HEP Agent Simulation Framework

Interface Documentation

January 20, 2026

Contents

Chapter 1

Introduction

The HEP Agent Simulation Framework provides a graphical user interface (GUI) to configure the fortran simulation.

Chapter 2

Main Graphical Interface

When launching ‘application.py‘, the user is presented with the main window containing four primary tabs (see Figure 2.2):

- **Configuration**: For managing simulation settings and HEP inputs.
- **Spawn Editor**: For defining initial agent distribution.
- **View Editor**: For configuring visualization settings.
- **Full Simulation**: For running headless, long-duration simulations.

At the bottom of the window, buttons are available to launch the simulation (Figure 2.1).

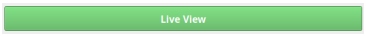

Figure 2.1: Live View Button

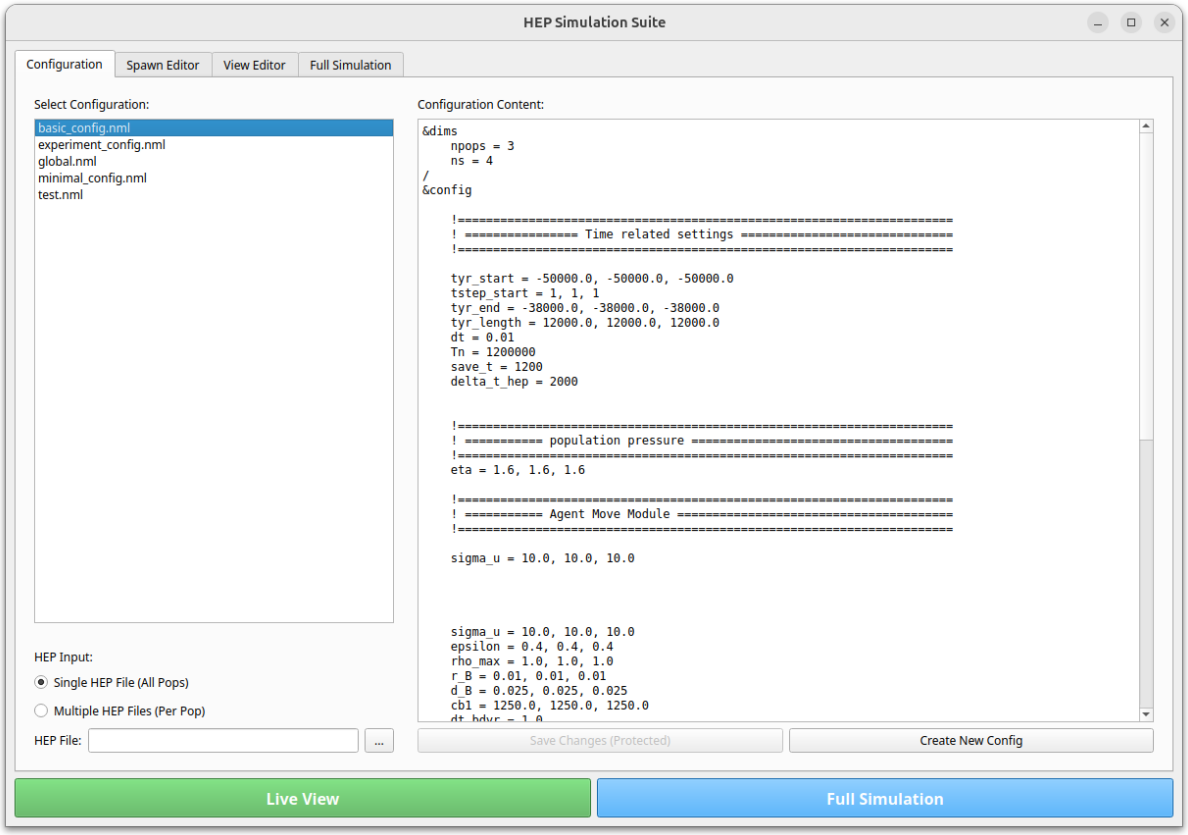

Figure 2.2: Overview of the Main Application Window (Configuration Tab)

Chapter 3

Configuration Tab

The Configuration tab serves as the entry point for setting up the simulation parameters.

3.1 Configuration List

On the left side, a list of available '.nml' configuration files is displayed (see Figure 3.1). Users can select a configuration to view and edit its content in the right-hand text editor.

