EcoNet

A web-based software for ecological modeling, simulation and analysis

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- Plots a time course diagram of stock values
- Performs Ecological Network Analysis, based on the final state of the system.

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- Brings the thought process and results closer.

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- **Free**!

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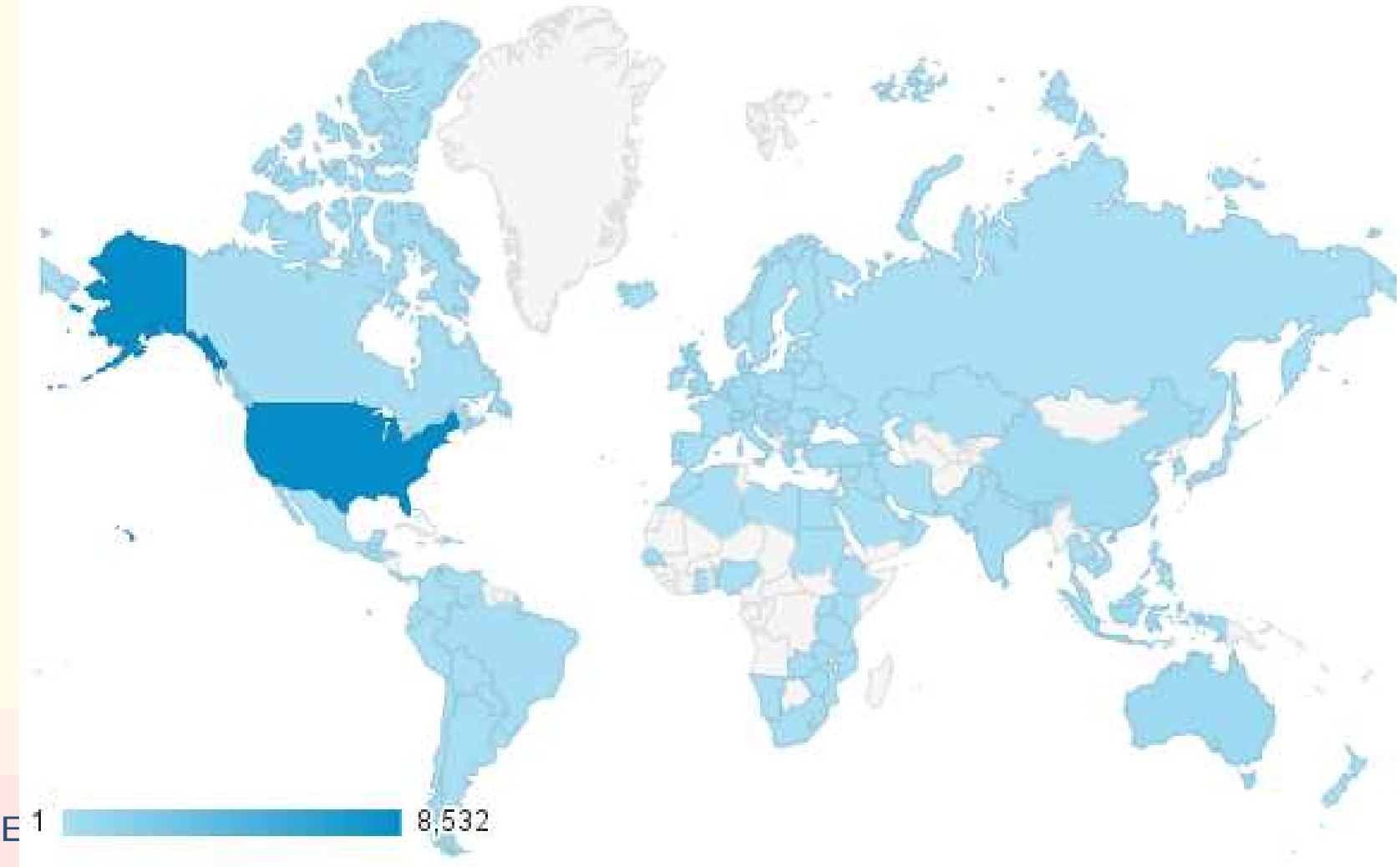
- Over 15000 unique visits from over 127 countries
- Around 500 people have accessed EcoNet more than a hundred times.



