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Climate change impacts on biomes and aridity in Peru

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In recent years, there has been an increasing interest in estimate future conditions on biomes and aridity due to climate change. Using a new observed-based gridded dataset and remote sensing products, we evaluate the future features in terms of potential biomes (PB) and aridity index (AI) over Peru.

Ten PBs were established for the present conditions by grouping the ecosystems maps at the national scale. The map presents biomes within areas from 1.08 to 42.44% of total coverage. In order to handle imbalanced data, we designed a calibration and validation scheme for three machine learning algorithms (Random Forest, SVM, and KNN) as follow: first, we perform a gridded search for the best parameters of each model; second, we tested the robustness of each model with a cross validations, checking their f1 score, the confusion matrix and the weighted average precision-recall; finally, we performed a cost-sensitive learning to make more suitable the learning approach for very imbalanced data. The best model is going to be used to predict future conditions of PB. For AI, we evaluate the present trend and quantified the contributions of climate variables to Ai variations. Also, the relationship between AI and vegetative greening was explored. The future change of AI is seen by its spatial variation (migration) of the dryland subtypes.

The preliminary results showed that random forest worked best for the PB imbalanced data, having a 0.84 weighted average in precision and recall metric. The model reproduces 9 of the PB with low error 4.5% and overestimates 34.52 % one of them in the Amazon. Furthermore, there is an increasing slight trend (not significant) of AI at the drainage-scale, mainly in the Pacific. We hypothesize that there is a migration of dryland subtypes from dry to wet areas in the present time.

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