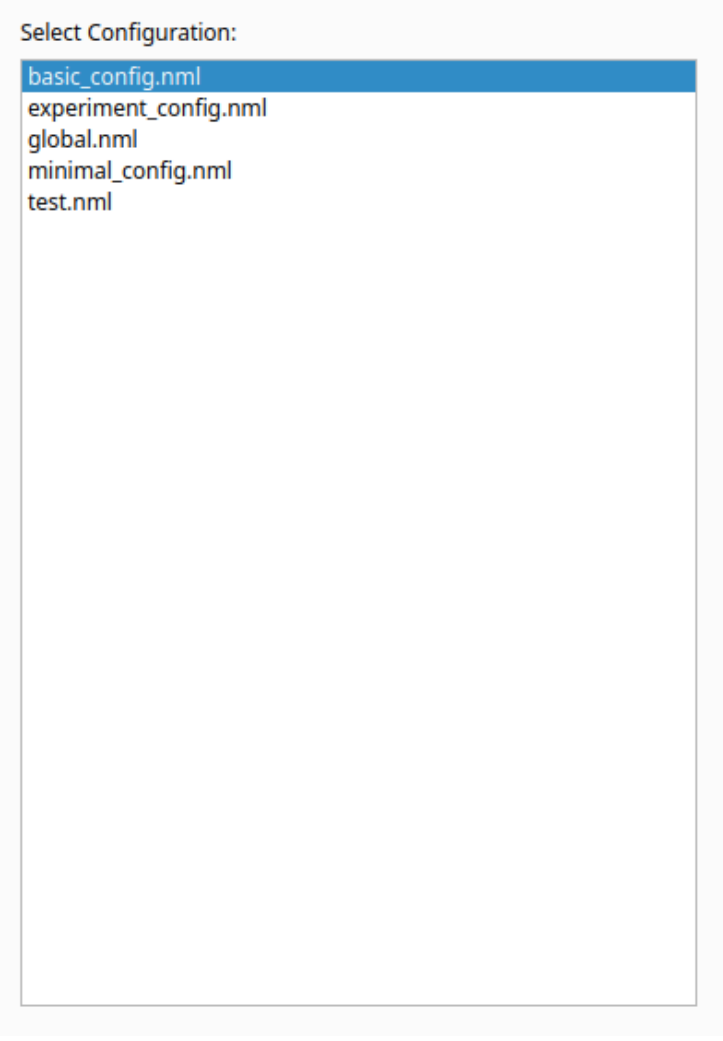

Figure 3.1: Selecting a Configuration File

The editor allows direct modification of the simulation parameters within the application (Figure 3.2). Note that the `basic_config.nml` serves as a template and cannot be modified directly in the editor.

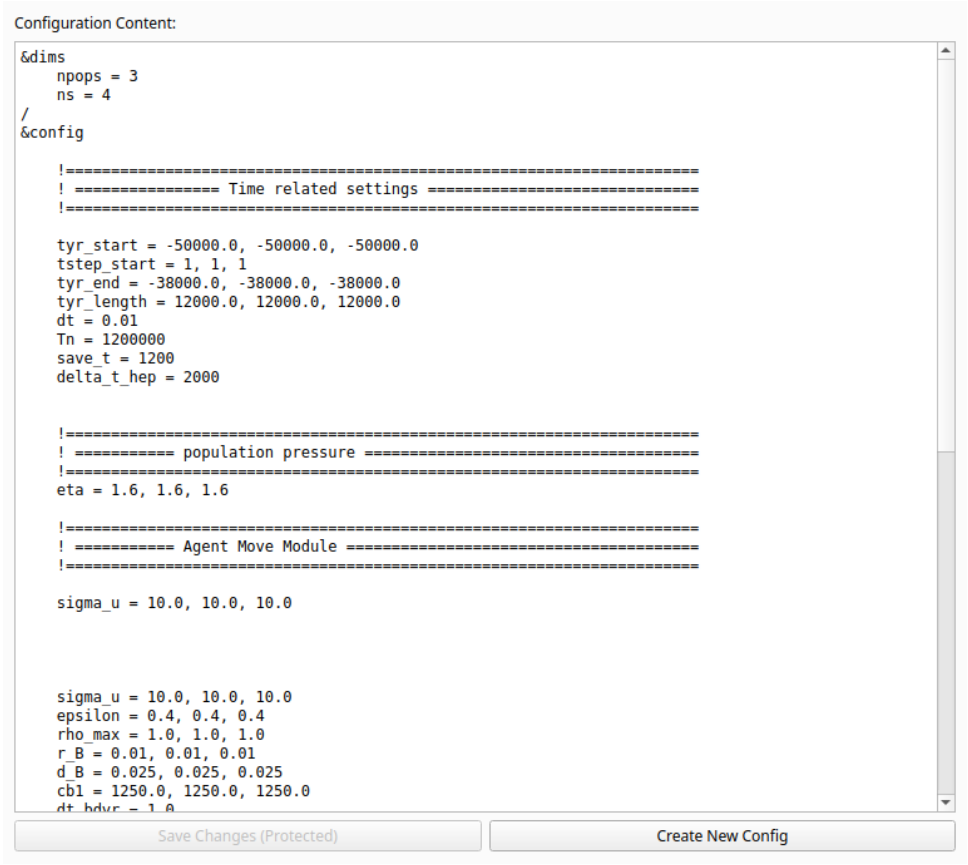

Figure 3.2: Editing Configuration Parameters

3.2 HEP Input Selection

Users can select the HEP input files (Figure 3.3):

- **Single HEP File**: Uses the same hep file for all populations.
- **Multiple HEP Files**: Allows specifying distinct hep files for each population.

