Introduction to Practice Session

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Practice sessions: List of content

http://www.dtcenter.org/com-GSI/users/tutorial/online_tutorial/Practical_2012/

- Introduction
- Basic Practical Cases: *Tuesday 2:45-5:00 pm*
  - 6 cases
- Advanced Practical Session: *Wednesday 2:30 pm and Thursday 1:30 pm*
  - A: Repeat basic practice with new data (6 cases)
  - B: Cycling
  - C: Single Observation Test with Hybrid GSI
- Building GSI from Scratch

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Introduction

- Basic application skills about computers in the COMET classroom
- Setup GSI and WRF system on your own local machine
  - Precompiled GSI
  - Precompiled WRF-ARW
  - Precompiled WRF-NMM
- Get data for practice
  - Where is the data
  - What kind of data available

2012 GSI Tutorial Practical Session

GSI Practical Session
Summer Tutorial 2012

Exercises for the version 3.1 release of the Community GSI ONLY!

Welcome to 2012 GSI Tutorial Practical Session Guide!

Both the DTC community GSI analysis system V3.1 and the WRFV3.4 have been pre-compiled on the COMET classroom machines for the tutorial exercises. Before starting the exercises, read the section on *Setting up the GSI system* and follow the instruction found there. Since building the community GSI system from scratch takes a significant amount of time, we strongly recommended that users use the pre-compiled binaries to make the best use of their laboratory time.

If upon completion of the exercise you want to experiment with building GSI, please check here for instructions.

These tutorial exercises are designed to be run on the Linux workstations provided in COMET classroom. The source code and data files needed for these exercises are provided, and available on an external directory.

Using the COMET Classroom machines

Setting up the GSI system

Case data summary and download

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Basic Practical Cases

- Introduction
- Background and Data
- Setting up the Run Script
  - Line to line instruction
  - Sample script
- Running the Script
- Results
  - Standard out (stdout)
  - Fit files
  - convergence
- Visualizing the Analysis

Basic Practical Cases

0). BUFR/PrepBUFR tools [practice]

To run any of the following practical cases, start with the basic run script **run_gsi.ksh**, found in the **comGSI_v3.1/run** directory, and make the following modifications to it. These changes are used by all the basic exercises, and are specific to using the COMET classroom. If you are running these exercises elsewhere, additional modifications will be necessary.

1). Single Observation Tests:
  - [a]. ARW background with global BE
  - [b]. ARW background with NAM BE
  - [c]. NMM background with global BE
  - [d]. NMM background with NAM BE

2). Test with conventional data (prepbufr):
  - [a]. ARW background
  - [b]. NMM background

3). Test with conventional and satellite radiance data:
  - [a]. ARW background
  - [b]. NMM background

4). Test with conventional and gpsro data:
  - [a]. ARW background
  - [b]. NMM background

5). Test with conventional data and radar radial wind:
  - [a]. ARW background
  - [b]. NMM background

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Basic Practical Cases

- Introduction

- Background and Data

- Setting up the Run Script
  - Line to line instruction
  - Sample script

- Running the Script

- Results
  - Standard out (stdout)
  - Fit files
  - convergence

- Visualizing the Analysis

GSI fundamentals

(1): Setup and Compilation

(2): Run and Namelist

(3): Diagnostics

GSI fundamentals

(4): Applications

Community GSI tools

(1): PrepBUFR/BUFR: Basic tools, NCEP data tank, and Obsproc

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Advanced Practical Session A:

- Introduction
- Setting up the Run Script
  - **No instruction!**
  - Sample script
- Running the Script
- Results
  - stdout,
  - Fit file
  - fort.220
- Visualizing the Analysis

Advanced Practical Session A: Repeat basic practice with new data

A0). BUFR/PrepBUFR tools [practice]

Please repeat the basic case 1 to 5 using the new data at 00Z June 05, 2011. Users can get the data following the instruction at: Case data summary and download
Note: the BUFR/PrepBUFR files were created on IBM machine, which are Big Endian files. To use these files on Linux machine, files need to be converted to Little Endian files.

A1). Single Observation Tests:
- [a]. ARW background with global BE
- [b]. ARW background with NAM BE
- [c]. NMM background with global BE
- [d]. NMM background with NAM BE

A2). Test with conventional data (prepbufr):
- [a]. ARW background
- [b]. NMM background

A3). Test with conventional and satellite radiance data:
- [a]. ARW background
- [b]. NMM background

A4). Test with conventional and gpsro data:
- [a]. ARW background
- [b]. NMM background

A5). Test with conventional data and radar radial wind:
- [a]. ARW background
- [b]. NMM background

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Advanced Practical Session A and Basic Practical Cases

Repeat basic practice with **new data**	Basic Practical Cases

Repeat basic practice with new data

A0). BUFR/PrepBUFR tools [practice]

A1). Single Observation Tests:
   * [a]. ARW background with global BE
   * [b]. ARW background with NAM BE
   * [c]. NMM background with global BE
   * [d]. NMM background with NAM BE

A2). Test with conventional data (prepbufr):
   * [a]. ARW background
   * [b]. NMM background

