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Software Developments in the Functionally Assembled Terrestrial Ecosystem Simulator (FATES)

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The Functionally Assembled Terrestrial Ecosystem Simulator (FATES) represents processes related to the demographics and dynamics of aboveground vegetation, often in an earth systems model context. It serves as a focal component of the Model-Experiment (MODEX) approach to the Next Generation Ecosystem Experiments (NGEE)–Tropics. This is a tool to probe our understanding of the terrestrial carbon sink and forest response to a changing climate and human activities. It is co-developed with scientific measurement experiments that are designed specifically to improve our understanding of model process and parameterization. FATES is a successor of the Ecosystem Demography model, and had originally been coupled with the Community Land Model, ie CLM-ED. The work presented here describes refactoring to isolate the FATES code into a standalone module and create a well documented public API. The API allows FATES to be incorporated into a range of host models, specifically targeting the Accelerated Climate Model for Energy (ACME). Further, the work presented here also covers efforts to make the FATES model robust, verifiable and integrated with benchmarking and workflow tools such as the Predictive Ecosystem Analyzer (PEcAn).