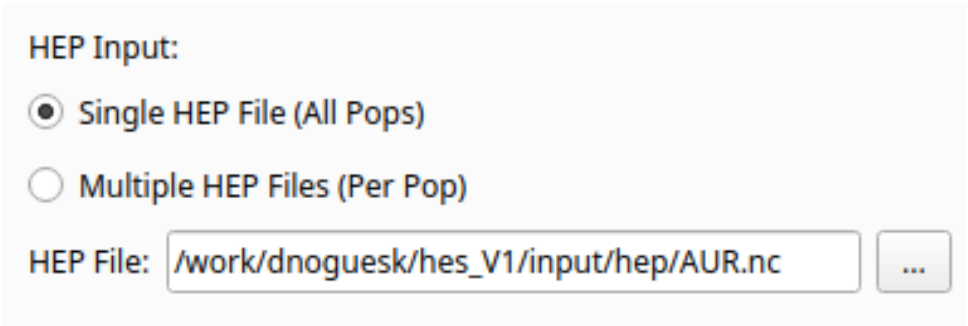

Figure 3.3: Selecting HEP Input Files

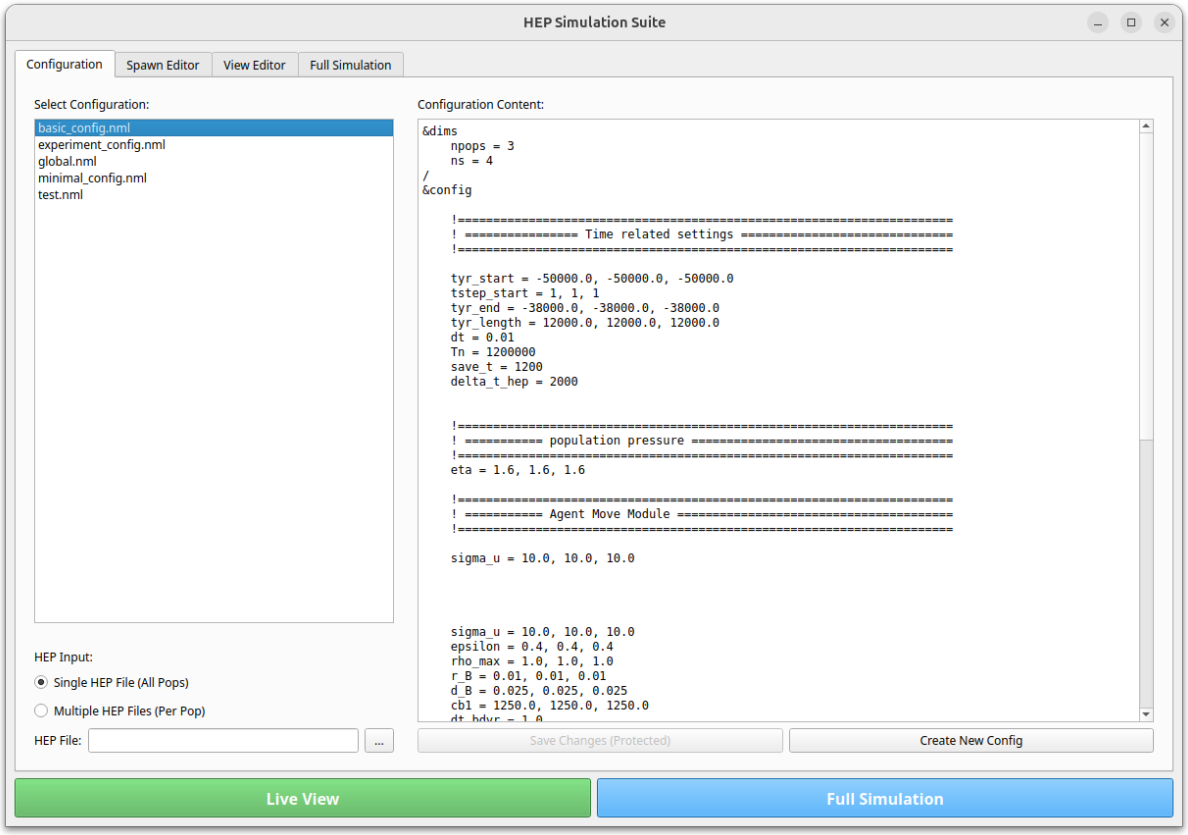

Figure 3.4: Configuration Tab showing file selection and editor

Chapter 4

Spawn Editor Tab

The Spawn Editor allows users to define where agents are initially placed on the map (Figure 4.1). This can only be done after a HEP File and a config File have been selected.

