The French Program FairCarboN

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To meet the goal of limiting global temperature rise to less than +1.5°C by 2050 (Paris Climate Agreement), the achievement of global carbon (C) neutrality is critical. This cannot be achieved without significant advances in our understanding of carbon (C) dynamics in terrestrial ecosystems. There is an urgent need for progress in understanding the determinants of C dynamics and for the development of credible scenarios of changes in land use and land management practices. Such research must simultaneously take into account both socio-economic (e.g., public policies, C prices, circular economy) and biophysical (e.g., water and nutrient resources, ecosystem capacities for increasing perennial biomass and C stocks) determinants and identify possible synergies or antagonisms between different actions. The French program "FairCarboN" aims to i) quantify the contributions of continental ecosystems to the evolution of C flows at different spatio-temporal scales and in the context of global change, and ii) to use these data to propose management strategies that can inform public policies and stakeholder decisions. FairCarboN has three main objectives: (1) to remove barriers to knowledge regarding the key processes governing the C cycle and their responses to global change; (2) to provide the scientific community and relevant stakeholders with validated numerical models that can be used to simulate changes in ecosystem C stocks at different scales (local, territory, global); and (3) to develop, test, and evaluate, in cooperation with various partners (members of the general public, NGOs, public policy makers, etc.), different scenarios of change and their impact on the environment, along with data to support their implementation at the territorial and national scales. FairCarboN will capitalize on the dynamism of the French scientific community, spread across different institutions and recognized internationally, as well as on the strengths of research facilities in mainland France, overseas territories, and internationally, particularly in the Global South. Its goal is to raise France's scientific leadership to the highest level in this strategic area, and to provide expertise and support for French public policies by actively soliciting the contributions of stakeholders. This ambitious program (2023-2028) will mobilize a large community of scientific experts toward understanding the potential contributions of continental ecosystems to climate change mitigation, without which the objective of the Paris Agreement is not achievable.