

1. Model Select – Model Source

The screenshot displays the EASY MODEL web application interface. The top navigation bar includes the EASY MODEL logo, a hamburger menu icon, and the text "Model Select". The left sidebar contains four navigation buttons: "1. Model Select", "2. Model Builder", "3. Simulation Launcher", and "4. Simulation Results". The main content area is titled "Model Source" and contains four buttons: "Create New Model", "Public Repository", "Private Repository", and "Import SBML Model File". Below the "Import SBML Model File" button is a "Drop file here" instruction with an upload icon. The right sidebar contains two buttons: "Tutorial" and "Login & Register".

Navigation buttons: from 1. Model Select to 4. Simulation Results.

Information buttons can be found across the application.

Create New Model
Create a blank model. Model can't be saved unless user is logged in.

Public Repository
Load public models. Model can't be saved unless user is logged in.


Private Repository
Load and modify your personal models. Models can be saved into your private repository.

Import SBML Model File
Upload a SBML model file. Model can't be saved unless user is logged in.

Tutorial

Login & Register

1. Model Select – Model Repository



- 1. Model Select
- 2. Model Builder
- 3. Simulation Launcher
- 4. Simulation Results

Model Select

Back to Model Source

Public Models

BIOMD001 Edelstein1996 - EPSP ACh event
BIOMD002 Edelstein1996 - EPSP ACh species
BIOMD003 Goldbeter1991 - Min Mit Oscil
BIOMD004 Goldbeter1991 - Min Mit Oscil, Expl Inact
BIOMD005 Tyson1991 - Cell Cycle 6 var
BIOMD006 Tyson1991 - Cell Cycle 2 var
BIOMD006 Tyson1991 - Cell Cycle 2 var test-variant#1

Edelstein1996 - EPSP ACh event

Model of a nicotinic Excitatory Post-Synaptic Potential in a Torpedo electric organ. Acetylcholine is not represented explicitly, but by an event that changes the constants of transition from unliganded to liganded.

This model has initially been encoded using StochSim.

This model is described in the article:

[A kinetic mechanism for nicotinic acetylcholine receptors based on multiple allosteric transitions.](#)
Edelstein SJ, Schaad O, Henry E, Bertrand D, Changeux JP.

Load the model to edit.

Load Model

2. Model Builder – Define Reactions

The screenshot shows the EASY MODEL Model Builder interface. On the left is a sidebar with four steps: 1. Model Select, 2. Model Builder (highlighted), 3. Simulation Launcher, and 4. Simulation Results. The main area is divided into two panes: the Model Editor on the left and the Rate Editor on the right. The Model Editor contains a table of reactions with columns for Name, Rate Law, and Reaction. The Rate Editor contains a table of rates with columns for Name, Rate Definition, Edit, and Remove. Annotations in red boxes provide instructions for each step. A text box at the bottom explains the syntax for writing reactions using substrates, products, and modifiers.

Model Builder

1. Start by naming your model. Description is optional.

2. Define reactions (see below note)

3. Set initial concentrations and variable types (see next slide)

4. Create or import rates (see next slide)

5. Select a rate for each reaction (see next slide)

Adjustable Split Bar

How to write reactions using Substrates, Products and Modifiers:
 $n_1 S_1 + n_2 S_2 + \dots \rightarrow m_1 P_1 + m_2 P_2 + \dots ; M_1; M_2; \dots$
 n_i, m_i : Stoichiometric coefficient.
 S_i, P_i : Substrates and Products.
 M_i : Modifiers that can activate or inhibit the reaction rate.

6. Validate model to advance to the Simulation Launcher step.

Model Editor

Name	Rate Law	Reaction
		-> C
R2		C ->
		C -> ;X
R4		-> M;C M

Rate Editor

Name	Rate Definition	Edit	Remove
BIOMD003_K1	cell*vi		
BIOMD003_K2	C*cell*kd		
	X*(C...		
BIOMD003_K4	cell*(1+-1*M)...		
BIOMD003_K5	cell*M*V2*(K2...		
BIOMD003_K6	cell*(M*VM3)*...		
BIOMD003_K7	cell*V4*X*(K4...		