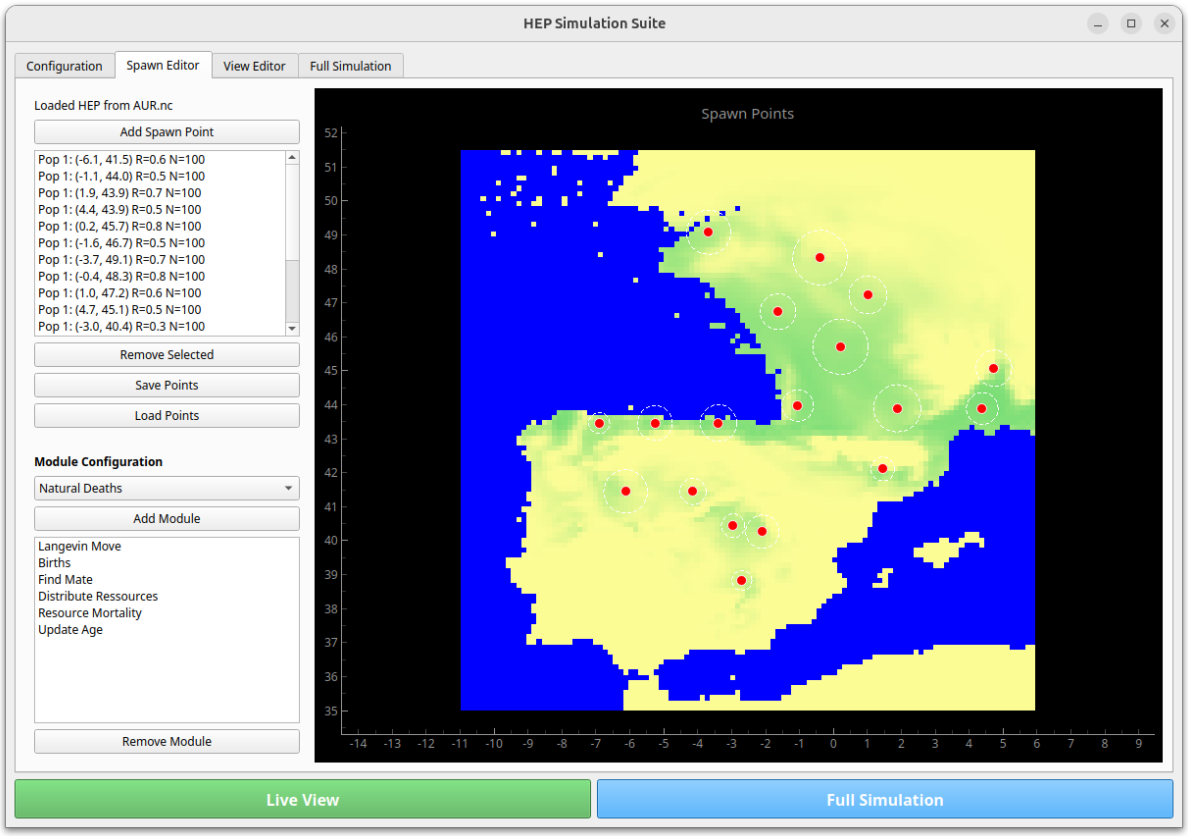

Figure 4.1: Spawn Editor Interface

4.1 Module Configuration

The user can activate or deactivate specific simulation modules for the agent population (see Figure 4.2). Note that new modules only appear in this list after the Fortran code has been recompiled and a Fortran-Python interface has been added. This tool serves not as a utility to create new modules, but only to toggle on and off modules that have already been implemented.

