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Modifying Unified Model Output Fields

BY

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VERSION 5

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MODEL VERSION 4.5

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Modification Record		
Document version	**Author**	**Description.....**
1	V. Blackman	New paper describing the of use of Unified Model utility qxumthin1
2	I. Edmond	Model utility qxumthin1 renamed qxfieldmod on which it was based. Changes to code enable qxfieldmod to scale wind fields as done in operational suite.
3	I. Edmond	Updated for UM vn4.3
4	D.M. Goddard	Updated for UM vn4.5
5	I.Edmond	Run length encoded fields covered.

1. Introduction

The Unified Model utility qxfieldmod operates on fieldsfiles and the following options (which can be combined as required) are available :-

(a) Select a subset of fields
(b) Reject a subset of fields
(c) Scale fields
(d) Replace 10m winds by the level 1 wind scaled using wind_10m_scale
(e) Thin fields. Fields are thinned by extracting every nth point where n is specified for both X and Y directions in the namelist input.
NOTE. Thinning does not interpolate.

2. Input and output fields

Input and output fieldsfiles can be unpacked, WGDOS packed, run Length encoded, CRAY32 or GRIB. The input type is detected automatically and the output type is specified in the namelist.

NOTE. The GRIB format for both input and output has a PP header before the GRIB data.

File names are passed to qxfieldmod by the following environment variables :-

```
export UM_SECTOR_SIZE=2048
export UNIT07="Diagnostic filename"
export UNIT10="Input fieldsfile name"
export UNIT11="Output fieldsfile name"
export UNIT12="Orography filename"  (NOTE. Only required for option (d) above)
```

3. Running the program

$UMDIR/vn4.5/exec/qxfieldmod < "Namelist filename"

4. Namelist input to qxfieldmod

NAMELIST /MODS/

Scaling fields

MODIFY	Logical switch - ON if fields are to be scaled.
STIME_MOD	Start of period for scaling fields.
ETIME_MOD	End of period for scaling fields.
NFIELDS_MOD	Number of Type/Level/Scale combinations.
MTYPE_MOD	List of M08 field types to be scaled.
MLEVS_MOD	List of M08 level codes to be scaled.
AMULT	List of Scale multipliers.

Select a subset of fields

SELECT	Logical switch - ON if subset of fields to be selected.
STIME_SEL	Start of period for selecting fields.
ETIME_SEL	End of period for selecting fields.
NFIELDS_SEL	Number of Type/Level combinations.
MTYPE_SEL	List of M08 field types to be selected.
MLEVS_SEL	List of M08 level codes to be selected.

Reject a subset of fields

REJECT	Logical switch - ON if subset of fields to be rejected.
STIME_REJ	Start of period for rejecting fields.
ETIME_REJ	End of period for rejecting fields.
NFIELDS_REJ	Number of Type/Level combinations.
MTYPE_REJ	List of M08 field types to be rejected.
MLEVS_REJ	List of M08 level codes to be rejected.

10m Winds

WIND_10M	Logical switch - ON if field is to be replaced by scaled level 1 wind
WIND_10M_OROG	Level above which the 10m wind is fixed
WIND_10M_SCALE	Scaling factor
PPUNIT_OROG	Unit number for orography field

Thinning fields

THIN	Logical switch - ON if fields are to be thinned.
STIME_THI	Start of period for thinning fields.
ETIME_THI	End of period for thinning fields.
NFIELDS_THI	Number of Type/Level/Scale combinations.
MTYPE_THI	List of M08 field types to be thinned.
MLEVS_THI	List of M08 level codes to be thinned.
IXXSTEP_THI	List of step values for thinning in the X direction.
IYYSTEP_THI	List of step values for thinning in the Y direction.

Output fields

OUTPUT_PACK_TYPE can be 'NONE ', 'WGDOS ', 'RUNLEN', 'CRAY32' or 'GRIB '.

