Screening and Minimization

Hirlam-B Training Week on HARMONIE system
Norrköping, Wednesday, 17 September, 2014

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Screening – last chance to be accepted

The main emphasis on rejecting crude observation errors and on removing redundant information. Select observations suitable for data assimilation.

Can the observation be accepted and used by the model?

- Control the quality of the data

- Remove wrong data or data we already have

scr/Screening

The SCREENING executable MASTERODB is launched from Screening through:

$MPPEXEC $BINDIR/$MODEL -c002 -maladin -vmeteo -eMIN1 -t001 -ft0 -asli -procs ${NPROC} || exit

-c: configuration (screening = 002)

-v: version of the code (always "meteo" for
    ARPEGE/ALADIN/HARMONIE)

-m: aladin for LAM

-e: experiment name (MIN1 for instance)

-t: time-step length ("1." for screening)

-f: duration of the integration ("t0" or "h0" for screening)

-a: dynamical scheme (does not matter for screening, Eulerian =
    "eul" or semi-Lagrangian = "sli"

-procs: needs number of processors ${NPROC}

scr/Screening

Needed Input

x ECMA ODB (observation, sigma-o)

x First guess (ICMSHMIN1INIT, ICMSHMIN1IMIN, ICMRFMIN10000, ELSCFMIN1ALBC000, ELSCFMIN1ALBC)

x Costants, statistics

x Namelists

Output

CCMA ODB and UPDATED ECMA ODB

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scr/Screening needed input: Namelists

```
NAMEL=namelist_screening

#--- prepare namelist

    sed -e "s/NBPROC/${NPROC}/g"  \
       -e "s/NPROCX/${NPROCX}/g"  \
       -e "s/NPROCY/${NPROCY}/g"  \
       -e "s/NBZONVAR_EW=NBZONVAR_EW/NBZONVAR_EW=$NBZONVAR_EW/g" \
       -e "s/LVARBC=LVARBC/LVARBC=$LVARBC/g"  \
       ${HM_LIB}/nam/$NAMEL > fort.4
```

Change in *nam/harmonie_namelists.pm* %screening -> mods in namelist_screening

scr/Screening needed input: Namelists

namelist_ screening

(NAMSCC and NAMOBS
contains tunable parameters)

&NAMCT0
LSCREEN=.TRUE.,
LOBS=.TRUE.,
LSIMOB=.FALSE.,
LOBSC1=.TRUE.,
/

...

&NAMSCC
RFIND_AIREP=25000.,
RFIND_RAD1C(0)=80000.,
RFIND_RAD1C(1)=80000.,
RFIND_RAD1C(15)=80000.,
RFIND_RAD1C(16)=80000.,
RFIND_RAD1C(2)=80000.,
RFIND_RAD1C(3)=80000.,
RFIND_RAD1C(4)=80000.,
RFIND_SATAM=45000.,
RFIND_SATOB=45000.,
RMIND_RAD1C(0)=60000.,
RMIND_RAD1C(1)=60000.,
RMIND_RAD1C(15)=40000.,
RMIND_RAD1C(16)=60000.,
RMIND_RAD1C(2)=60000.,
RMIND_RAD1C(3)=60000.,
RMIND_RAD1C(4)=40000.,
RMIND_SATAM=25000.,
RMIND_SATOB=25000.,
/

&NAMOBS
LAMSUB_FULL=.TRUE.,
LCACHMT=.TRUE.,
LCAPACH=.TRUE.,
LHDRRH2=.TRUE.,
LMKCMARPL(2,9)=.TRUE.,
LRSTBIAS_ODB=.FALSE.,
LSCATT_NEUTRAL=.TRUE.,
LSLRW10=.TRUE.,
LSOE=.TRUE.,
NOBSHOR=201,
/
  &NAMJO
    SIGMAO_COEF=0.9,
  /

scr/Screening needed input: Constants, statistics

```
cp $WRK/VARBC.cycle   ./VARBC.cycle


ln -s ${HM_LIB}/const/bias_corr/correl.dat  correl.dat

ln -s ${HM_LIB}/const/bias_corr/sigmab.dat  sigmab.dat

ln -s ${HM_LIB}/const/bias_corr/rszcoef_fmt rszcoef_fmt

ln -s ${HM_LIB}/const/bias_corr/errgrib0scr errgrib

ln -s ${HM_LIB}/const/bias_corr/cstlim_noaa.dat  cstlim_noaa.dat

ln -s ${HM_LIB}/const/bias_corr/var.amv* .


#--- RADIOSONDE BIAS CORRECTIONfor tabfile in table1 table2 table3;do

  cp ${HM_LIB}/const/bias_corr/$tabfile .

done
```

```
!**** SUBROUTINE DECIS - CONTROLS IFS OBS. SCREENING DECISIONS

!        HEIKKI JARVINEN   ECMWF        15/MAR/1995

!        DRASKO VASILJEVIC ECMWF        21/10/1999

!*   PURPOSE


!        CONTROLS IFS OBS. SCREENING DECISIONS

!        DECIS IS CALLED BY SUBROUTINE SCREEN

!*    EXTERNALS

!      GETDB- GET DB DATA

!      PUTDB- PUT DB DATA

!      PRECH - PRELIMINARY CHECKS: RDB FLAGS, REPORTING PRACTICE ETC.

!      BLACK - BLACKLISTING

!      FIRST - FIRST GUESS CHECK

!      VERCO - VERTICAL CONSISTENCY OF MULTILEVEL REPORTS

!      MISCE - A MISCELLANEOUS COLLECTION OF INDEPENDENT CHECKS

!      GLOBA - MAKE GLOBAL TIME-LOCATION ARRAYS FOR SELECTED PLATFORMS

!      DUPLI – CHECK FOR DUPICATED AUREP REPORTS

!      REDUN - ALL REDUNDANCY CHECKS

!      THINN - THINNING OF DATA
```

1. ➜ Preliminary check of observations

    ➔ *Check of completeness of the reports*

        ➔ *Check if station altitude is present*

    ➔ *Check of the reporting practice for SYNOP & TEMP*
       mass observations [Ps & Φ]

2. ➔ Blacklisting

A blacklist is applied to discard observations of

known poor quality and/or that cannot

be properly handled by the data assimilation.
A selection of variables for assimilation is done using
the data selection part of the blacklist file and the
information hard-coded in Arpege/Aladin (orographic
rejection limit, land-sea rejection…).