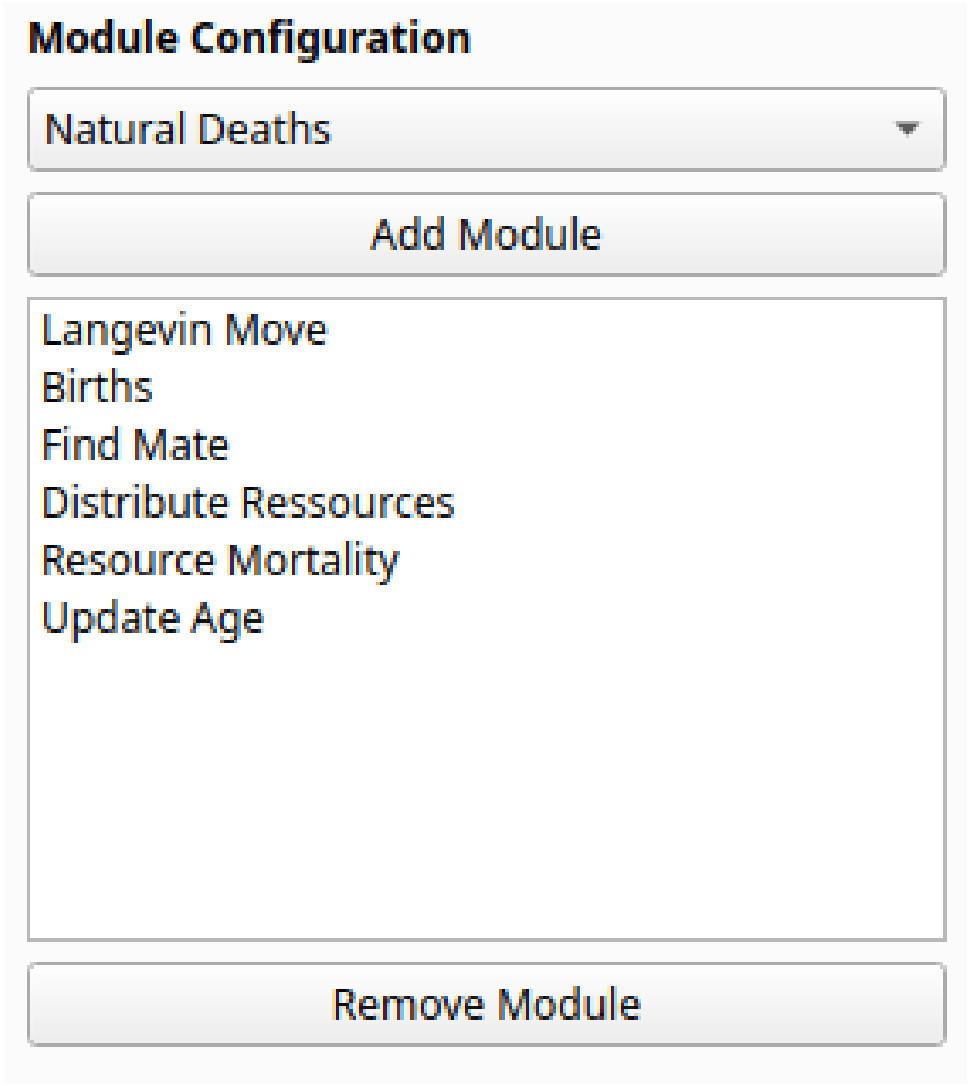

Figure 4.2: Module Activation Panel

4.2 Spawn Point Management

Users can add, remove, and manage spawn points directly from the list (Figure 4.3).

