

Launch a sensitivity analysis

Launch sensitivity interface

Click on the MEXICO logo in the application tabs.

Sensitivity interface

Parameters tabs

This tab is the same than the normal simulation launch one. You can choose here the simulation parameters (initial population parameters, number of years, strategies and rules used). This is also from this tab that you will be able to load old simulations or launch new ones.

'Sensitivity analysis tab (factors selection)

This is from this tab that you will choose all the factors to take into account in the sensitivity analysis. Parameters that can be used as factors are shown with a little icon that changes shape when moused over. To take this parameter into account, double click on that parameter. A pop-up will be shown, depending on the parameter type.

Equation

An equation can be continuous or discrete

Continuous

For a continuous equation, choose the parameter by clicking on « Add ». Then enter the parameter name, its initial value (by default), the coefficient (in percentage, so a 0.05 coefficient stands for a 5 % variation), and the operand.

Then click on « validate » so that these parameter values are taken into account. Once all the equation parameters have been entered, click on Save.

Discrete

For a discrete equation, specify the number of different values for the factor. Then modify the equation (one equation per value/tab).

Matrix

A matrix can be continuous or discrete.

Continuous

For a continuous matrix, enter the base matrix (generally, it does not change from the usual one), the coefficient (Caution: a multiplying factor is expected rather than a percentage as indicated) and the operator.

Discrete

For a discrete matrix, as for the equation, indicate the number of different values. Then modify the matrices (one matrix per value/tab).

Numerical value

A numerical value can be continuous (only real values) or discrete (integer and real values).

Continuous

For a continuous numerical value, select the distribution and enter its parameters (the minimum and maximum value for uniform distribution).

Discrete

For a discrete value, indicate the number of different values. Then modify the values.

« Sensitivity method » tab

This tab allows you to choose the sensitivity method that will be used.

First, you have to choose the method and enter its parameters (mousing over the parameter name, a contextual help will display parameters' info and accepted values).

Then, depending on the chosen method, you may have to specify the number of different values per factor (some methods adapt the number of values to optimise the exploration of the parameter domains).

To finish, specify the model outputs on which to perform the sensitivity analysis and possibly the parameters needed to compute those outputs.

Model outputs :

12 outputs could be considered :

- 6 to directly study the model properties :

- **SensitivityCatchWeightY1** = Catch summed over months, classes and zones of the simulation last year.
- **SensitivitySpawningBiomassY2** = Spawning biomass in the last time step (sum of the biomass for all mature classes and zones at the last time step).
- **SensitivityBiomassY3** = Total biomass in the last time step (sum over all the classes and zones).
- **SensitivityCatchWeightRelativeY4** = SensitivityCatchWeightY1/CatchWeight summed over months, classes and zones of the simulation first year.
- **SensitivitySpawningBiomassRelativeY5** = SensitivitySpawningBiomassY2/Spawning biomass in december of the simulation first year (sum of the biomass for all mature classes and zones at time step = 11).
- **SensitivityBiomassRelativeY6** = SensitivityBiomassY3/Total biomass in december of the simulation first year (sum of the biomass for all classes and zones at time step = 11).
- 6 others to evaluate the impact relatively to a reference scenario (ref)
 - **SensitivityCatchWeightReferenceY7** = SensitivityCatchWeightY1/SensitivityCatchWeightY1(ref)
 - **SensitivitySpawningBiomassReferenceY8** = SensitivitySpawningBiomassY2/SensitivitySpawningBiomassY2(ref)
 - **SensitivityBiomassReferenceY9** = SensitivityBiomassY3/SensitivityBiomassY3(ref)
 - **SensitivityCatchWeightRelativeReferenceY10** = SensitivityCatchWeightRelativeY4/SensitivityCatchWeightRelativeY4(ref)
 - **SensitivitySpawningBiomassRelativeReferenceY11** = SensitivitySpawningBiomassRelativeY5/SensitivitySpawningBiomassRelativeY5(ref)
 - **SensitivityBiomassRelativeReferenceY12** = SensitivityBiomassRelativeY6/SensitivityBiomassRelativeY6(ref)

« Results export » tab

This tab is the same as for a normal simulation, you specify here the exports to take into account.

« Result choice » tab

This tab is the same as for a normal simulation, you specify here the results to save.

« Advanced parameters » tab

This tab is the same as for a normal simulation. It allows you to specify the log level, the simulator to use or the tags to add.

« Analyse results » tabs

This tab allows you to visualise the results of a sensitivity analysis (some results from R) or to launch again a sensitivity analysis from the simulations results (once all the simulation ran without errors).

Use results in R

Find .Rdata file

Results are located in a .Rdata file located in the isis-export directory. The address of the directory can be found in your configuration file.

.Rdata file content

The R session saved in the .Rdata file contains numerous R objects obtained at each step of the analysis in ISIS-Fish.

isis.factor

`isis.factor` is a 5 column, single row data frame.

- column 1: `nomFacteur`
- column 2: `Nominal` (value in the database)
- column 3: `Continu` (TRUE/FALSE)
- column 4: `Binf` (minimum value)
- column 5: `Bsup` (maximum value if continuous, otherwise the number of values)

Attributes

- an attribute for each discrete factor: `nomFacteur`: `list(values)`
- an attribute `nomModel`: “`isis-fish-externeR`”

`isis.factor` is registered in R as `SensitivityAnalysisName_0.isis.factor`

(Note that all spaces between words in the simulation name are stripped by R).

isis.factor.distribution

`isis.factor.distribution` is a 3 column data frame with one row per factor

- column 1: `NomFacteur`
- column 2: `NomDistribution`
- column 3: `ParametreDistribution`

`isis.factor.distribution` is registered in R as

`SensitivityAnalysisName_0.isis.factor.distribution` (all spaces are stripped by R).

isis.methodExp

`isis.methodExp` is a list with three objects

- object 1: `isis.factor`
- object 2: `isis.factor.distribution`
- object 3: `call`

Attributes

- an attribute `nomModel`: “`isis-fish-externeR`”

`isis.methodExp` is registered in R as

`SensitivityAnalysisName_0.isis.methodExp` (all spaces are stripped by R).

isis.simule

`isis.simule` is a data frame with one row per simulation and one column for each factor and each simulation result

- columns 1 to k: values of the k factors.
- columns k+1 to k+n: values of the n simulation results

Attributes

- an attribute `nomModel`: “`isis-fish-externeR`”
- an attribute `call`: the method that generating the simulations.

`isis.simule` is registered in R as `SensitivityAnalysisName_0.isis.simule` (all spaces are stripped by R).

isis.methodAnalyse

`isis.methodAnalyse` is a list with 5 objects:

- object 1: `isis.factor`
- object 2: `isis.factor.distribution`
- object 3: `isis.simule`
- object 4: `call_method`
- object 5: `analysis_result` (R object with the analysis results. If the results were calculated by `aov`, the object is a list with the `aov` and the sensitivity indices.)

`isis.methodAnalyse` is registered in R

as `SensitivityAnalysisName_0.ResultName.isis.methodAnalyse` (all spaces are stripped by R).

List of all R session objects

You can always use the R function `ls()` to list all the objects in the R session and the help of the method used in the corresponding package.