Default values

Variables are INTEGER unless indicated otherwise

```
MODIFY   = .FALSE.                (LOGICAL)
REJECT   = .FALSE. (LOGICAL)
SELECT   = .FALSE. (LOGICAL)
WIND_10M = .FALSE.                (LOGICAL)
THIN = .FALSE.                    (LOGICAL)
STIME_MOD = -99
ETIME_MOD = -99
NFIELDS_MOD = 0
STIME_SEL = -99
ETIME_SEL = -99
NFIELDS_SEL = 0
STIME_REJ = -99
```

```
ETIME_REJ = -99
NFIELDS_REJ = 0
STIME_THI = -99
ETIME_THI = -99
NFIELDS_THI = 0
DO I=1,500
      MTYPE_MOD(I) = 0
      MLEVS_MOD(I) = 0
      AMULT(I) = 1.0                    (REAL)
      MTYPE_SEL(I) = 0
      MLEVS_SEL(I) = 0
      MTYPE_REJ(I) = 0
      MLEVS_REJ(I) = 0
      MTYPE_THI(I) = 0
      MLEVS_THI(I) = 0
      IXXSTEP_THI(I) = 2
      IYYSTEP_THI(I) = 2
ENDDO
WIND_10M_OROG  = -9999.           (REAL)
WIND_10M_SCALE = .7               (REAL)
PPUNIT_OROG = 12
OUTPUT_PACK_TYPE = 'WGDOS '       (CHARACTER*6)
```

4. Examples

NOTE. Coding MODIFY, WIND_10M or THIN only specifies the fields that are to be processed. All other fields in the input file will be copied, without alteration, to the output file unless SELECT or REJECT are coded - see examples (a) and (b).

(a) Selects T+00 to T+06 MSL pressure fields, thins them with a step of 3 in the X and Y directions and writes unpacked fields to the output file.

```
&MODS
 SELECT=.TRUE.
 NFIELDS_SEL=2
 STIME_SEL=0, ETIME_SEL=6
 MTYPE_SEL(1)=12, MLEVS_SEL(1)=8888
 THIN=.TRUE.
 NFIELDS_THI=2
 STIME_THI=0, ETIME_THI=6
 MTYPE_THI(1)=12, MLEVS_THI(1)=8888
 IXXSTEP_THI(1)=3, IYYSTEP_THI(1)=3
 OUTPUT_PACK_TYPE='NONE  '
&END
```

(b) Thins T+00 to T+06 MSL pressure fields with a step of 3 in the X and Y directions and writes them to the output file together with all other fields (which are not thinned). All

fields are unpacked.

```
&MODS
  THIN=.TRUE.
  NFIELDS_THI=2
  STIME_THI=0, ETIME_THI=6
  MTYPE_THI(1)=12, MLEVS_THI(1)=8888
  IXXSTEP_THI(1)=3, IYYSTEP_THI(1)=3
  OUTPUT_PACK_TYPE='NONE  '
&END
```

(c) Selects T+00 to T+06 MSL pressure fields, scales them by a factor of 1.1 and writes GRIB fields to the output file.

```
&MODS
  MODIFY=.TRUE.
  NFIELDS_MOD=2
  STIME_MOD=0, ETIME_MOD=6
  MTYPE_MOD(1)=12, MLEVS_MOD(1)=8888
  AMULT(1)=1.1
  SELECT=.TRUE.
  NFIELDS_SEL=2
  STIME_SEL=0, ETIME_SEL=6
  MTYPE_SEL(1)=12, MLEVS_SEL(1)=8888
  OUTPUT_PACK_TYPE='GRIB  '
&END
```

(d) Read orography from unit 13 and replace 10m winds above 500m by the level 1 wind scaled by 0.6. Remember that OROGFILE="Orography file name" has to be specified by environment variable in the script.

```
&MODS
  WIND_10M = .TRUE.
  WIND_10M_OROG  = 500.
  WIND_10M_SCALE = .6
  PPUNIT_OROG    = 13
&END
```

(e) Using the defaults of WIND_10M_OROG = -9999.0, WIND_10M_SCALE = 0.7 and PPUNIT_OROG = 12 the orography field is read from unit 12 and all 10m winds are replaced by the level 1 winds scaled by 0.7.

```
&MODS
  WIND_10M = .TRUE.
&END
```

(f) Fieldmod as it is used operationally to scale wind fields.

```
&MODS
MODIFY=.TRUE., STIME_MOD=0, ETIME_MOD=144, NFIELDS_MOD=20,
MTYPE_MOD=5, 6, 5, 6, 5, 6, 5, 6, 5, 6, 5, 6, 5, 6, 5, 6, 5, 6, 46, 47,
MLEVS_MOD=100, 100, 150, 150, 200, 200, 250, 250, 300, 300, 400, 400,
          500, 500, 70, 70 700, 700, 8888, 8888,
AMULT=      1.04, 1.04, 1.04, 1.04, 1.04, 1.04, 1.04, 1.04, 1.04, 1.04, 1.04, 1.04,
          1.07, 1.04, 1.02, 1.02, 1.02, 1.02, 1.04, 1.04
/
```