2. Model Builder – Species, Define rates, Select a rate for each reaction

The screenshot displays the EAM Model Builder interface with several key components and annotations:

- Left Sidebar:** Contains a navigation menu with icons and labels for "1. Model", "2. Model", "3. Simula", and "4. Simula".
- Species Settings Window:** A table with columns "Name", "Initial Concentration", and "Variable Type". It lists species C, M, and X, each with an initial concentration of 0.01 and a "Time Deper" variable type. Buttons for "Ok" and "Cancel" are at the bottom.
- Main Interface:** Features tabs for "Mit Osci", "Description", and "Species". A "Description" tab is active, showing a reaction list with green background highlights. Annotations point to the "Species" tab and the reaction list.
- Rate Law Selection for R2 Reaction Window:** Shows a dropdown menu with "BIOMD003_K2" selected. Below it, a "Parameters values" table lists parameters C, cell, and kd with their respective values and dropdown menus. Buttons for "Save" and "Cancel" are at the bottom.
- Edit Rate Window:** Displays the rate law "C*cell*vd*X*(C+Kd)^-1" and "Rate Options" (One substrate only, No products, One modifier only). Buttons for "Ok" and "Cancel" are at the bottom.
- Import Predefined Rates Window:** A table with columns "Name" and "Rate Definition". It lists predefined rates like "Power Laws", "Saturating Cooperative", "Saturating", "Mass action", and "Henri-Michaelis menten". Buttons for "Import" and "Cancel" are at the bottom.
- Bottom Panel:** Shows a list of reactions with columns for reaction ID (e.g., BIOMD003_K6, BIOMD003_K7), rate law, and a dropdown menu. Buttons for "Validate" and "Save to Private Repository" are at the bottom.

Annotations:

- 3. Set initial concentrations and variable types:** Points to the Species Settings window.
- 4. Create or import rates:** Points to the "+ New Rate" and "Import Rates" buttons.
- 5. Select a rate for each reaction and set a value for all the rate's parameters. Each parameter must have either a numeric value, a reference to a substrate or a reference to a modifier.** Points to the Rate Law Selection for R2 Reaction window.

3. Simulation Launcher – Dynamic and Steady State simulation

The screenshot shows the EASY MODEL Simulation Launcher interface. On the left is a sidebar with a navigation menu containing four items: '1. Model Select', '2. Model Builder', '3. Simulation Launcher' (highlighted with a rocket icon), and '4. Simulation Results'. The main panel is titled 'Simulation Launcher' and features a 'Select Simulation Types' section with three checked options: 'Dynamic (Deterministic)', 'Steady State', and 'Dynamic (Stochastic)'. Below this is a 'Plot Settings' button with a dashed red border and a 'Launch Simulation' button. The right panel displays 'Dynamic (Deterministic) Simulation Settings' with a 'Main Settings' section containing 'Initial Time' (0, Min=0), 'Final Time' (100, Min=0), and 'Time Step' (0.1, Min=0.000001; Max=0.1). Below this is an 'Analysis' section with 'Gains' and 'Sensitivities' both checked. At the bottom, 'Steady State Simulation Settings' are partially visible. Red annotations with arrows point to various elements: 'Dynamic simulation: time evolution of the species in the model.' points to 'Dynamic (Deterministic)'; 'Steady state simulation: calculates the steady states (non-trivial equilibriums) of the biological system. These steady states remain constant over the time.' points to 'Steady State'; 'Plot settings: contains several configuration parameters for the graphical plots that will be performed.' points to 'Plot Settings'; 'Launching the simulation will add the simulation job to the job queue. You can check the progress of the job inside of the queue in the next step.' points to 'Launch Simulation'; 'Analysis options' points to the 'Analysis' section, with sub-explanations: '"Gains" option analyses how changes in the independent variables affect the values of the time-dependent variables.' and '"Sensitivities" option analyses how changes in the parameter values affect the values of the time-dependent variables.'

