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Introduction to an open-source python platform for agent based modeling in coupled natural and human systems

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This presentation presents an open source python platform for building agent-based models and simulations (ABMS). It targets the modeling of complex systems such as the "coupled natural and human systems" and uncovering the coupled relationships within them. Unlike other general toolkits for ABMS, it leverages the advantages of python in data sciences, and is specialized in modeling the spatially explicit agents in the real world. In this platform, users can easily instantiate different types of agents directly from shapefiles (road maps, census boundaries, etc.) or other datasets. Users can easily add, remove, and modify the agents in the shapefile format.

The locations of the agents as well as their other attributes can be exported as shapefile at any time step. Simulation rules derived by machine learning models built based on real-world data can be updated on-the fly. The parameter tuning can be optimized either by exhaustive grid search or randomized parameter optimization to make sure the whole process is best calibrated to the real-world data. Viewing interfaces are developed to offer deep inspections on the agents by 2D or 3D displays of the key statistics of the results. The platform will greatly facilitate the researchers in the ABMS area by offering them an integrated platform.