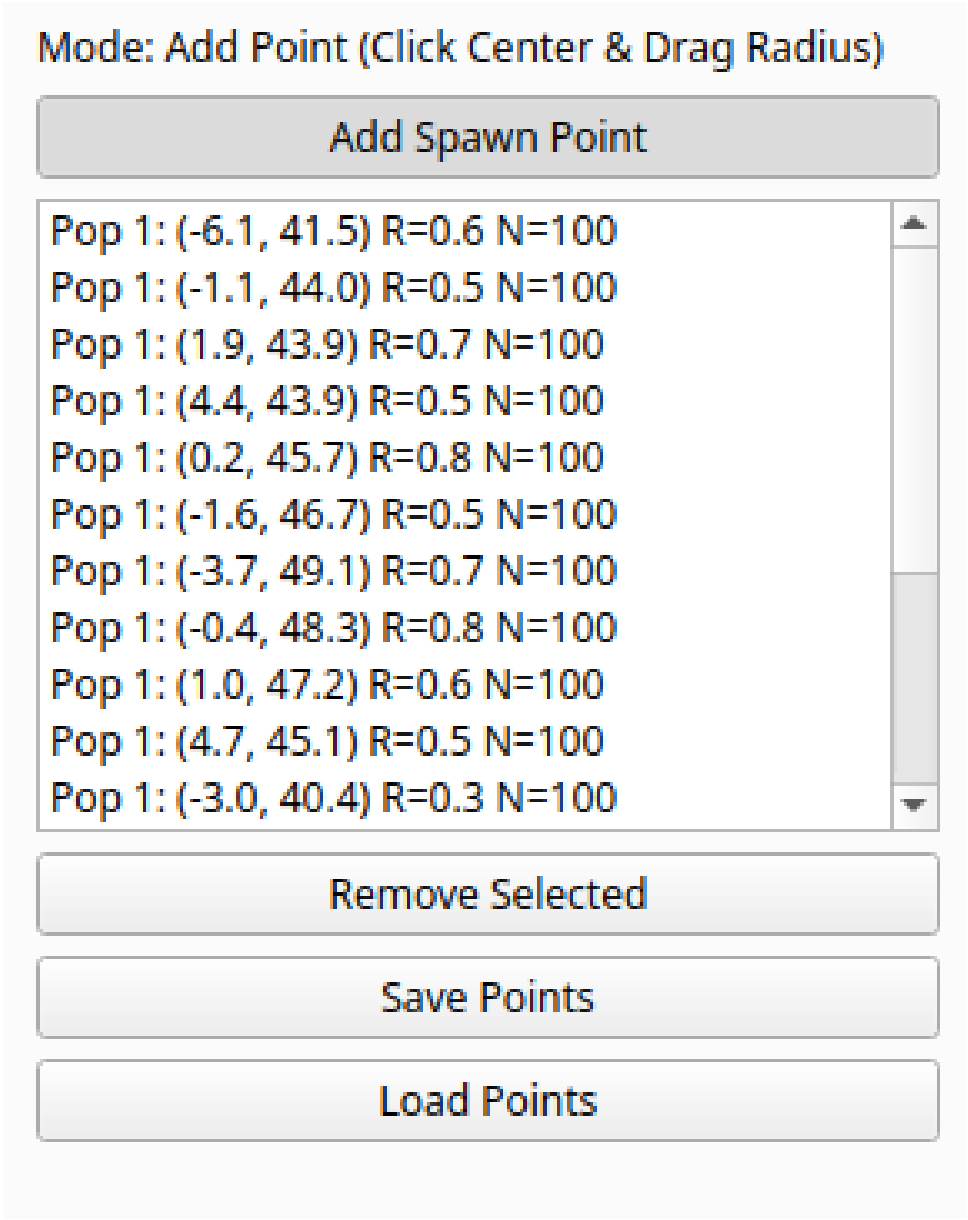

Figure 4.3: Spawn Point Management List

4.3 Preview Context

The editor allows previewing spawn locations overlaid on the selected HEP environment (Figure 4.4).

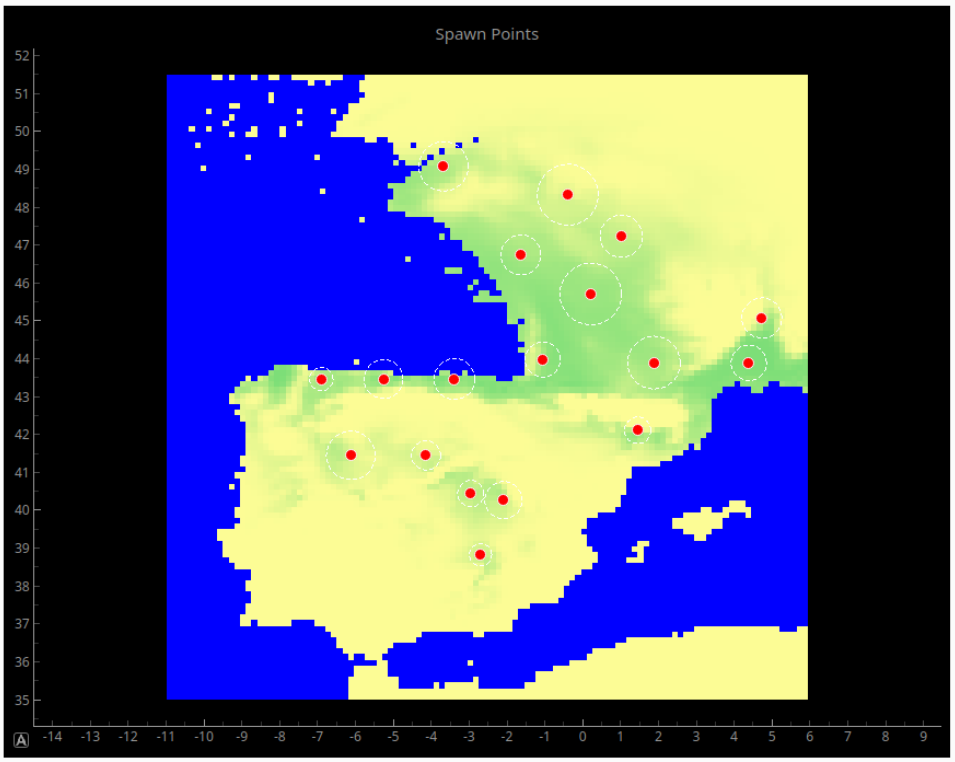

Figure 4.4: Preview of Spawn Points on HEP Map

Chapter 5

View Editor Tab

The View Editor controls the visualization parameters for the Live View execution (see Figure 5.1).

