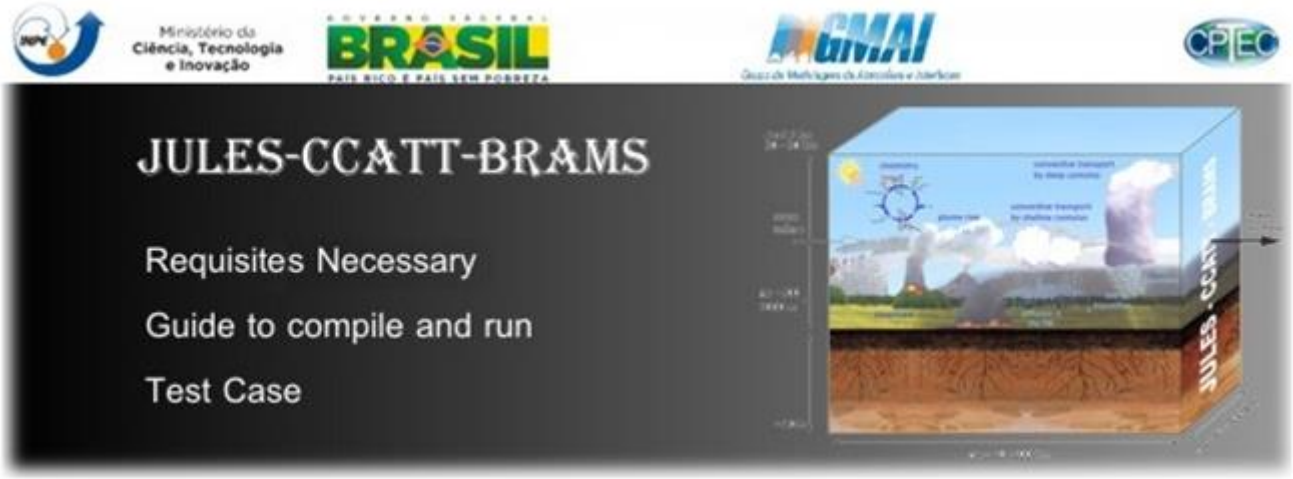

Guide to: JULES-CCATT-BRAMS1.0

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Last revision: 15/Mar/2013

1 INTRODUCTION:

This guide shows the requisites necessary to compile and run JULES-CCATT-BRAMS1.0 model and pre/post processing. Also have a description of a Test Case. Further details can be obtained in BRAMS homepage: http://brams.cptec.inpe.br

JULES-CCATT-BRAMS1.0 was originated of coupling between jules-v3.0 and CCATT_BRAMS4.3.3.

2 REQUISITES:

2.1 Necessary:

a) A good machine (preference for scalar machine with over 100 processors)
b) mpich2 (http://phase.hpcc.jp/mirrors/mpi/mpich2/)
c) LINUX operating system (or UNIX, but not tested in this system)
d) FORTAN-90 compiler (preference to PGI-FORTRAN)
e) Netcdf library (http://www.unidata.ucar.edu/downloads/netcdf/index.jsp)
f) HDF4 library (http://www.hdfgroup.org/products/hdf4/)
g) zlib library (http://www.zlib.net/)
h) jpeg library (http://www.ijg.org/)
i) Signed the JULES licence agreement (https://jules.jchmr.org/software-and-documentation)

2.2 Recommended versions (were used by me)

a) CRAY Cluster (2.1 GHz AMD Opteron processors) using 360 processors
b) xt-mpich2_5.5.4 (Cray MPICH2 Message Passing Interface)
c) SUSE Linux - 2.6.27.48-0.12-default - x86_64
d) PGI_VERSION 11.3 (pgf90 11.3-0 64-bit)
e) netcdf-3.6.2
f) hdf-4.2.5
g) zlib-1.2.7
h) jpeg-8d

3 TO COMPILE THE LIBRAIES (Netcdf, HDF4, zlib and jpeg):

- Libraries and JULES-CCATT-BRAMS must be compiled with the some compiler.

a) Shell command: "export CC=<C compiler>" (ex: export CC=pgcc)
b) Shell command: "export F77=<F77 compiler>" (ex: export F77=pgf77)
c) Shell command: "export FC=<F90 compiler" (ex: export FC=pgf90)
d) Go to: ./source/LIBS/netcdf-3.6.2 or ./source/LIBS/hdf-4.2.5 or ./source/LIBS/zlib-1.2.7 or ./source/LIBS/jpeg-8d
e) Execute: DIR=$(pwd); ./configure --prefix=$DIR/installed
f) Execute: make

g) Execute: make install
h) Repeat items d-g until to compile the four libraries

4 TO COMPILE JULES-CCATT-BRAMS:

a) Open in a ascci editor the file: ./source/JULES-CCATT-BRAMS1.0/src/brams/jules/LIB/Makefile
b) On line 56 inform the netcdf PATH
c) On lines 108 and 118 inform the compiler name
d) If pgf is not your compiler, create a file to your compiler with name: ./source/JULES-CCATT-BRAMS1.0/build/bin/include.mk.<COMPILES>, similar to: ./source/JULES-CCATT-BRAMS1.0/build/bin/include.mk.pgf
e) Open in a ascci editor the file: ./source/JULES-CCATT-BRAMS1.0/build/bin/include.mk.<COMPILES>
f) In lines 25 and 27, inform the compiler name
g) In lines 31, 34 and 36 you can change the options to your compilation.
h) Execute: ./source/JULES-CCATT-BRAMS1.0/build/bin/comp.bash

- If everything was alright, was generated the executable: ./source/JULES-CCATT-BRAMS1.0/build/ccatt-brams-4.3-<COMPILES>-CO2_JULES

