**Exercise\_4\_forest\_systems**

There are two simulations in this exercise. The duke simulation is based on

the Duke Forest (<http://www.dukeforest.duke.edu/about/>). Duke Forest is

comprised of an evergreen (coniferous) forest and is located in North Carolina (USA). The harvard simulation is based on the Harvard Forest LTER site (http://harvardforest.fas.harvard.edu/research/LTER). Harvard Forest is a deciduous system located in Massachusetts (USA).

I have created two schedule files, one for each forest system:

1. duke.sch

2. harvard.sch

I have also provided a file named outvars.txt that contains a list of output

variables that can be extracted from the binary output files that are created when you run the Century simulations, and an Excel workbook,

forest\_results\_template.xls,that contains a separate spreadsheet for entering the output for each forest system.

Run the two Century simulations, enter the model output into the Excel workbook and look at the graphs to see how the coniferous and deciduous forest systems behave differently. Also, please note that when examining model output for a forest system that the growing season accumulator and production output variable names are different from those used when examining production for a grassland/cropping system. There are 5 forest live carbon pools:

1. rleavc (leaves)

2. frootc (fine roots)

3. fbrchc (fine branches)

4. rlwodc (large wood)

5 crootc (coarse roots)

There are 6 growing season and production output variables:

1. rlvacc/rlvprd (leaves)

2. frtacc/frtprd (fine roots)

3. fbracc/fbrprd (fine branches)

4. rlwacc/rlwprd (large wood)

5. crtacc/crtprd (coarse roots)

6. fcacc/fcprd (total forest production)

The dead wood components of a tree system are stored in three dead wood pools:

1. wood1c (dead fine branches)

2. wood2c (dead large wood)

3. wood3c (dead coarse roots)

The dead leaves and dead fine roots are stored in the surface and soil

litter pools:

1. metabc(1) (surface metabolic litter - dead leaves)

2. strucc(1) (surface structural litter - dead leaves)

3. metabc(2) (soil metabolic litter - dead fine roots)

4. strucc(2) (soil structural litter - dead fine roots)

After you have successfully completed this exercise create a new list of

output variables that will be used to examine additional output information

for the forest system. Name this file outvars2.txt. Here is a suggested list of output variable names to include in this file:

metabc(1)

strucc(1)

metabc(2)

strucc(2)

wood1c

wood2c

wood3c

totsysc

Run the list100 utility to extract this additional information from the

duke.bin and harvard.bin binary output files that were created from your

original simulations. Open a new Excel workbook, import the list of output

variable values into a worksheet, and plot the results.

The totsysc output variable can be used to track the change in system carbon. Taking the difference of this output variable value over a period of time will indicate if the system you are simulating is a storing (sequestering) or losing carbon.

If you have time create new schedule files for these two sites, changing the

fire frequency to examine how more or less frequent fires affect the system.

To run all the simulations at once, open a DOS window and run the batch file by typing its name:

run\_forest\_sites.bat