

# SI and Real procedures Related to WRF/Unified Noah LSM Coupled System

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## 1. Running SI:

### 1.1 Running *grib\_prep.pl*

(a) GO TO `$EXT_DATAROOT/static/`:

**Input:** Specify input files as sources for surface/soil data to be ingested (e.g., GFS, EDAS, AGRMET)

**Vtables:** Specify surface/soil fields to be processed in SI  
Examples (Vtable.AGRMET, Vtable.ETA etc) depending on your usage

Edit `grib_prep.nl` for start, end date of your run, Vtables and sourcename.

(b) GO TO `$INSTALLROOT/etc/`:

give the commad

```
grib_prep.pl -s {start_date} -l {fcst_len} {SOURCE_NAME}  
ex: grib_prep.pl -s 2002053112 -l 0 AGRMET
```

**Note:** If using more than one source of surface/soil data (e.g., using EDAS for snow and AGRMET for soil moisture/temperature), one needs to run `grib_prep.pl` twice, one for AGRMET Vtable and the other for ETA Vtable.

```
Ex: grib_prep.pl -s 2002053112 -l 0 AGRMET  
and  
grib_prep.pl -s 2002053112 -l 24 ETA
```

**Ouput:** Create files in an intermediate format e.g. `ETA:2002-05-31_12` in `EXT_DATAROOT/extprd`

## 1.2 Configure the WRF domain

(a) OBTAIN GLOBAL GEOGRAPHICAL DATA SETS

From [ftp://aftp.fsl.noaa.gov/divisions/frd-laps/WRFSI/Geog\\_Data](ftp://aftp.fsl.noaa.gov/divisions/frd-laps/WRFSI/Geog_Data) get the required data sets and untar within your GEOG\_DATAROOT.

(b) setenv for your MOAD\_DATAROOT. This directory would contain data for your domain.

(c) Go to \$INSTALLROOT/templates and make a copy of the "default" subdirectory

```
cp -r default default2
```

```
chmod -R u+w      (in order to make it editable)
```

(d) GO TO \$INSTALLROOT/templates/default2 and edit wrfsi.nl for start, end date, lat/lon information, paths (especially the paths for LBC and LSM roots if you are using two different source of input data).

(e) Run window\_domain\_rt.pl in etc/ directory. It executes the gridgen\_model to create the static.wrfsi netCDF file in the directory

```
$MOAD_DATAROOT/static.
```

This file has geographical fields interpolated to the WRF domain.

## 1.3 Running WRFSI

GO TO \$INSTALLROOT/etc directory.

Running wrfsi.pl would invoke wrfprep.pl. wrfprep.pl runs the WRFSI hinterp/vinterp routine.

```
wrfsi.pl -g {start_date} {fcst_len} {SOURCE_NAME}
```

(use -g option if you'd already run grib\_prep independently).

**Input:** wrfsi.nl, static.wrfsi, ETA:2002-05-31\_12 (etc. files)

**Output:** real\_input\_em\* files

in MOAD\_DATAROOT/siprd. These files are later used by real.

## 2 Running Real:

**Input:** 1) real\_input\_em\* (as output from WRF SI)  
2) namelist.input (Note: both WRF and Real shares the same namelist)

**Output:** 1) wrfinput\_d01 (Note: contains both atmospheric and soil initial conditions)  
2) wrfbdy\_d01 (lateral boundary conditions)

**How soil/surface conditions are processed:**

Real\_input\_em\* files has variables such as SM010040, SM040100, SM100200 for soil moisture and similarly for other variables like soil temperature etc. These variables are read and assigned to the array SMOIS which is present in wrfinput\_d01. The steps are as follows:

1) In module\_initialize\_real.F in dyn\_em/

Subroutine init\_domain\_rk:

CALL read\_si (part of dyn\_em/ module\_si\_io\_em.F)

Subroutine read\_si reads (in Unit 13):

soilm010\_input, soilm040\_input,  
soilm100\_input, soilm200\_input

2) module\_initialize\_real.F CALL process\_soil\_real (part of share/module\_soil\_pre.F)

Subroutine process\_soil\_real

CALL init\_soil\_2\_real (part of share/module\_soil\_pre.F)

Subroutine init\_soil\_2\_real assigns soilm010\_input  
etc to SMOIS

3) Some surface/soil variables like snowh\_input(i,j) are assigned to SNOWH(i,j) in module\_initialize\_real.F

## 3Examples

### 3.1Using one source of soil/surface data

**Using EDAS**

```
grib_prep.pl -s 2002053112 -l 24 ETA  
window_domain_rt.pl -w wrfsi -t $INSTALLROOT/templates/default2 -c -s  
$SOURCE_ROOT  
wrfsi.pl -g 2002053112 24 ETA
```

### ***3.2 Using multiple sources of soil/surface data***

#### **Using EDAS and AGRMET(for soil fields)**

```
grib_prep.pl -s 2002053112 -l 0 AGRMET
grib_prep.pl -s 2002053112 -l 24 ETA
window_domain_rt.pl -w wrfsi -t $INSTALLROOT/templates/default2 -c -s
$SOURCE_ROOT
wrfsi.pl -g 2002053112 24 ETA
```