EASY MODEL

1. Model Select
2. Model Builder
3. Simulation Launcher
4. Simulation Results

Simulation Launcher

Select Simulation Types

- ✓ Dynamic (Deterministic)
- ✓ Steady State
- ✓ Dynamic (Stochastic)

Plot Settings

Launch Simulation

Dynamic (Deterministic) Simulation Settings

Main Settings

Initial Time: 0 (Min=0)

Final Time: 100 (Min=0)

Time Step: 0.1 (Min=0.000001; Max=0.1)

Analysis

Plot Views

Parameter Scan

Steady State Simulation Settings

Main Settings

Analysis options

"Gains" option analyses how changes in the independent variables affect the values of the time-dependent variables.

"Sensitivities" option analyses how changes in the parameter values affect the values of the time-dependent variables.

Plot settings: contains several configuration parameters for the graphical plots that will be performed.

Launching the simulation will add the simulation job to the job queue. You can check the progress of the job inside of the queue in the next step.

Dynamic simulation: time evolution of the species in the model.

Steady state simulation: calculates the steady states (non-trivial equilibriums) of the biological system. These steady states remain constant over the time.

3. Simulation Launcher – Plot Views, Parameter Scan, Stochastic simulation

The screenshot shows the 'Dynamic (Deterministic) Simulation Settings' interface. The 'Plot Views' section is expanded, showing 'View 1' as the active view. Below it, under 'Dependent variables', three species are listed: C, M, and X, each with a checked checkbox. To the right of the checkboxes are four icons: an information icon (i), a plus icon (+), a minus icon (-), and a refresh icon (circular arrow). The 'Main Settings' and 'Analysis' sections are collapsed, and the 'Parameter Scan' section is visible at the bottom.

Plot views: you can select which time-dependent species are to be plotted in the simulation graphics. Furthermore, you can define several plot views, each of them with its own selected time-dependent species.

