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NEW INSIGHTS INTO AMAZONIAN REFUGIA AND PLEISTOCENIC ARC HYPOTHESES

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The two main hypotheses about the Neotropical paleovegetation, namely the Amazonian refugia, by Haffer and the Pleistocene arc, by Prado & Gibbs, are still constantly debated. We offer new insights on this debate using a ecological niche modeling with combined climate-soil predictors to test both hypotheses, reconstruct the paleovegetation of the Last Glacial Maximum (LGM- 21ka) and Mid-Holocene (Mid-H- 6ka). We modeled the environmental space of the 10 most representative biomes with the RandomForest classifier, using climate predictors from three atmospheric general circulation models (CCSM4, MPI-ESM-P and MIROC-ESM) and soil predictors, the same for the different situations. Based on the consensus among the models, we reconstructed the paleovegetation cover for LGM and Mid-H. The climate in the past was cooler and wetter throughout most of the territory. The Amazon basin region was the most affected by climate change in the last 21 ka, with equatorial rain forest retracting to refugia areas, while the tropical rain forest (with climatic preferences similar to Atlantic forest) expanded in the basin. In southern Brazil, the mixed forest (Araucaria forest) shifted to lower latitudes, while the grasslands expanded. In most biomes, the greatest changes occurred in the ecotonal zones. Regarding geographical distribution assumptions of Amazonian refugia, the replacement of the equatorial forest by seasonal vegetations was impossible due to soil constraints and to the climate of the past. However, the colder conditions of the Amazon basin favored the establishment of another type of rainforest, causing the equatorial rain forest to retreat to more stable climate areas. With regard to the geographical distribution assumptions of Pleistocenic arc, the seasonal (deciduous and semidecidual) forests and caatinga only began to expand after warming and reduction of water availability in the post-glacial period, however, limited to environments with favorable soils and never forming a continuous arc during these periods.

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