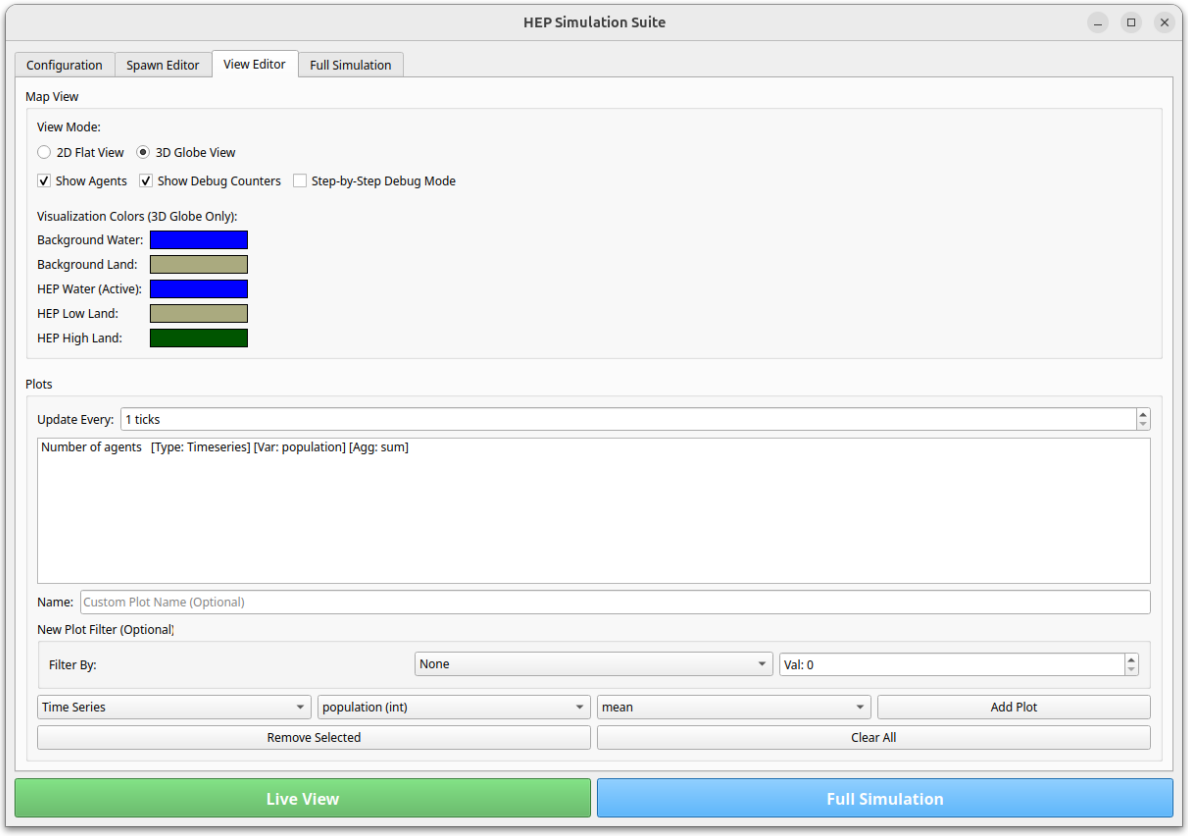

Figure 5.1: View Editor Overview

5.1 Map View Settings

Users can toggle between visualization modes (Figure 5.2):

- **2D Flat View**: Standard map projection.
- **3D Globe View**: Spherical projection of the simulation data.

Additional toggles allow showing/hiding agents and debug counters.

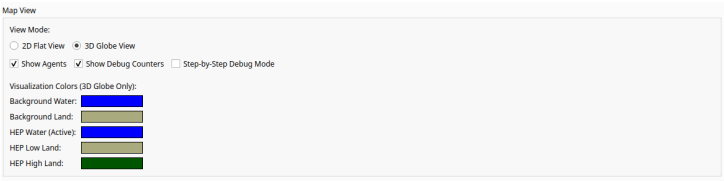

Figure 5.2: Map View and Visualization Settings

5.2 Plot Configuration

A dynamic plotting interface allows users to add real-time analysis charts (Figure 5.3). Supported plot types include:

- **Time Series**: Tracks variable evolution over time (e.g., Total Population).
- **Bucket Plot**: Demographics distribution (e.g., Age cohorts).
- **Count Plot**: Conditional counts (e.g., Number of pregnant agents).