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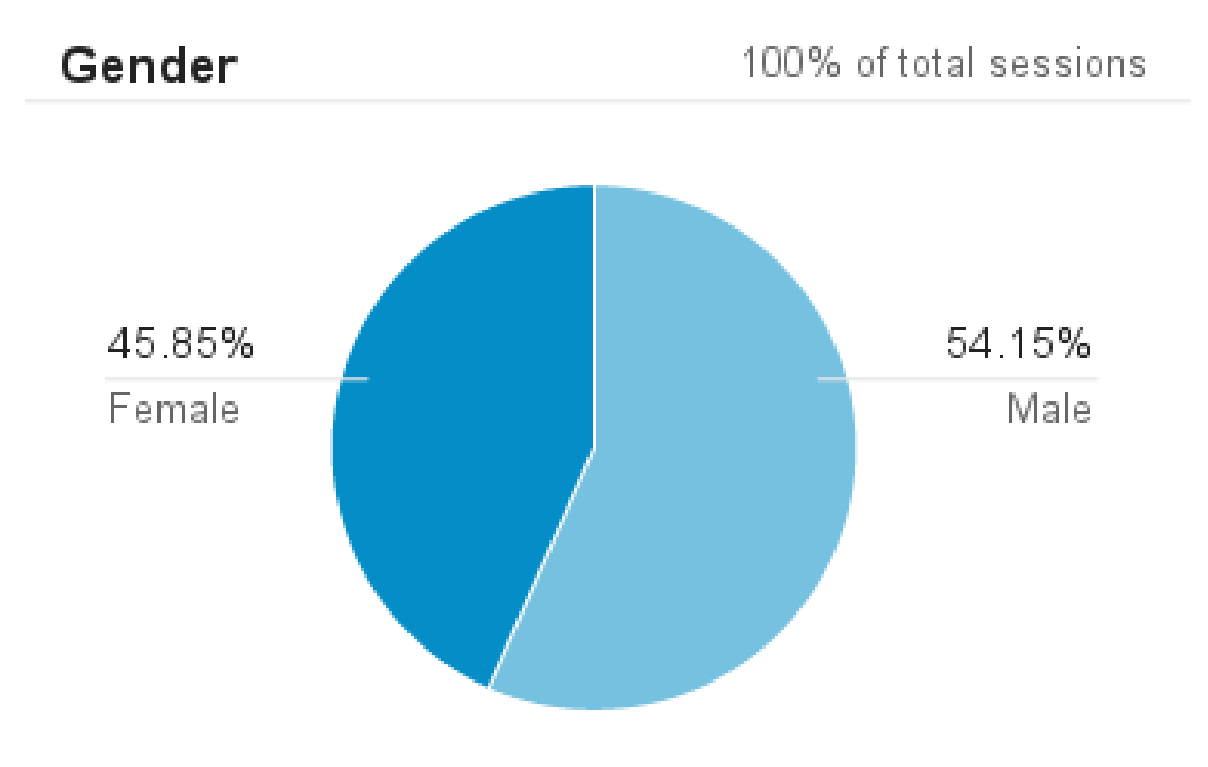

