

User's Guide for the NMM Core of the Weather Research and Forecast (WRF) Modeling System Version 2.1

Chapter 4: WRF-NMM Initialization

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Introduction

The *real_nmm* portion of the code generates initial and boundary conditions for the *WRF-NMM* model (*wrf.exe*) that are derived from output files provided by the *WRF-NMM SI*. Inputs required for the WRF-NMM model are not restricted to *WRF-NMM SI* alone. Several variables are defined/re-defined using the *real_nmm* part of routines. For instance, the WRF-NMM core uses the definition of the Coriolis parameter in *real_nmm*, rather than that in WRF-NMM SI.

*nmm_real*The initialization program performs the following tasks:

- Reads data from the namelist
- Allocates space
- Initializes remaining variables
- Reads input data from the WRF-NMM Standard Initialization (WRF-NMM SI)
- Prepares soil fields for use in the model (usually vertical interpolation to the requested levels)
- Checks to verify soil categories, land use, land mask, soil temperature, and sea surface temperature are all consistent with each other
- Generates initial condition file
- Generates lateral condition file

The *real_nmm.exe* program may be run as a distributed memory job.

The real code includes:

- (1) ./main/real_nmm.F
- (2) ./dyn_nmm/module_initialize_real.F
- (3) ./dyn_nmm/start_domain_nmm.F
- (4) ./share/module_soil_pre.F
- (5) ./main/real_nmm.exe

Initialization for Real Data Cases

The real code inputs are:

data files provided by the WRF-NMM Standard Initialization (WRF-NMM SI) system. The data processed by the WRF-NMM SI typically come from a previously run, large-scale forecast model. The original data is generally in “GriB” format and is ingested into the WRF-NMM SI by first using “*ftp*” to retrieve the raw GriB data from one of the national weather agencies anonymous ftp sites.

An example:

- A forecast from 2005 January 23 0000 to 2005 January 24 0000
- The original GriB data are available at 3h increments

The following files will be generated by the WRF-NMM SI:

```
wrf_real_input_nm.d01.2005-01-23_00:00:00  
wrf_real_input_nm.d01.2005-01-23_03:00:00  
wrf_real_input_nm.d01.2005-01-23_06:00:00  
wrf_real_input_nm.d01.2005-01-23_09:00:00  
wrf_real_input_nm.d01.2005-01-23_12:00:00  
wrf_real_input_nm.d01.2005-01-23_15:00:00  
wrf_real_input_nm.d01.2005-01-23_18:00:00  
wrf_real_input_nm.d01.2005-01-23_21:00:00  
wrf_real_input_nm.d01.2005-01-24_00:00:00
```

The convention is to use “*wrf_real_input_nm*” to signify data that is output from the *WRF-NMM SI* and input into the *real_nmm.exe* program. The “*d01*” part of the name is used to identify to which domain this data refers. The trailing characters are the date, where each *WRF-NMM SI* output file has only a single time-slice of processed data. The *WRF-NMM SI* package delivers data that is ready to be used in the *WRF-NMM* system.

- The data adheres to the WRF IO API.
- The data has been horizontally interpolated to the correct grid-point staggering for each variable.
- The 3-D data have already been vertically interpolated to the model's computational surfaces.
- 3-D meteorological data from the WRF-NMM SI: *u, v, temperature, specific humidity*
- 3-D surface data from the WRF-NMM SI: *soil temperature, soil moisture, soil liquid*
- 2-D static data: *terrain, land categories, soil info, etc.*
- 1D arrays describing the vertical coordinate,
- Constants: domain size, date, lists of available optional fields, etc.

The real code products are:

wrfinput_d01 and *wrfbdy_d01*

Real Data Test Case: 2005 January 23/00 through 24/00 is given in [the Chapter 5, Real Data Test Case section](#).