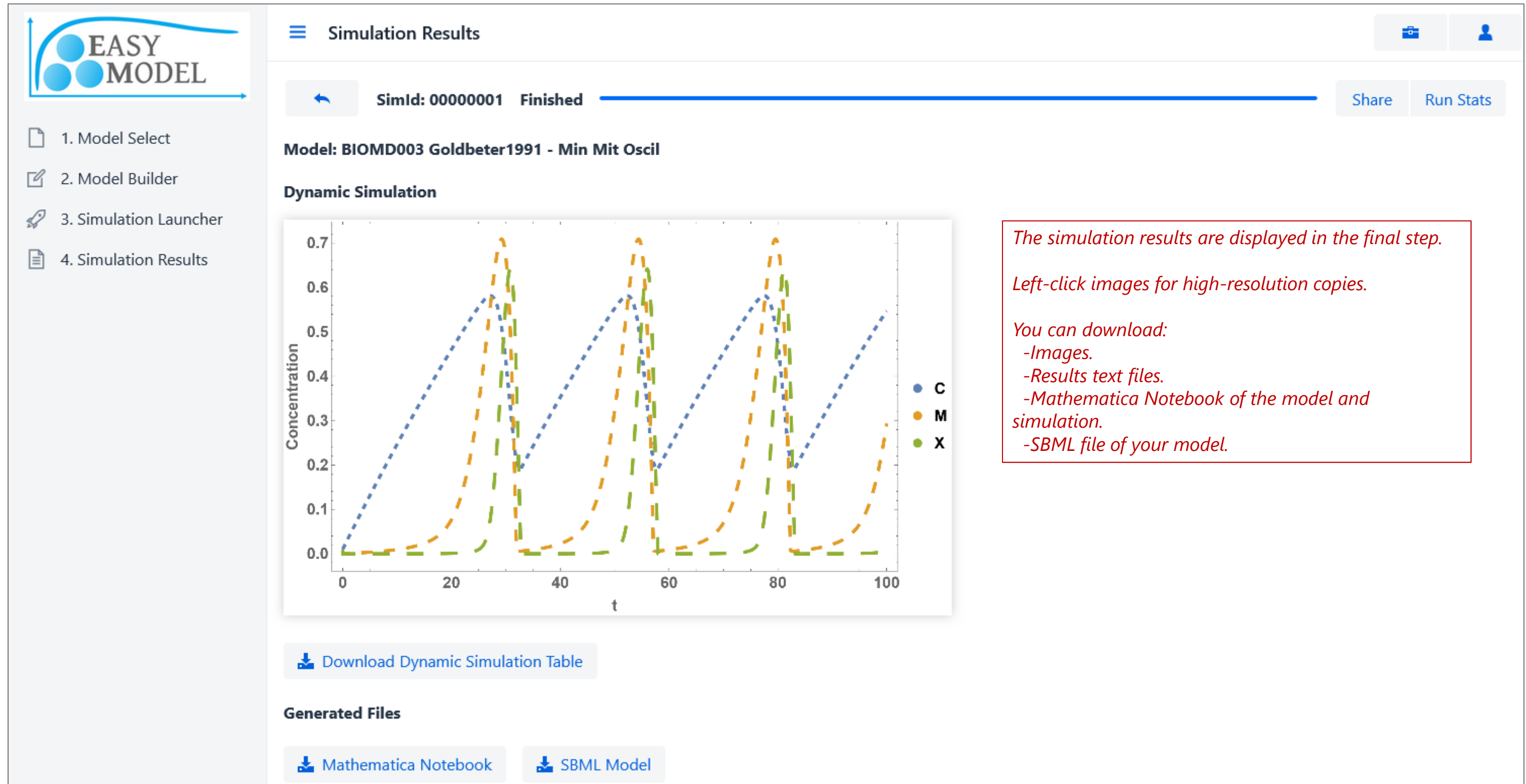
The screenshot shows the 'Dynamic (Deterministic) Simulation Settings' interface. The 'Parameter Scan' section is expanded, showing three buttons: 'Select Parameters', 'Select Independent Variables', and 'Reset Selection'. Each button has an information icon (i) to its right. The 'Main Settings', 'Analysis', and 'Plot Views' sections are collapsed.

Parameter scan: perform the simulation for several values of the rate parameters or independent variables. Select a numerical range and the number of range intervals for the parameter you want to scan to observe how the system evolves with the values variation. Each parameter scan is simulated separated from the others.


The screenshot shows the 'Dynamic (Stochastic) Simulation Settings' interface. A blue message states: 'Stochastic simulation is available for this model. Recommended method is preselected.' The 'Main Settings' section is expanded, showing five parameters: 'Initial Time' (0, Min=0), 'Final Time' (100, Min=0), '#Iterations' (3, Min=1 ; Max=8), 'Cell Size' (Prokaryotic Cell), and 'Stochastic Method' (SSA). Each parameter has an information icon (i) to its right. The 'Analysis' section is collapsed.

*Stochastic simulation: time evolution of the species using the Gillespie SSA stochastic simulation method. Compared to the deterministic simulation, it provides a more accurate simulation, specially when the model is composed of a small number of molecules and linear noise analysis is a more appropriate tool than the deterministic sensitivity analysis to understand the limitations and regulation of the system. All these benefits come at the expense of a longer simulation time.
Tau-leaping method: useful to reduce the simulation time. Not all models can benefit from it.*

4. Simulation Results – Simulation Job Results





4. Simulation Results – Simulation Queue

















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Simulation Results



Your Launched Simulations

Simulation Id	Status	Position in Queue	Copy URL	Cancel
00000001	Finished	-		
00000002	Finished	-		
00000003	Finished	-		
00000004	Finished	-		
00000005	Running	R		
00000006	Pending	1		
00000007	Pending	2		

When you launch a simulation, it is added into the processing queue. You can check the progress of your launched simulations in the queue view. You may also share and cancel unfinished simulations.