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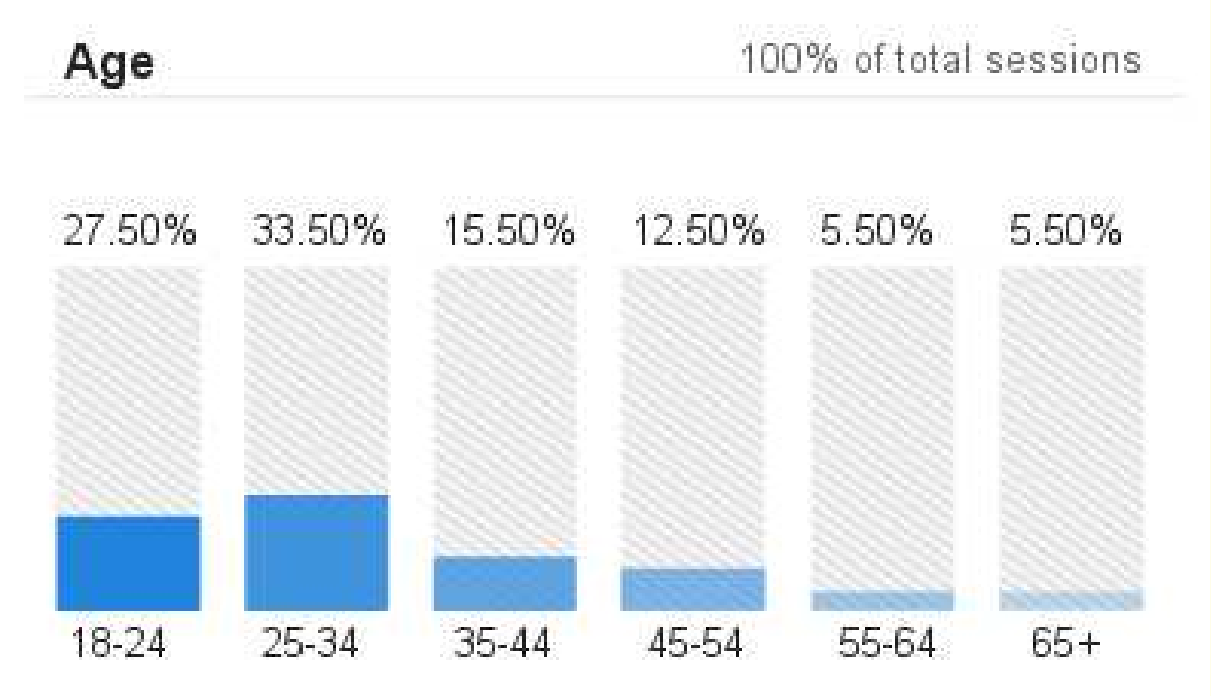
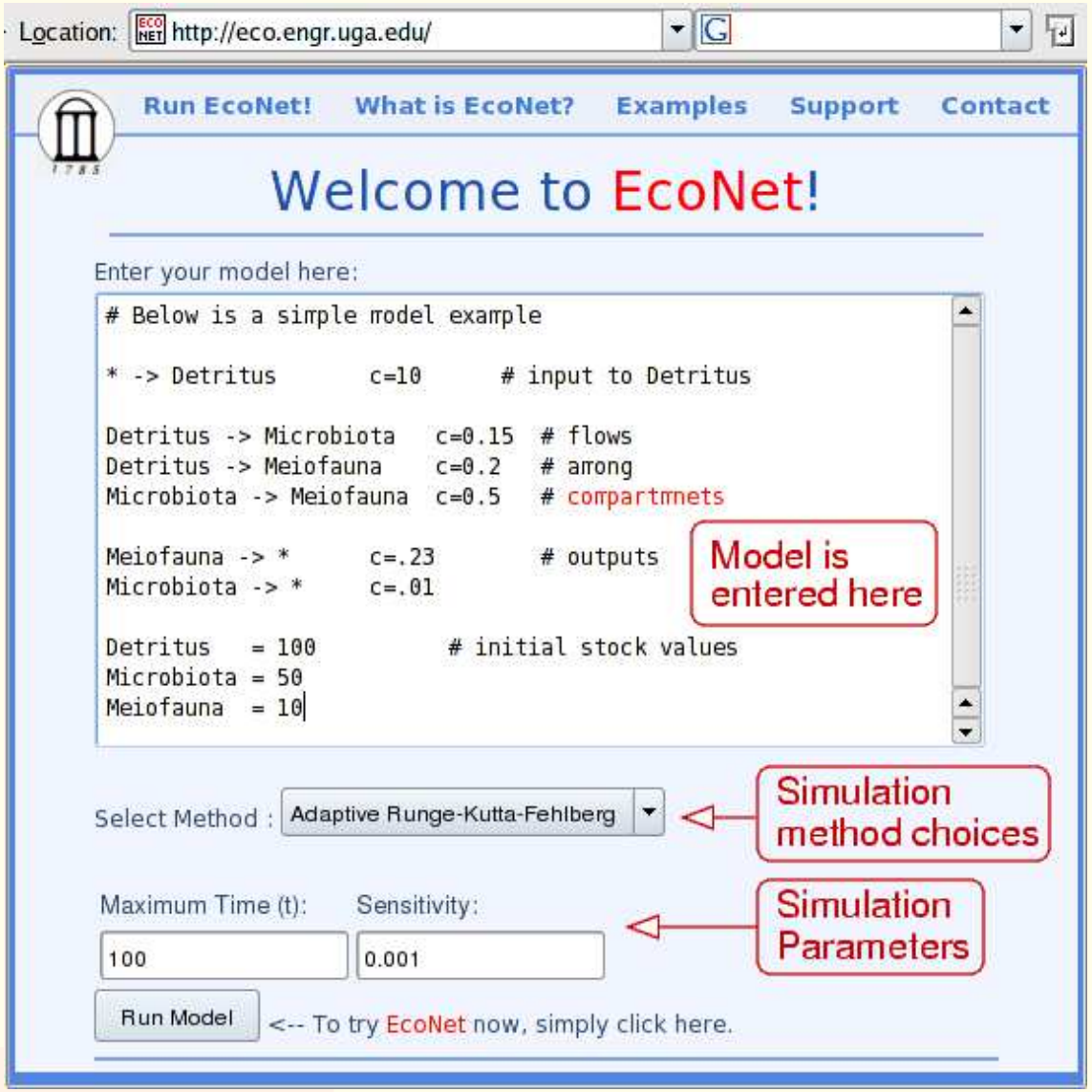