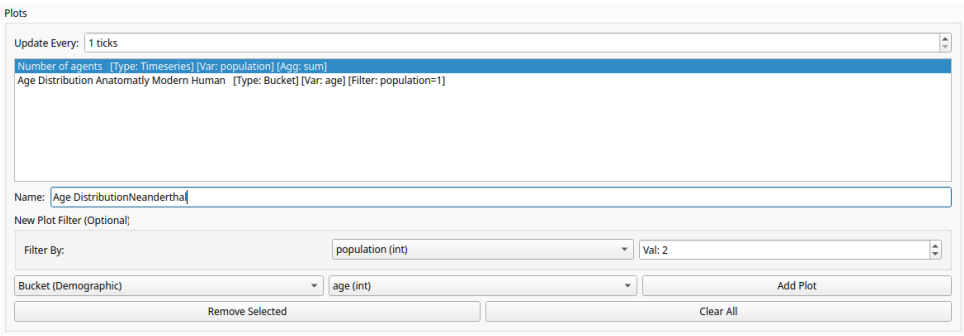

Figure 5.3: Plot Creation Tool

Chapter 6

Full Simulation Tab

The Full Simulation tab is designed for running high-performance, non-interactive simulations (see Figure 6.1).

Disclaimer: This feature has not been finished yet and is very much a work in progress.

6.1 Parameters

- **Start/End Year**: Defines the simulation timeline.
- **Output File**: Specifies the path for the simulation recording (.gif).

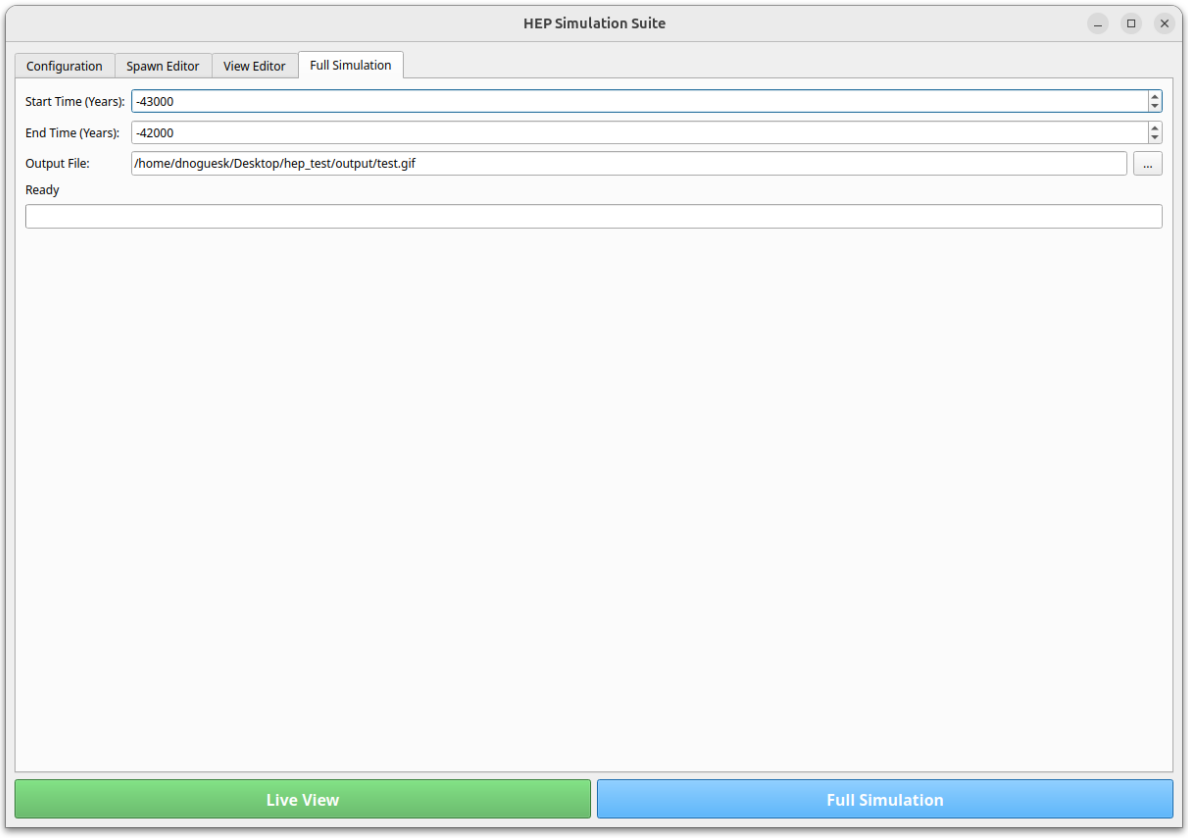

Figure 6.1: Full Simulation Execution Interface