

New features in JULES version 2

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Overview

JULES version 1

Single point

ASCII input and output

Input data in specific format, with times and frequency to match run

Fixed vegetation characteristics (e.g. LAI)

JULES version 2

No new science!

Single point or gridded

Inputs: ASCII, binary (incl. PP) and (some) netCDF files

Outputs: ASCII and binary

Inputs can be interpolated in time, and times found in files

Time- and space-varying vegetation characteristics

Automatic spin up (not for TRIFFID)

Setting up the grid

The input grid can be 2-D (x,y) or a vector (e.g. of land points).

The model grid can be a subset of the input grid.

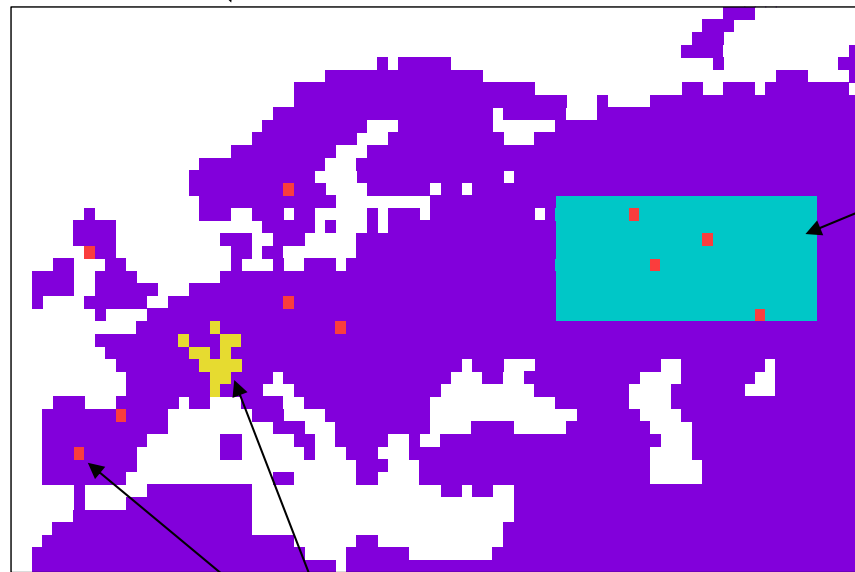
Different ways to choose a subset – e.g.

- select land points within given lat/lon range
- or specify point numbers

Setting up the grid

Options...

run the model at all point in input file



run only at locations within a given lat/lon range

run at "arbitrary" points – e.g. a catchment or FLUXNET sites



(Slightly more) Flexible types and tiles

At v1:

The 9 surface types were fixed

5 PFTs (BT,NT,C3G,C4G,shrub)

4 non-veg (urban, lake, soil, ice)

Now... not fixed – e.g. can add new PFTs.

Meteorological (driving) data

At v1: the required variables had to be in correct order in a single ASCII file, with correct time interval.

Now....

Can be in ASCII, binary, PP or (some) netCDF files.

All variables can be in the same file, or can be split between several files.

Data for different times can be in different files (e.g. monthly files).

File names can be arbitrary or can follow a naming convention.

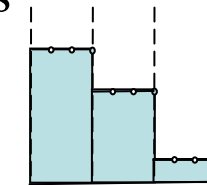
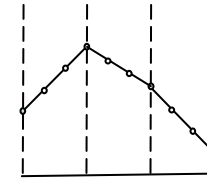
....cont....

Meteorological (driving) data

Data can be interpolated in time, with different options on different variables -

e.g.

- linear interpolation of instantaneous values
- interpolate and conserve mean of backward averages
- no interpolation



Choice of precipitation inputs – e.g.

- total precipitation
- rainfall and snowfall
- 4 components from the UM.



Prescribed vegetation characteristics

At v1: no time variation (LAI, canopy height, root depth)

Now...

- Option to vary LAI, canopy height and root depth with time and/or location.
- As for meteorological data:
 - interpolation in time
 - etc.
- Some support for “climatological” files.

Spin up

The model can be repeatedly integrated using any arbitrary section of input data (e.g. 1 year, 10 years).

There is NO option for automatic spin up with TRIFFID.

