Rothamsted Carbon Model - Summary data requirements

This is a summary of the data required to run RothC and the data that the model simulates. For more detailed information please see the documentation for RothC, which can be obtained from the web

https://www.rothamsted.ac.uk/rothamsted-carbon-model-rothc

The data required to run the model are: -

Variable	**Units**	
Monthly rainfall	mm	see note A
Monthly open pan evaporation	mm	see notes A & B
Average monthly mean air temperature	^{o}C	see note A
Clay content of the soil	%	
An estimate of the decomposability of the incoming plant material - the DPM/RPM ratio.	none	
Soil cover (0 or 1)	none	
Monthly input of plant residues	t C ha^{-1}	see note C
Monthly input of farmyard manure (FYM)	t C ha^{-1}	see note D
Depth of soil layer sampled	cm	

Data simulated by the model

- Total organic C content in t C ha^{-1} in the top soil, several points over a few decades would is preferable.
- Microbial biomass C content in t C ha^{-1} in the top soil (optional)
- Radiocarbon age of the soil (optional)

Notes:

A: Because the model is a medium to long-term SOM turnover model, using long-term averages will not affect the models performance. But if you want to know how climate change would affect SOM, it would be better to use monthly data for each year.

B: If open-pan evaporation is not known, mean (monthly) potential evaporation from Müller's (1982) collection of meteorological data for sites around the world can be used with adequate accuracy. If Müller's data is used, you must remember to convert his values (column14 in his individual site Tables, headed 'mean potential evaporation') to open-pan evaporation by dividing by 0.75.
i.e. Potential evapotranspiration / 0.75 = open pan evaporation

C: The plant residue input is the amount of carbon that enters the soil per month (t C ha^{-1}), including carbon released from roots during crop growth. As this input is rarely known, the model is most often run in 'inverse' mode, generating input from known soil, site and weather data.

D: The amount of carbon from FYM (t C ha^{-1}) put on the soil, if any, is inputted separately, because FYM is treated slightly differently from carbon inputs of fresh plant residues.

An example weather file

```
' Rothamsted weather '      <-- text describing the data in the file
   3.4   74.0    8.0              <-- Temperature, rainfall and evaporation for January
   3.6   59.0   10.0
   5.1   62.0   27.0
   7.3   51.0   49.0
  11.0   52.0   83.0
  13.9   57.0   99.0
  16.0   34.0  103.0
  16.0   55.0   91.0
  13.5   58.0   69.0
  10.2   56.0   34.0
   6.1   75.0   16.0
   4.6   71.0    8.0              <-- Temperature, rainfall and evaporation for December
  23.4   23.0                    <-- clay content and depth
```

An example land management file

```
' land management file '    <-- text descripting the data in the file
  0.00   0.0    1                 <-- Plant C returns, FYM C, soil cover for January
  0.00   0.0    1
  0.00   0.0    1
  0.09   0.0    1
  0.19   0.0    1
  0.29   0.0    1
  0.88   0.0    1
  0.00   0.0    0
  0.00   0.0    0
```

0.00	0.0	0	
0.00	0.0	0	
0.00	0.0	1	<-- Plant C returns, FYM C, soil cover for December