare a framework and relevant tools to monitor the ecosystem stability at multiple scales and estimate the global map of biodiversity resilience.