A3). Test with conventional and satellite radiance data:
   * [a]. ARW background
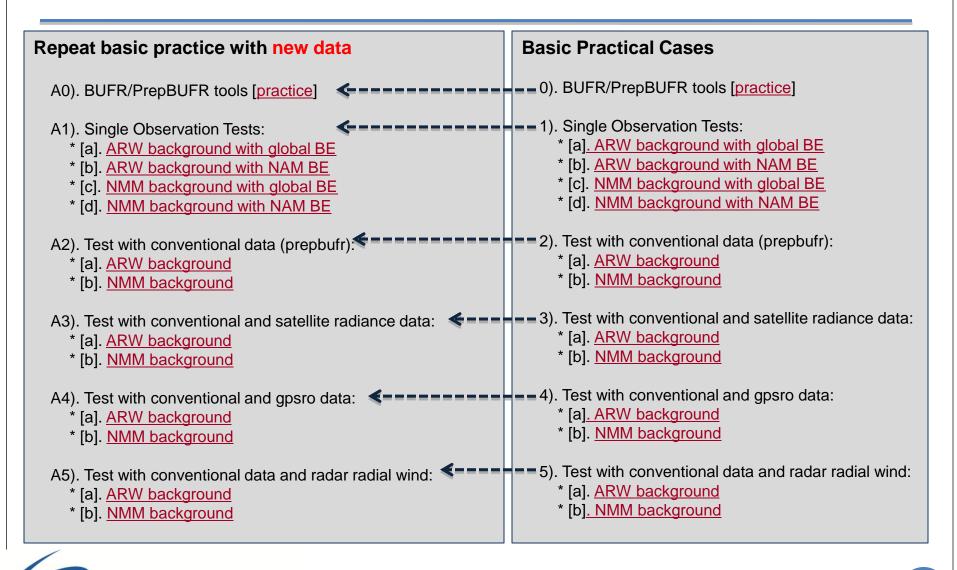   * [b]. NMM background

A4). Test with conventional and gpsro data:
   * [a]. ARW background
   * [b]. NMM background

A5). Test with conventional data and radar radial wind:
   * [a]. ARW background
   * [b]. NMM background

Basic Practical Cases

0). BUFR/PrepBUFR tools [practice]

1). Single Observation Tests:
   * [a]. ARW background with global BE
   * [b]. ARW background with NAM BE
   * [c]. NMM background with global BE
   * [d]. NMM background with NAM BE

2). Test with conventional data (prepbufr):
   * [a]. ARW background
   * [b]. NMM background

3). Test with conventional and satellite radiance data:
   * [a]. ARW background
   * [b]. NMM background

4). Test with conventional and gpsro data:
   * [a]. ARW background
   * [b]. NMM background

5). Test with conventional data and radar radial wind:
   * [a]. ARW background
   * [b]. NMM background

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Advanced Practical Session B

- Introduction

- Setting up the GSI Run Script
  - No instructions
  - Sample script

- Running the GSI run Script and checking the results
  - Same as other cases

- Setting up ARW run environment
  - With detailed instructions

- Running the ARW and checking the forecast results

Advanced Practical Session B: cycling

This exercise is to illustrate the basic structure and flow of a cycling data assimilation system. We will use the data on June 5, 2011 to manually run data assimilation cycles from 00z to 12z with 6 hour interval on June 5. The June 5, 2011 data have been used for the Advanced Practical session A and users should have downloaded the data after play with the Advanced Practical cases. If not, please check Case data summary and download.

The flow chart of this practical cycling data assimilation system can be found at here.

B1). GSI and ARW Cycling exercise:
- [00z]. cycle 2011060500
- [06z]. cycle 2011060506
- [12z]. cycle 2011060512

B2). GSI and NMM Cycling exercise:
- [00z]. cycle 2011060500
- [06z]. cycle 2011060506
- [12z]. cycle 2011060512

Advanced Practical Session C

- A single observation test
- Ensemble forecasts have been provided

Advanced Practical Session C: Single Observation Test with Hybrid GSI

After compiling GSI and running the GSI introductory exercises successfully, the interested user can practice the GSI hybrid function by executing a series of single observation sensitivity experiments introduced below.

An important part of the GSI hybrid data assimilation system is ensemble forecasts used to generate flow dependent background error covariance. How to generate a good set of ensemble forecasts is out of the scope of this tutorial. For this practice, we assume the ensemble forecasts are already available and saved under directory: **/wrfhelp/GSI/Datafiles/ens_data**. More details of the ensemble forecasts used here can be found here .

C). GSI Hybrid with Single Observation
- [c0]. Exercise 0: Setup GSI Hybrid Run
- [c1]. Exercise 1: β Sensitivity Experiments
- [c2]. Exercise 2: N Sensitivity Experiments
- [c3]. Exercise 3: H Sensitivity Experiments
- [c4]. Exercise 4: V Sensitivity Experiments

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Suggestions and notes

- Basic cases: try to go through
  - Pick ARW or NMM, or mix
- Advanced cases:
  - A: Pick up cases based on needs
  - B: Has to try A2 first (A2a-->B1, A2b-->B2)
- All cases will be uploaded on-line after tutorial
- 3-4 instructors in classroom to help
- A sheet lists important information (available in classroom)

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Questions?

GSI Tutorial Survey:

https://survey.ucar.edu/s?s=8305&tr=722184