Introduction to Practice Session

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Practice sessions: List of content

http://www.dtcenter.org/com-GSI/users/tutorial/online_tutorial/Practical_2013/

- Introduction

- Basic Practical Cases: *Monday 2:00-4:30 pm*
  - 6 cases

- Advanced Practical Session: *Tuesday 2:30 pm and Wednesday 2:20 pm*
  - A: Repeat basic practice with new data (6 cases)
  - B: Cycling
  - C: Single Observation Test with Hybrid GSI
  - D: GSI Global Analysis

- Building GSI from Scratch

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Introduction

- Basic application skills on Yellowstone

- Setup GSI and WRF system on your own account space
  - Precompiled GSI
  - Precompiled WRF-ARW
  - Precompiled WRF-NMM

- Get data for practice
  - Where is the data
  - What kind of data available

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

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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_v3.2/run` directory, and make the following modifications to it. These changes are used by all the basic exercises, and are specific to the 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

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

GSI fundamentals

(4): Applications

(3): Diagnostics

GSI tools

Observation processing

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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. For the practical session, these files are located in the directory `/glade/p/ral/jnt/GSI_DTC/data/20110605` on Yellowstone.

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

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 section is to illustrate the basic structure and flow of a cycling data assimilation system. The flow chart of this practical cycling data assimilation system can be found at here. If practice on local machine, the data used in thepractical can be downloaded from Case data summary and download.

B1). GSI and ARW Cycling exercise:

This exercise is to do cycling with GSI and ARW. 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.

- [00z]. cycle 2011060500
- [06z]. cycle 2011060506
- [12z]. cycle 2011060512

B2). GSI and NMM Cycling exercise:

This exercise is to do cycling with GSI and NMM. We will use the data on August 1, 2013 to manually run data assimilation cycles from 00z to 12z with 6 hour interval on August 1.

- [00z]. cycle 2013080100
- [06z]. cycle 2013080106
- [12z]. cycle 2013080112

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Advanced Practical Session C and D

- Session C
  - A single observation test
  - Ensemble forecasts have been provided

- Session D
  - GSI global analysis
  - GFS background
  - New run scripts for GFS

Advanced Practical Session C: Single Observation Test with Hybrid GSI

After compiling GSI and running the GSI introductory exercises successfully, interested users 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: `/glade/p/ral/jnt/GSI_DTC/data/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

Advanced Practical Session D: GSI Global Analysis

D). GSI Global Analysis
  - [d1]. Exercise 01: Setup GSI Global Run

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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)
- 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