

VERSION 12 MM5toGRIB PROGRAM

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This software is developed at Instituto Nacional de Meteorologia (INM) from Spain (Servicio de Modelizacion numerica del Tiempo).

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This is the main directory of the MM5toGRIB.

To run the MM5toGRIB program you need the GRIBEX (EMOS library) from European Centre For Medium-Range Weather Forecasts (ECMWF).

Everything a user needs to run the MM5toGRIB program is contained in this directory, except for GRIBEX. For free download ECMWF GRIBEX software (EMOS library), please see

<http://www.ecmwf.int/products/data/software/grib.html>

For GRIBEX subroutine (EMOS library) and detailed documentation about it, please see

<http://www.ecmwf.int/publications/manuals/libraries/gribex/index.html>

See also GRIBEX NOTES at the end of this README.

What is MM5toGRIB ?

- MM5toGRIB is a free Fortran 90 program that convert MM5 (For more information, see please

<http://www.mmm.ucar.edu/mm5/mm5-home.html>)

pressure-level outputs in version 3 (MMOUTP_DOMAIN*) to GRIB (GRIdded Binary) format (For GRIB format, see please

<http://www.wmo.ch/web/www/WDM/Guides/Guide-binary-2.html> and

<http://www.ecmwf.int/publications/manuals/libraries/gribex/ksec0.html>

[ksec1.html](#) [ksec2.html](#)).

- The code sources for MM5toGRIB are:

- 1) From PSU/NCAR mesoscale model (known as MM5):

`readv3.f` (MM5 Utils)

`module_horiz_interp.F` (from REGRID MM5)

`map_utils_module.F` (from LITTLE_R MM5)

- 2) GRIBEX (subroutine of EMOS library from ECMWF)

- The main features of MM5toGRIB are:

- a) It is available for MM5 Version 3;

- b) Read MMOUTP_DOMAIN* for the 3 output projections:

- LAMBERT-CONFORMAL MAP PROJECTION

- POLAR STEREOGRAPHIC MAP PROJECTION

- MERCATOR MAP PROJECTION

- c) Write GRIB for respectively 2 native projections in MMOUTP_DOMAIN*:
- LAMBERT-CONFORMAL MAP PROJECTION
 - POLAR STEREOGRAPHIC MAP PROJECTION

Note: the MERCATOR MAP PROJECTION is programmed in MM5toGRIB, but unfortunately it is not accepted for libemos (GRIBEX, EMOS library) yet.

- d) Write GRIB for regular longitude/latitude grid from the 3 input projections (3 possible output projections in MMOUTP_DOMAIN*).

Note: MM5toGRIB is supported for Cray, SUN and PC running Linux. But you can edit the top-level Makefile in this directory and the low-level src/your_machine/Makefile to change it.

To extract MM5toGRIB:

- 'gunzip MM5toGRIB.6.tar.gz'
- 'tar -xvf MM5toGRIB.6.tar'

To compile MM5toGRIB:

- Type 'make' in the MM5toGRIB directory to compile [ksh, csh, ...].
- When 'make' is successful, executable MM5toGRIB will appear in this directory.

- To customize it, you must link GRIBEX and change compilation options, modify top-level 'Makefile' at MM5toGRIB directory and low-level 'Makefile' at MM5toGRIB/src/your_machine directory. Example to link to EMOS library (your_emosdir/libemos.a) in Makefile top-level:

```
#
#
#   ...
#   "LIBDIR   =   -L/your_emosdir_000220/"\
#   "LIBEMOS =   -lemos"\
#   ...
#
```

See COMMON COMPILATION OPTIONS in this README file.

To run MM5toGRIB:

See first MM5toGRIB usage ('MM5toGRIB -h'):

```
#
# Usage: MM5toGRIB [-v] MM5file
#
#   -v           : Print info
#
#   -o [-vo]    : Split the gribfile for each period of time
#
#   -l [-lvo]  : Interpolate to regular longitude-latitude grid with
#
#                 the parameters of grid_lonlat.input file
#
#   -h           : Print this help message.
#
#   MM5file     : MMOUTP (isobaric) file name to read.
#
```

```

# Information: source program readv3 from MM5 utils
#
#           subroutines emoslib from ECMWF for WMO FM-92 GRIB code
#
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#

```

Edit namelist.output to select the output variables from MMOUTP_DOMAIN*
to GRIB. Exemple:

```

                MM5 variable          select KSEC1(6)   (7)   (8)   (9)   factor

# name: #U          # togrib: .true.  & 34 & 100 & 300 & 0 & 1.0
# name: #U          # togrib: .true.  & 34 & 100 & 850 & 0 & 1.0
# name: #V          # togrib: .true.  & 33 & 100 & 300 & 0 & 1.0
# name: #V          # togrib: .true.  & 33 & 100 & 850 & 0 & 1.0
                    [Select only pressure-level winds to 300 and
                    850 hPa]

# name: #T          # togrib: .true.  & 0 & 0 & 0 & 0 & 1.0
                    [Select all T variables with default KSEC1:
                    & 11 & 100/105 & ...]

# name: #H          # togrib: .true.  & 6 & 100 & 500 & 0 & 9.80665
                    [Select H at 500 hPa, but use factor 9.80665 to
                    convert geopotential height to geopotential]

# name: #W          # togrib: .false. & 40 & 0 & 0 & 0 & 1.0

