



## **Copula Multivariate analysis of Gross primary production and its hydro-environmental driver; A BIOME-BGC model applied to the Antisana páramos**

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Simulations of carbon cycling are prone to uncertainties from different sources, which in general are related to input data, parameters and the model representation capacities itself. The gross carbon uptake in the cycle is represented by the gross primary production (GPP), which deals with the spatio-temporal variability of the precipitation and the soil moisture dynamics. This variability associated with uncertainty of the parameters can be modelled by multivariate probabilistic distributions. Our study presents a novel methodology that uses multivariate Copulas analysis to assess the GPP. Multi-species and elevations variables are included in a first scenario of the analysis. Hydro-meteorological conditions that might generate a change in the next 50 or more years are included in a second scenario of this analysis. The biogeochemical model BIOME-BGC was applied in the Ecuadorian Andean region in elevations greater than 4000 masl with the presence of typical vegetation of *páramo*. The change of GPP over time is crucial for climate scenarios of the carbon cycling in this type of ecosystem. The results help to improve our understanding of the ecosystem function and clarify the dynamics and the relationship with the change of climate variables.

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