5 TO EXECUTE JULES-CCATT-BRAMS:

5.1 Requisites:

a) JULES-CCATT-BRAMS Executable
   - ⇨ obtained above (ccatt-brams-4.3-<COMPILES>-CO2_JULES)
b) CCATT-BRAMS namelist (RAMSIN)
   - ⇨ There is one model in: ./source/JULES-CCATT-BRAMS1.0/
   - ⇨ Documentation BRAMS variables: http://downloads.cptec.inpe.br/~rdown/upload/brams40-namelist-final.pdf
   - ⇨ Documentation CCATT variables: http://downloads.cptec.inpe.br/~rdown/upload/BRAMS4.0_CATT_First_Time_User_Guide_Ver1.pdf
c) JULES namelist (jules.in)
   - ⇨ There is one model in: ./source/JULES-CCATT-BRAMS1.0/
   - ⇨ Documentation JULES variables: ./source/JULES-CCATT-BRAMS1.0/src/brams/jules/LIB/DOCS/jules_v3.0_users_guide.pdf
d) Soil Carbon map (soil_carbon.txt), only if cs!=-1 in jules.in (line 554)
   - ⇨ Is a ascii file with three cols (longitude, latitude and soil carbon (C/m2)) and a lot of lines (depends of region domain and resolution)
e) Atmospheric and CO2 initialization and boundary condition (ex: dpCO2-2010-03-25-0000.vfm)

- ⇨ Use geraDP program (http://brams.cptec.inpe.br/geraDP.shtml) to convert atmospheric variable (wind, temperature, geopotential and relative humid) in BRAMS format (ex: dp2010-03-25-0000)
- ⇨ Use ./source/Utilits/join-dp_co2.f90 to join file above (dp) with CO2 boundary condition (Ex. from TM5 model)

f) Source emissions (ex: Queima_source-T-2010-03-25-000000-g1.vfm)
- ⇨ Use: ./source/PREP-CHEM-SRC-1.2 (http://brams.cptec.inpe.br/in_data_catt_burn_map.shtml)

g) NDVI (http://brams.cptec.inpe.br/in_data_ndvi_modis.shtml)
h) Soil Moisture (http://brams.cptec.inpe.br/in_data_soil_moisture.shtml)
i) SST (http://brams.cptec.inpe.br/in_data_gl_weekly_sst.shtml)
j) Soil Textural Class (http://brams.cptec.inpe.br/in_data_soil_textural.shtml)
k) Landuse (http://brams.cptec.inpe.br/in_data_landuse.shtml)
l) Topography (http://brams.cptec.inpe.br/in_data_topography.shtml)

5.2 Hint to execute the model

a) Create a folder named “run” (mkdir run)
b) Enter in “run” (cd run)
c) Create a link to executable (ln -s ../source/JULES-CCATT-BRAMS1.0/build/ccatt-brams-4.3-pgf-CO2_JULES)
d) Create a link to tables folder (ln -s ../source/JULES-CCATT-BRAMS1.0/tables)
e) Copy RAMSIN_model (cp ../source/JULES-CCATT-BRAMS1.0/RAMSIN_model RAMSIN
f) Copy jules.in_model (cp ../source/JULES-CCATT-BRAMS1.0/jules.in_model jules.in
g) Open RAMSIN in ascii editor (gedit, nedit, vi, …) to make the necessary changes
h) Create the outputs folders: IVAR, HIS, ANL, sfc and tmp (mkdir IVAR HIS ANL sfc tmp)
i) Execute the model for phases: MAKESFC, MAKEVFILE and INITIAL (see: http://downloads.cptec.inpe.br/~rdown/upload/Brams_First_Time_User_Guide_Ver4.pdf)

6 POST PROCESSING (RAMSPOST)

- Documentation: http://downloads.cptec.inpe.br/~rdown/upload/RAMSPOST_User_guide_ver_01.pdf

a) To Compile:
   - Open in a ascci editor the file: ./source/Ramspost-5.1/LIB/include.mk
   - Change to the options of your compiler.
   - Execute: ./source/Ramspost-5.1/comp.bash
b) Configure the namelist (ramspost.inp), see: http://downloads.cptec.inpe.br/~rdown/upload/RAMSPOST_User_guide_ver_01.pdf
c) Run executable: ramspost_51
d) Open the forecasts p. ex. in GrADS software (http://www.iges.org/grads/)

7 TEST CASE

7.1 Configuration:

- Grid with horizontal resolution of 20 km
- Amazon region (Grid center: 59.0W ; 3.2S)
- X, Y, Z point = 310, 210, 48
- Six hour of integration (01/Mar/2010 00Z until 01/Mar/2010 06Z)
- Forecast output in each hour

7.2 Requisites necessary to this Test Case:

- Download the tarballs: source.tgz and test_case.tgz
- Execute item 3 to compile all libraries in your machine
- Execute item 4 to compile the model in your machine
- Execute item 6 to compile post processing in your machine

7.3 Not necessary to this Test Case:

- Download surface data (topography, NDVI, …)
- Download Initialization and boundary condition (Atmospheric and CO_2)
- Prepare source emissions
- Change RAMSIN
- Change jules.in

7.4 To execute Test Case:

- Execute item 7.2 and expand all tarballs
- Execute: "./TEST_CASE/test_case.bash <nproc>", where <nproc> is the number of processor that you want to use.

➢ If everything was alright, was generated the files:
  - ./TEST_CASE/grads/test_g1.gra (binary with variables: Temperature and wind)
  - ./TEST_CASE/grads/test_g1.ctl (descriptor to GrADS software)
  - ./TEST_CASE/grads/test_field.png (figure generated by GrADS)
  - ./TEST_CASE/grads/test_serie.png (figure generated by GrADS)