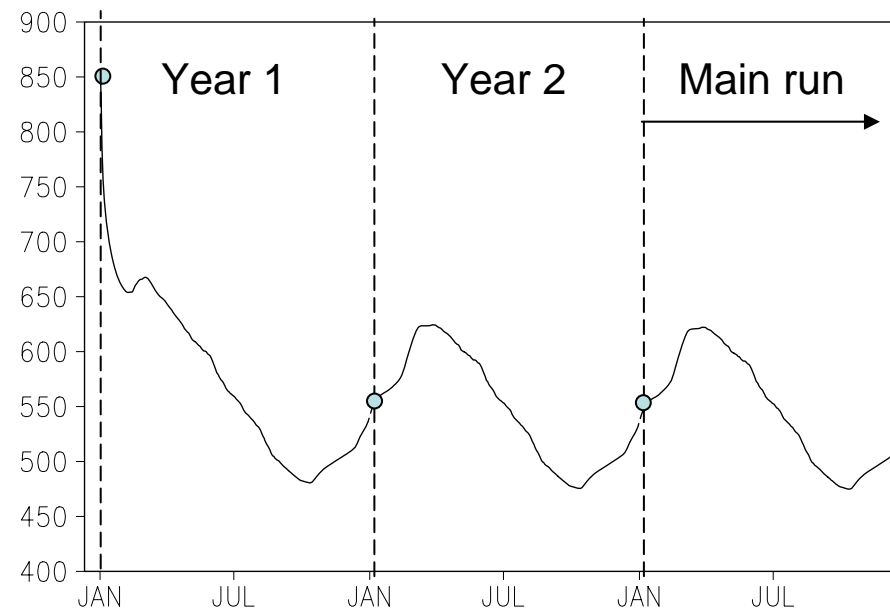
The user specifies the maximum number of repetitions and the convergence criteria for soil moisture and/or temperature.

Output can be generated at all stages or just after spin up.

Deep soil moisture (mm)

Large adjustment during Year 1 of spin up

Year 2 of spin up – reaches quasi-steady state



Output (diagnostics)

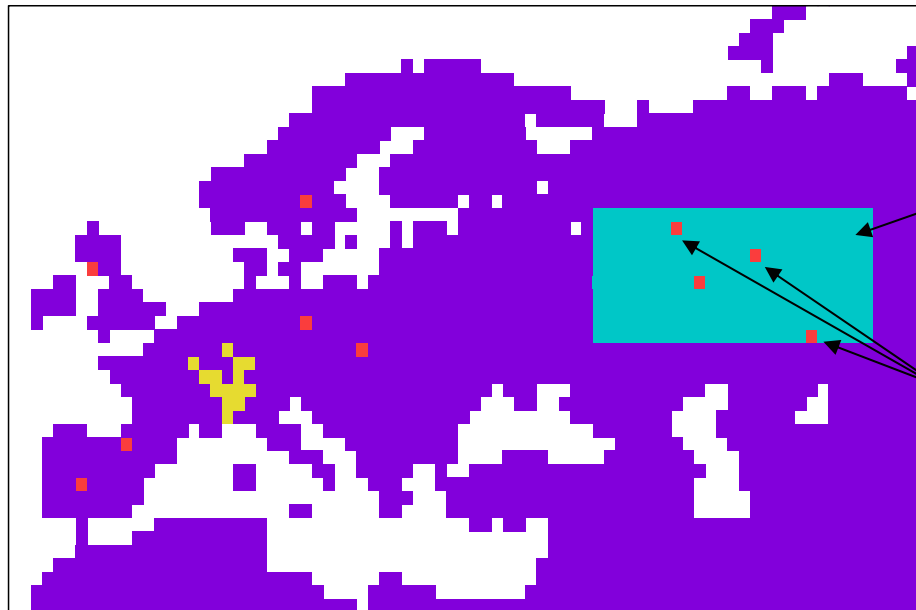
At v1: two ASCII streams - instantaneous (every timestep) and time-average

Now...

- Any number of streams, each of which can contain both instantaneous and time-averaged quantities
- ASCII or binary files
- For each stream select
 - start and end times
 - frequency (and sampling frequency for averages)
 - points to be output (can be chosen in different ways)
 - variables

Output – an example

Monthly diagnostics over whole domain



Daily output over a sub-area during an intensive observation period

Hourly output at selected sites with high frequency observations

Status

The new i/o code has undergone a moderate amount of testing.

Some options we have used extensively and “in anger” – so we know they work.

Other options and combinations are less tested – feel free to break and fix them (and tell us).

The future

New science!

More generic i/o code – e.g. a FLUME i/o model?

Summary

JULES version 2

- runs on a grid
- has improved i/o