Other Practical Cases

Other Practical Cases cindyhg Tue, 07/16/2019 - 11:02

Exercises

Other Practical Cases

Case 8: GSI analysis for HWRF

Case 8: GSI analysis for HWRF cindyhg Tue, 07/16/2019 - 11:13

3D HYBRID GSI USING NMM - HURRICANE WRF CASE

Introduction

The GSI is used for 3D Hybrid Data Assimilation within the Hurricane WRF (HWRF) opertional system, which employes the NMM dynamical core. To run the full HWRF system, see: [HWRF Online Tutorial]

Case 9: Chem case: GSI analysis for WRF-Chem

Case 9: Chem case: GSI analysis for WRF-Chem cindyhg Tue, 07/16/2019 - 11:14

GSI CHEMICAL ANALYSIS FOR WRF-CHEM GOCART

Introduction, Background and Data

The GSI has been developed to analyze chemical observations, such as MODIS AOD or PM2.5, to improve the pollution forecast with chemical models.

This exercise introduces running the GSI analysis with WRF-Chem GOCART background and PM2.5 observations.

Please check the Download Practice Data section if need to obtain the background and observation files.

Setup GSI run scripts for chemical analysis

Setup GSI run scripts for chemical analysis cindyhg Tue, 07/16/2019 - 11:15

GSI CHEMICAL ANALYSIS FOR WRF-CHEM GOCART

Setup GSI run scripts for chemical analysis

The script **`run_gsi_chem.ksh`** was built based on regional GSI run scripts and has a similar structure to the regional run script **`run_gsi_regional.ksh`**, but include a couple of different details.

The first part of the run script sets up the computer environment and case configuration. This is the similar to the regional analysis run scripts, except for the namelist for the chemical application, the specification of the chemical cases (**`bk_core`** and **`obs_type`**):

- Set the analysis date: **`ANAL_TIME=2012060318`**
- Set the observation file: **`PREPBUFR=${OBS_ROOT}/anow.2012060318.bufr`**
- Set the background file: **`BK_FILE=${BK_ROOT}/wrfinput_d01_2012-06-03_18:00:00`**

- Set to use the namelist for chemical analysis:
  `GSI_NAMELIST=${GSI_ROOT}/ush/comgsi_namelist_chem.sh`
- Set the core for the background file: `BK_CORE=WRFCHEM_GOCART`
- Set the observation type: `obs_type=PM2.5`

Similar to the regional run script, this chemical run script will also double check the needed parameters. Then it creates a run directory and generates the namelist in the directory and copies the background, observations, and fixed files into the run directory

An example of the run script and namelist is available from the link run_gsi_chem.ksh namelist for chem

Running the GSI Chemical Run script

Running the GSI Chemical Run script cindyhg Tue, 07/16/2019 - 11:15

GSI CHEMICAL ANALYSIS FOR WRF-CHEM GOCART

Running the GSI Chemical Run script

If you run on PBS system (Cheyenne), submit the GSI chemical analysis run script:

```
qsub run_gsi_chem.ksh
```

When completed, the contents of this run directory are provided in the following list .

Results

The standard output file **stdout** contains the run diagnostics, details of the standard output file are available in section 6.2.2 of the GSI User's Guide.

Analysis Increments should be checked after successfully running the chemical analysis to see if the data impact are reasonable.

Case 10: Chem case: GSI analysis for CMAQ

Case 10: Chem case: GSI analysis for CMAQ cindyhg Tue, 07/16/2019 - 11:17

GSI CHEMICAL ANALYSIS FOR CMAQ

Introduction, Background and Data

The GSI has been developed to analyze chemical observations, such as MODIS AOD or PM2.5, to improve the pollution forecast with chemical models.

This exercise introduces running the GSI analysis with CMAQ background and PM2.5 observations.

Please check the Download Practice Data section if need to obtain the background and observation files.

Setup GSI run scripts for chemical analysis

Setup GSI run scripts for chemical analysis cindyhg Tue, 07/16/2019 - 11:18

GSI CHEMICAL ANALYSIS FOR CMAQ

Setup GSI run scripts for chemical analysis

The script **run_gsi_chem.ksh** was built based on regional GSI run scripts and has a similar structure to the regional run script **run_gsi_regional.ksh** , but include a couple of

different details.