http://eco.engr.uga.edu



EcoNet Model Structure


```
* -> Detritus

Detritus -> Microbiota
Detritus -> Meiofauna
Microbiota -> Meiofauna

Meiofauna -> *
Microbiota -> *
```

-> : Flows

* : Environment

Flows among compartments

EcoNet Model Structure


```
* -> Detritus                c=10

Detritus -> Microbiota      c=0.15
Detritus -> Meiofauna       c=0.2
Microbiota -> Meiofauna     c=0.5

Meiofauna -> *              c=.23
Microbiota -> *             c=.01
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Flow types and rates

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Detritus   = 100
Microbiota = 50
Meiofauna  = 10
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Initial conditions

EcoNet Model Structure


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# Below is a simple model example

* -> Detritus                c=10    # Input to Detritus

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Meiofauna -> *              c=.23   # outputs
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Detritus   = 100                    # initial stock values
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Comments (ignored by EcoNet)

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Flows

Initial storage values

Flow type and coefficients

Comments

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Detritus   = 100

Detritus -> Meiofauna
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Microbiota -> Meiofauna, Meiofauna -> *, Microbiota -> *
c=0.5, c=.23, c=.01
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Flexibility

EcoNet model format

EcoNet uses a flexible text format for model representation..

Because:

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Because:

- Quick and easy to enter.
- Human readable.
- Easy to manipulate.
- Portable.
- Can be automated easily.

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- **Michaelis-Menten type flow**: A -> B v=3,5

$$\text{(Flow rate } A \rightarrow B) = \frac{3 \times \text{(Storage of } A) \times \text{(Storage of } B)}{5 + \text{(Storage of } A)}$$

(Michaelis Menten is not implemented as of August 2015)

What is EcoNet made of?

- A set of interacting modules based on:
  - **C++ codes**: Resource intensive processes
  - **CGI**: Web interface
  - **Graphviz**: Network diagram
  - **GNU plot**: Time course figure
  - **Python**: Network Flux Decomposition
  - **Linux shell scripts**: Communication among separate modules

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- Choose a numerical solution method (optional).
- Change default parameters if need be.
- Hit "**Run Model**" to see the results.

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- New ENA measures (coding finished, not implemented)
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Pytho -> Zoo    c=2
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k=2*[Phyto]*[Zoo]/(12+[Zoo])*[1+sin(23*t)]
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