**Step by Step: A Century Tutorial**

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Step 1: Collect your site data

a. If desired, create a monthly weather data file using the format outlined in section 4.9., “Generating Weather Statistics”, in the Century 4.0 manual.

b. Enter site specific parameters into an existing <site>.100 file or create a new <site>.100 file with your site specific parameter values. The site file can be edited using any text editor such as Windows Notepad or Windows WordPad. Required site specific parameters are:

* latitude of site - SITLAT (decimal degrees)
* longitude of site - SITLNG (decimal degrees)
* fraction of sand in the soil - SAND (0.0-1.0)
* fraction of silt in the soil - SILT (0.0-1.0)
* fraction of clay in the soil - CLAY (0.0-1.0)
* bulk density of soil - BULKD (g cm-3)
* number of soil layers to simulate - NLAYER (1-9)
* pH of the soil

c. If you will be using a weather data file for your simulation (step a), use option 13 in the file100 utility to create weather statistics for your site file (step b) using the weather data file created in step a.

Step 2: Create Site Specific Event Options

a. Options specific to your site and simulation can be entered (or modified) in the crop.100, cult.100, fert.100, fire.100, graz.100, harv.100, irri.100, omad.100, tree.100, and trem.100 files. These files can be edited using a text editor such as Windows Notepad or Windows WordPad. Using the file100 utility to update the \*.100 files is not recommended.

b. When creating a new option in a \*.100 file the first 5 characters of the abbreviation for the option are used for entering the event into a schedule file. These abbreviations must be unique for each option in the file. *The definitions for the parameters in the \*.100 file are contained in the associated \*.def file.*

Step 3: Determine the order and types of events that you want to include in the schedule file for your simulation.

Modify example schedule files using a text editor.

Step 4: Run your simulation

a. The command line for running the Century model is:

century\_47 -s <sch\_file> -n <bin\_file>

* where sch\_file in the name of your schedule file without the .sch extension
* bin\_file is the name of the binary file of monthly output that will be created without the .bin extension.

For organizational purposes, it is easier to keep track of which schedule file and binary file go together if the same or similar file name is used for both files. For example, to run the corn.sch file to produce a binary output file named corn.bin use the command line:

century\_47 -s corn -n corn

b. Century can also be run using information from the end of a previous simulation as a starting point for a new simulation. This option is used when the model has been run to simulate a site up to a specific time period and you wish to run the model forward in time using different options to examine how different management practices will affect the model output. For example, traditional cropping until 2005 and then 4 simulations from 2006 to 2100 one with no-till, one with a reduced amount of fertilizer applied, one using a different crop rotation, and one where the site is allowed to go back to native conditions.

To run the Century model extending from a previous simulation use the command line:

century\_47 -s <sch\_file> -n <bin\_file> -e <extend\_file>

* where sch\_file in the name of your schedule file without the .sch extension,
* bin\_file is the name of the binary file of monthly output that will be created without the .bin extension, and
* extend\_file is the name of the binary file that will be read as a starting point without the .bin extension.

Using the example from step a above and extending from a file named historic.bin the command line is as follows:

century\_47 -s corn -n corn -e historic

Step 5. Examine the model output

a. It is important to check the net primary productivity (NPP) that the model is predicting for your site. If the NPP for your site is not correct then none of the other model output can be expected to be representative of the conditions at your site.

b. Use the list100 utility to extract output variables from the \*.bin file. To run list100 use the command line:

list100\_47

and follow the on-screen prompts.

The list100 utility can also be run using an input file containing a list of output variables that you wish to extract from the file. This option can be useful when running the model using a batch file or script.

list100\_47 <bin\_file> <lis\_file> <txt\_file>

* where bin\_file is the \*.bin file from which you wish to extract data without the .bin extension,
* lis\_file is the output file that will be created by the list100 utility without the .lis extension, and
* txt file is a text file with a list of output variables one per line.

For example, to extract information from the corn.bin file to create a corn.lis file with the output variables in the outvars.txt file use the command line:

list100\_47 corn corn outvars.txt

c. For binary output file variable definitions see Appendix 2.13., “Output variables”, in the Century 4.0 manual and the Century\_4.7\_ModelDevelopmentNotes.txt file.