```

[Not select vertical velocity wind]

```
# name: #newMM5var# togrib: .true. & 177 & 0 & 0 & 0 & 1.0
```

```
[Append in namelist.output a new output variable  
in MMOUTP]
```

(For MM5 variables, see please

http://www.mmm.ucar.edu/mm5/documents/MM5_tut_Web_notes/IO/io.html)

(For KSEC1 elements, see please,

<http://www.ecmwf.int/publications/manuals/libraries/gribex/ksec1.html>)

If you choose -l option (Interpolate to regular longitude-latitude grid)
you must edit the grid_lonlat.input to select the rectangular output
lon/lat grid and interpolation method. Example:

```
#  
# &record1  
# start_lon    = -35.00 [negative longitude to west, + to E]  
# end_lon      = 10.00  
# interval_lon = 0.25  
# start_lat    = 22.25  
# end_lat      = 56.75  
# interval_lat = 0.25  
#  
# & Interpolating method (all 4 points, except 0):  
# & 0 ---> 16-point overlapping parabolic interpolation [slow]  
# & 1 ---> 4-point bilinear interpolation (quasi-rectangular  
areas)  
# & 2 ---> Inverse-square radius (distance)  
# & 3 ---> Inverse radius (distance)
```

```
#  
# &record2  
# inter      = 1  
# /  
#
```

Notes: the most accurated method is 0, the best relation run-time/results
method is 1.

Type ./MM5toGRIB to execute the program. Examples:

Exemple 1: one grib output file without any display information in Lambert
Conformal proyection (output in MMOUTP_DOMAIN* file):

```
./MM5toGRIB MMOUTP_DOMAIN*
```

Exemple 2: one output grib file for each period of time in MMOUTP_DOMAIN*
with

information at run time and lon/lat rectangular grid output:

```
./MM5toGRIB -lvo MMOUTP_DOMAIN*
```

The output files from MM5toGRIB are

```
gribfileyyyy-mm-dd_hh:mm (Example 1)
```

(Ex. 2) grib2fileyyyy-mm-dd_hh:mm Split for each period of time

in MM5toGRIB directory.

See MM5toGRIB EXECUTING ERRORS if MM5toGRIB crashes.

Files/directories:

Makefile: top-level makefile

README: this general information about how to run MM5toGRIB

namelist.output: file to select output variables

grid_lonlat.input: file to choose output lon/lat grid

src: directory of MM5toGRIB source code

src/interpol_lonlat.f90

src/weightsa.f90

src/SUN/Makefile [Low-level Makefile]

src/SUN/MM5toGRIB.f90

src/LINUX/Makefile

src/LINUX/MM5toGRIB.f90

src/LINUX/weightsa.f90.intel.ifort

src/x1/*

COMMON COMPILATION OPTIONS (in top-level Makefile)

a) SUN

"FC = f95\"

"FFLAGS = -free") ; \

b) Intel fortran compiler

```
# "FC = ifc"\  
    or  
# "FC = ifort"\  
# "FFLAGS = -FR -Vaxlib -w" ) ; \  

```

c) Portland Group fortran compiler

```
# "FC = pgf90"\  
# "FFLAGS = -FR -Vaxlib -w -Mfreeform -byteswapio" ) ; \  

```

MM5toGRIB EXECUTING ERRORS

A) For the error:

```
> Call GRIBEX  
> INXBIT : Word 54275 is outside array bounds -1305289676  
> GRIBEX: Error inserting/extracting data values  
> GRIBEX: Return code = 712  
> Error subroutine write_grib: Return code from GRIBEX = 712  
> Memory fault
```

You must edit */MM5toGRIB/src/your_machine/MM5toGRIB.f90

(where your_machine=LINUX, SUN or X1) and change

```
# PARAMETER (JPACK=50000)
```

for a bigger value

```
#    PARAMETER (JPACK=280000)
```

GRIBEX NOTES

1) You can install ECMWF GRIBEX for 32 or 64 bits for reals.

Example for intel compiler and 64 bits (config.linux_intel):

```
1  #
2  #    Configuration file for linux (32-bit reals).
3  #
4  AR      = ar
5  ARFLAGS = rv
6  #
7  DEBUG =
8  #
9  CC      = gcc
10 CFLAGS = $(DEBUG) -DLITTLE_ENDIAN
11 FASTCFLAGS = $(DEBUG) -DLITTLE_ENDIAN
12 #
13 FC      = ifc
14 FFLAGS = $(DEBUG) -FR -Vaxlib -w -i4 -r8 -Dlinux -
DUSE_NO_POINTERS -DLITTLE_ENDIAN
15 VECTFFLAGS = $(FFLAGS)
16 #          |
17 #          v
18 #          32-bit reals
19 #
```

20 RANLIB = /usr/bin/ranlib

21

- 2) You must customize Pbytes parameter (two times) in MM5toGRIB.f90 according to ECMWF GRIBEX software (EMOS library) previous instalation:

Pbytes=8 ----> 64 bits GRIBEX (Default in /src/LINUX/MM5toGRIB.f90)

Pbytes=4 ----> 32 bits GRIBEX (Default in /src/SUN/MM5toGRIB.f90)

(unique difference between /src/LINUX/MM5toGRIB.f90 and /src/SUN/MM5toGRIB.f90)

or exchange /src/LINUX/MM5toGRIB.f90 versus /src/SUN/MM5toGRIB.f90.