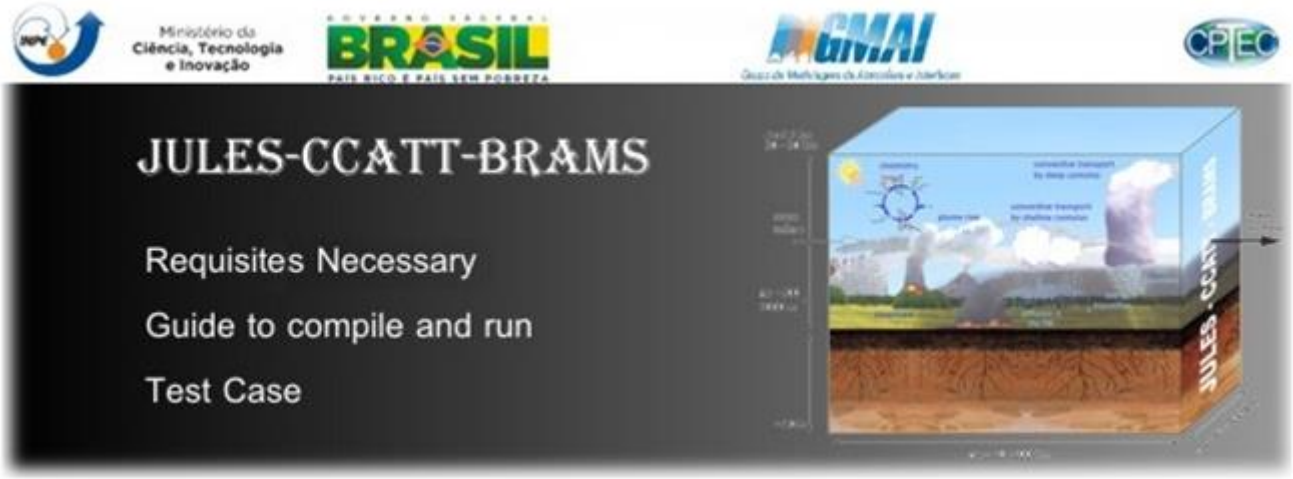

Guide to: JULES-CCATT-BRAMS1.0

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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)

7.5 Questions and Answers:

Q-01: Luis Molina (24/Oct/2013)

"A quick question, the dp* files for this test case have to be build or are they available?

I am already familiar with dp* files used by CCATT-BRAMS, that I used to process using geraDP, as they follow the RALPH convention. However, not familiar with the new files used in this new couple version, I wanted check with you if I do understand how the initial CO2 conditions and the final dp* files are organized, according to what I saw in join-dp_co2.f90, so I would like to compare what I get from my processing with your data... a sanity check.

In the initial conditions, I would say I can find grids of CO2 concentration at all vertical levels (from lowest to highest level), for time step 1, the time step 2, and so on. Is that correct?

The, the final dpCO2 files will have the same structure as in the previous CCATT-BRAMS versions but with one extra variable, which is the CO2 concentration. Am I right?

I wanted to run this test to check if I can get the fluxes associated with the deep convection (thanks to the routines for the coupling with STILT). I have run some tests with CCATT-BRAMS 4.5, but these variables give me strange results. So perhaps in this last version, things could have been fixed or at least I will see if results are similar (with JULES surface model deactivated, for the sake of coherence).

One additional question, CT data are available at 24 levels, I suppose you interpolated them to 35 levels, as shown in the f90 code attached to the test case?"

A-01: Demerval Moreira (24/Oct/2013)

"A quick question, the dp* files for this test case have to be build or are they available?"

Test case don´t have dp's. The idea is use the iv's that are in run/IVAR. Obviously not is possible change the model grid in this test.

"I am already familiar with dp* files used by CCATT-BRAMS, that I used to process using geraDP…"

Correct! you can generate the dp's with geraDP and after to use join-dp_co2.f90 to join this dp with CO2 boundary condition. The result will be a dp in vfm format with atmospheric variable and CO2.

"In the initial conditions, I would say I can find grids of CO2 concentration at all vertical levels (from lowest to highest level), for time step 1, the time step 2, and so on. Is that correct?"

Yes, is correct.

"The, the final dpCO2 files will have the same structure as in the previous CCATT-BRAMS versions but with one extra variable, which is the CO2 concentration. Am I right?"

Yes, is correct.

"I wanted to run this test to check…"

Unfortunately I cannot tell you if this problem you found on STILT is fixed in this version, really should make a test.

“One additional question, CT data are available at 24 levels, I suppose you interpolated them to 35 levels, as shown in the f90 code attached to the test case?”
I ran CPTEC/MCGA model to convert NCEP analyses to lat/lon coordinate, so I wrote 35 levels instead 24. But, no problem in to use only 24 levels.