The first part of the run script sets up the computer environment and case configuration. This is the similar to the regional analysis run scripts, except for the namelist for the chemical application, the specification of the chemical cases (**bk_core** and **obs_type**):

- Set the analysis date: **ANAL_TIME=2013062112**
- Set the observation file: **PREPBUFR=${OBS_ROOT}/anow.2013062112.bufr**
- Set the background file: **BK_FILE=${BK_ROOT}/cmaq2gsi_4.7_20130621_120000.bin**
- Set to use the namelist for chemical analysis: **GSI_NAMELIST=${GSI_ROOT}/ush/comgsi_namelist_chem.sh**
- Set the core for the background file: **BK_CORE=CMAQ**
- Set the observation type: **obs_type=PM2.5**

Similar to the regional run script, this chemical run script will also double check the needed parameters. Then it creates a run directory and generates the namelist in the directory and copies the background, observations, and fixed files into the run directory

An example of the run script and namelist is available from the link run_gsi_chem.ksh namelist for chem

Running the GSI Chemical Run script and Results

Running the GSI Chemical Run script and Results cindyhg Tue, 07/16/2019 - 11:19

GSI CHEMICAL ANALYSIS FOR CMAQ

Running the GSI Chemical Run script

If you run on PBS system (Cheyenne), submit the GSI chemical analysis run script:

```
qsub run_gsi_chem.ksh
```

When completed, the contents of this run directory are provided in the following list .

Results

The standard output file **stdout** contains the run diagnostics, details of the standard output file are available in section 6.2.2 of the GSI User's Guide.

Case 11: GFS case: GSI Analysis for GFS

Case 11: GFS case: GSI Analysis for GFS cindyhg Tue, 07/16/2019 - 11:22

SET UP GSI GLOBAL ANALYSIS

Introduction

This exercise consists of running the GSI 3DVar analysis with T62 global (GFS) background field, conventional data from prepbufr, satellite radiances, and gpsro data.

Background and Data

The global background files are:

surface forecast files at 3 time levels: 3, 6, 9 hours

```
sfcf03 sfcf06 sfcf09
```

atmosphere forecast files at 3 time levels: 3, 6, 9 hours

```
sigf03 sigf06 sigf09
```

The observation files are:

- **prepbufr (conventional data)**
- **airsbufr (gdas1.t06z.airsev.tm00.bufr_d)**
- **gomebufr (gdas1.t06z.gome.tm00.bufr_d)**
- **gsnd1bufr (gdas1.t06z.goesfv.tm00.bufr_d)**
- **iasibufr (gdas1.t06z.mtiasi.tm00.bufr_d)**
- **sbuvbufr (gdas1.t06z.osbuv8.tm00.bufr_d)**
- **ssmisbufr (gdas1.t06z.spssmi.tm00.bufr_d)**
- **amsuabufr (gdas1.t06z.1bamua.tm00.bufr_d)**
- **gpsrobufr (gdas1.t06z.gpsro.tm00.bufr_d)**
- **hirs4bufr (gdas1.t06z.1bhrs4.tm00.bufr_d)**
- **mhsbufr (gdas1.t06z.1bmhs.tm00.bufr_d)**
- **seviribufr (gdas1.t06z.sevcsr.tm00.bufr_d)**
- **tmirrbufr (gdas1.t06z.sptrmm.tm00.bufr_d)**

Please check the Downloading Practice Data section if need to obtain the background and observation files.

Set up GSI Global Analysis

Set up GSI Global Analysis
admin Mon, 06/29/2020 - 21:11

Setting up the Run Script

For this exercise, we will use run script **run_gsi_global.ksh** provided with the release package under ./ush directory.

Based on an example environment, make the following modifications to the script **run_gsi_global.ksh** :

- In section "case set up (users should change this part)":

  An example of this run script is available from the link run_gsi_global.ksh

  - specify the analysis date:
    ANAL_TIME=2014080400
  - specify the global case:
    GFSCASE=T62
  - specify the run directory:
    WORK_ROOT=...
  - specify the location of the background files:
    BK_ROOT=.../T62.gfs/bkg
  - specify the location of the observations:
    OBS_ROOT=.../T62.gfs/obs

Run Script and Results

Run Script and Results
admin Mon, 06/29/2020 - 21:13

Running the Script

Here, GSI global is run as a 4-core MPI job. If you run on PBS system (Cheyenne), Use:

```
qsub run_gsi_global.ksh
```

to launch the job.

The run script will create an output or run directory according to the path set in the variable **WORK_ROOT** . The contents of this run directory are provided in the following list.

Results

The standard output file **stdout** contains the run diagnostics, such as convergence information, and observation distribution from the GSI run. Details of the standard output file are available in section 4.1 of the GSI User's Guide.

Information about the use of observations by the analysis, and the corresponding innovations are available from the **fit** files (named **fort.2***). The fit files located in the run directory should agree with the following fit files for temperature (fit_t1); wind (fit_w1); moisture (fit_q1); surface pressure (fit_p1); and radiance (fit_rad1); and GPS (fort.212).

Convergence information (section 4.6 of the GSI User's Guide) is available in the file: fort.220