Generating the CDF files for the Observations

Step-5

In this presentation ...

- We present an overview of using LDT to generate SMAP soil moisture (SM) observation-based CDF file.
- Working with the SMAP SM observations.
- Examining the ldt.config file contents.
- Running this LDT case.

Running LDT: Our Testcase Overview

- Next, we will use LDT to generate files that support scaling and bias-correction between the model open-loop states and satellite observations that we will assimilate in Step 6.
- In this step, we will generate the CDF files for the satellite-based soil moisture (SM) observations, which will be used along with the model CDF files for the data assimilation run in Step 6.
- Here, we provide an example of working with the Soil Moisture Active Passive (SMAP) satellite soil moisture data to generate our observation-based CDF files and to assimilate these observations later in our data assimilation run.

Download necessary files to run this step …

1) Download the "*Step 5*" tarred-gzipped file from the LIS testcases webpage ("*testcase5_ldt_obscdf.tgz*").

2) Unpack the testcase files into your directory, `$WORKING_DIR;`

3) Once unpacked, you will see the following directories and files:

- `DA_proc_SMAP` ➔ Contains all the files below;
- `ldt.config.smapobs_cdf` ➔ The LDT config file for this step
- `target_ldtlog.0000` ➔ The "target" LDT log file;
- `target_cdf_smapobs_domain.nc` ➔ "target" SMAP observations domain file;
- `target_cdf_smapobs.nc` ➔ "target" LDT generated SMAP observation CDF file;
- **`RS_DATA.tgz`** ➔ Sample SMAP soil moisture observations for this testcase.

4) Finally, unpack the SMAP "**RS_DATA.tgz**" file directly in your: `$WORKING_DIR`

LDT.config file: Setting up and checking entries

First, review the LDT configuration files for our observation CDF case:

DA_proc_SMAP/ldt.config.smapobs_cdf

- Copy your LDT executable into the **DA_proc_SMAP** directory
- Make sure to understand the settings for the desired model or run mode
- ***For further reference, please check out the LDT User's Guide:***
  https://modelingguru.nasa.gov/docs/DOC-2635

Creating the CDF files for a priori bias correction
Observation CDF

Use LDT in the 'DA preprocessing' mode to generate the obs domain and scaling parameters

Within the DA preprocessing mode, three options are supported:
"Obs grid generation"
"CDF generation"
"Anomaly correction"

Temporal resolution: yearly | monthly

To increase sampling density:
'Enable spatial sampling for CDF calculations:'
'Sampling window radius for CDF calculations:'

```
LDT running mode:                "DA preprocessing"
```

```
DA preprocessing method:            "CDF generation"
DA observation source:              "NASA SMAP soil moisture"
Name of the preprocessed DA file:   "./cdf_smapobs"

Apply anomaly correction to obs:      0
Temporal resolution of CDFs:          "yearly"   # monthly | yearly
Number of bins to use in the CDF:     100
Observation count threshold:          30
Temporal averaging interval:          "1da"
Apply external mask:                  0
External mask directory:              none

NASA SMAP soil moisture observation directory:
../RS_DATA/SMAP/SPL3SMP.005
NASA SMAP soil moisture data designation:          SPL3SMP
NASA SMAP search radius for openwater proximity detection:  3
```

Running LDT - DA preprocessing Step

- Run the ***LDT*** executable with the SMAP CDF generator:

  LDT ldt.config.noah36_cdf

- Should take a couple of minutes to run …
- Was the run successful?
  - **Yes** ⇒ *Great job!*
  - **No** ⇒ *look at the error message and ldtlog file*

You can look at the final CDF file produced for this step (sample plot on right).

ncview cdf_smapobs_domain.nc