COSMO GM, Sibiu, 2-6 September 2013

NEtcdf Feedback File based PRObabilistic VErification (NEFFPROVE) Verification Tool

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Outline

Purpose

Basic Design and Features

Future Steps

NEFFPROVE $\longrightarrow$ postprocessing routine which determins statistic verification results for different runs of the ensemble

Main tasks:

- compute statistical scores using the <u>netcdf feedback files</u> as input
- make comparisons between different numerical weather forecast experiments which use the same observations

- requires the libnetcdf.a external library

Modules from the 3Dvar environment:

- mo_fdbk
- mo_fdbk_in
- mo_fdbk_io
- mo_fdbk_tables
- mo_t_table
- mo_t_netcdf_file
- mo_fdbk_3dvar
- mo_fdbk_cosmo
- mo_kind

COSMO model utilities:

- data_parameters
- utilities
- environment

Input Files

- NetCDF feedback files containing the model run (COSMO or LETKF)
- a NAMELIST-input file, specifying runtime parameters

Output Files

- files in ASCII format:
  neffprove_plot_scores.${obs_type}_${varno}
- represented using the Gnuplot graphing utility

NAMELIST

```
!===================================
! Model and observations types used
!===================================
&MODEL
typ_obs_ana  = 1 ! obs/ana type (1: TEMP LETKF, 2: AIREP LETKF, &
                              !3: TEMP 3dvar, 4: AIREP 3dvar, &
                              !5: filename given by netcdf_name)
!netcdf_name  = 'verTEMP.2010040100_gme'
typ_model = 2 ! model (1: COSMO-DE, 2: GME)
typ_file = 'TEMP' ! model ( AIREP, DRIBU, PILOT, SATOB, &
                    ! SYNOP, TEMP, GPSRO, GPSGB, RADAR, ALL )
typ_fc = 1 ! facility (1: lmstat, 2: letkf)
/
```

NAMELIST2

```
!======================================
! Selection criteria for observations
!======================================
&SEL_CRIT
t_start_c = 2011060500
t_end_c = 2011060500
t_incr = 180
!ixw = ixw_d
!ixe = ixe_d
!iys = iys_d
!iyn = iyn_d
!lonw = lonw_d
!lone = lone_d
!lats = lats_d
!latn = latn_d
imode_align = 1 ! alignment (1: strong alignment 2: weak alignment 3: no alignment)
itype_align = 1 ! quality criteria (1: obs must be used actively
                                   ! 2: obs must not be rejected
                                   ! (i.e. use active and passive obs)
                                   ! 3: obs must be processed
                                   ! 4: obs must be rejected only due to blacklisting)
!cd_typ = 35
obsv_typ = 5
!ql = 90
exp_list = '9076' ' ' ' ' ' ' ' ' ' ' ' '        !list of experiments
k_enkf = 40 !number of ens members
em_enkf = 1
det_enkf = 1
for_time = -1 0 24 48 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9 -9
!ver_time = 0 1 2 3 4                             ! verification run type***
!thresh_temp = -9 -9 -9 -9 -9 -9 -9 -9 -9 -9
!sgn_temp = -9 -9 -9 -9 -9 -9 -9 -9 -9      ! ( 0: >= , 1: <= , 2: > , 3 < )
!thresh_prec = -9 -9 -9 -9 -9 -9 -9 -9 -9
!sgn_prec = -9 -9 -9 -9 -9 -9 -9 -9 -9      ! ( 0: >= , 1: <= , 2: > , 3 < )
!thresh_ws = -9 -9 -9 -9 -9 -9 -9 -9 -9
!sgn_ws = -9 -9 -9 -9 -9 -9 -9 -9 -9        ! ( 0: >= , 1: <= , 2: > , 3 < )
!thresh_rh = -9 -9 -9 -9 -9 -9 -9 -9 -9
!sgn_rh = -9 -9 -9 -9 -9 -9 -9 -9 -9        ! ( 0: >= , 1: <= , 2: > , 3 < )
!thresh_cloud(:) = thresh_cloud_d(:)
!vert_lev(:) = vert_lev_d(:)
pbfc_bin = 0 5 15 25 35 45 55 65 75 85 95 100
cl_size = 0.05
/
```

Statistical scores

- currently implemented
- tested for TEMP observations, i.e. temperature, relative humidity, wind components

1. for continuous variables: BIAS (ME), RMSE, MSE
   - for deterministic run or ensemble mean
2. EPS verification:
   - Continuous Ranked Probability Score (for continuous variables)
   - Ranked Probability Score, ROC curve, Brier Score and Reliability diagram (temperature, wind speed and relative humidity at standard levels)

Statistical scores 2

- currently implemented
- not tested yet
- for precipitation and cloud cover

1. multicategory forecasts: Accuracy, Heike Skill Score, Hansen and Kuiper discriminant
2. EPS verification:
   - Ranked Probability Score, ROC curve, Brier Score and Reliability diagram (for precipitation)

Future steps

- adapt some features depending on input files (different conventions for parameter naming, levels and so on)
- compute scores for smaller time intervals (currently for the entire period)
- missing values in files
- test for different observation types
- test for several experiments
- quality check
- test scores for precipitation and cloud cover
- other requirements...

Thanks

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Thank you for your attention!

SUGGESTIONS...