

EGU22-10754

<https://doi.org/10.5194/egusphere-egu22-10754>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Understanding the deforestation process may mitigate environmental risks in recent agricultural frontier expansion in Ecuador

Andrea Urgilez-Clavijo^{1,2} and Ana María Tarquis Alfonso³

¹IERSE, Universidad del Azuay, Cuenca, Ecuador (aurgilez@uazuay.edu.ec)

²Complex Systems Group, Universidad Politécnica de Madrid, Madrid, Spain (andrea.urgilez@upm.es)

³CEIGRAM, Universidad Politécnica de Madrid, Madrid, Spain (anamaria.tarquis@upm.es)

The agricultural expansion frontier in Ecuador is mainly attributed to the deforestation process. Exacerbated rates of forest loss have been motivated more significant impacts in the territory, even negatively affecting the new uses of land, agriculture, and livestock. Climatic conditions have been changing in larger deforested areas, increasing landslides, floods, water level rise, and drought. This work aims to go deeper in understanding the deforestation process patterns by analyzing the structure of the expansion at the patch level.

We used the concept of patch skeletons and the Local connected fractal analysis (LCFA) through its temporal dynamics to identify complex hotspots inside the new agricultural areas. The K-means algorithm was used to perform LCFA segmentation and colouring to identify the complex intensity of the deforestation structure. This may indicate active expansion areas associated with high risk areas to perform agriculture and livestock systems because of high ecosystem dynamics recovery.

Hot spotting derived from the fractal analysis and k-means clustering not only serves for reforestation but will also lead to decision-makers for monitoring other associated environmental impacts. Most of the deforested areas in Ecuador after 5 to 7 years in agriculture were abandoned because of the nutrient loss and agricultural failure activities because of feeble farming systems infrastructure. LCFA and colouring communicate in a straightforward spatially explicit visualization strategy the hot spot method to geographically allocate the complex points of the deforested structure of the patches.

Acknowledgements

The authors acknowledge the support of Project No. PGC2018-093854-B-I00 of the Ministerio de Ciencia, Innovación y Universidades of Spain and the financial support from Boosting Agricultural Insurance based on Earth Observation data - BEACON project under agreement N° 821964, funded under H2020EU, DT-SPACE-01-EO-2018-2020.

References

Andrea Urgilez-Clavijo, J. de la Riva, D. Rivas-Tabares and A.M. Tarquis. Linking deforestation patterns to soil types: A multifractal approach. *European Journal of Soil Science*, 2021, 72(2), 635-655. <https://doi.org/10.1111/ejss.13032>

Andrea Urgilez-Clavijo, D. Rivas-Tabares, J.J. Martín-Sotoca and Ana M. Tarquis. Local fractal connections to characterize the spatial processes of deforestation in Ecuadorian Amazon. *Entropy*, 23(6), 748, 2021, <https://doi.org/10.3390/e23060748>