Decisions based on the blacklist are feedback to the

CMA

2. ➔ Blacklisting

src/bla/mf_blacklist.b

```
if (OBSTYP = satob)  then
! Geographical blacklist by satellites
   if (STATID) in ("    171") and (abs(LAT)>50. or (LON>-170. and LON<90.)) then fail(CONSTANT); endif;
   if (STATID) in ("    172") and (abs(LAT)>50. or (LON>-165. and LON<95.)) then fail(CONSTANT); endif;
endif;  ! satob

if (OBSTYP = radar)  then
! remove reflectivity
   if ( VARIAB = refl ) then
     if (statid ='   07569') and (elevation < 2.6) then  fail(CONSTANT); endif;
     if (statid ='   07745') and (elevation < 2.8) then  fail(CONSTANT); endif;
     if (statid ='   07629') and (elevation < 2.6) then  fail(CONSTANT); endif;
     if (statid ='   07572') then  fail(CONSTANT); endif;
   endif;

   if (statid ='   02606') then  fail(CONSTANT); endif;  ! Remove the radar Ängelholm until it is upgraded

! To run radar in passive mode
   fail (EXPERIMENTAL);
endif;  ! Radar
```

3. ➜ Background quality control

• **Flags are assigned to observations by checking:**

$$\left(\frac{y - H(x_b)}{\sigma_b}\right)^2 > \text{flaglimits}*\lambda$$

where $1 + \frac{\sigma_o^2}{\sigma_b^2} \equiv \lambda$

1: **probably correct**

2: **probably incorrect** **flaglimits(i=1,3)** **DEFRUN (RBGQC)**

3: **incorrect**

from file errgrib and interpolated - σ^b

from ECMA- σ^o

bator_init_mod.F90 (+ tuning through SIGMAO_COEF in batnam)

4. ➔ Vertical consistency of multilevel reports

➔ *The duplicated levels, in multi-level reports, are removed from the reports*

➔ *If 4 consecutive layers are found to be of suspicious quality then these layers are rejected*

5. ➔ Removal of duplicated reports

➔ *In case of co-located airep reports of the same observation types (time, position), some or all of the content of one of the reports is rejected*

6. ➔ Redundancy check

➔ *It is performed for the active reports that are co-located and originate from the same station*

➔ *For land **Synop**, the report closest to the centre of the screening time window with most active data is retained*

➔ *The ship **Synop** are redundant if the moving platforms are within a circle of 1 degree radius*
(*arp/obs_preproc/sufglim.F90: RSHIDIS = 111000._JPRB*)

➔ ***Temp** and **Pilot** from same station are considered at the same time in the redundancy check*

➔ *A **Synop** mass observation is redundant if there are any **Temp** geopotential height observations (made in the same time and the same station) that are no more than 50hPa above the **Synop** mass observation*

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7. ➔ Thinning

Background field

Conv. obs

Radar obs.

- High resolution data needs to be reduced

  – Reduce correlated errors

  – Reduce the amount of data

  – The model cannot make use of the data

- Thinning procedure

  – Decide on a minimum distance between observations

  – Decide which observation to keep (clear or cloudy, land or sea...)

- Alternative: Super observations

  – Averaging over an area

  – Needs to be done clever (e.g. not mixing land and sea)
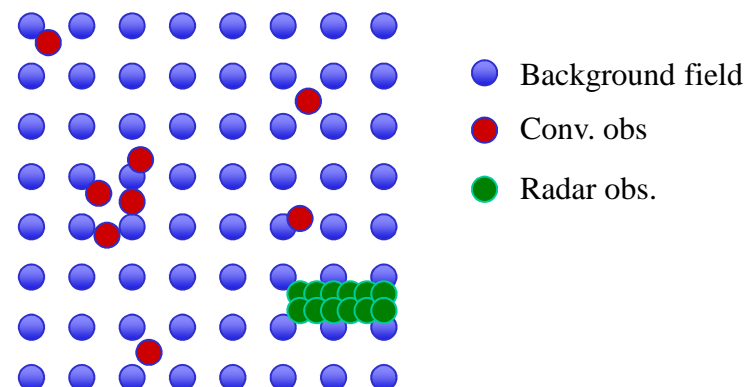
NAMSCC

```
&NAMSCC
  RFIND_AIREP=25000.,
  RFIND_RAD1C(0)=80000.,
  RFIND_RAD1C(1)=80000.,
  RFIND_RAD1C(15)=80000.,
  RFIND_RAD1C(16)=80000.,
  RFIND_RAD1C(2)=80000.,
  RFIND_RAD1C(3)=80000.,
  RFIND_RAD1C(4)=80000.,
  RFIND_SATAM=45000.,
  RFIND_SATOB=45000.,
  RMIND_RAD1C(0)=60000.,
  RMIND_RAD1C(1)=60000.,
  RMIND_RAD1C(15)=40000.,
  RMIND_RAD1C(16)=60000.,
  RMIND_RAD1C(2)=60000.,
  RMIND_RAD1C(3)=60000.,
  RMIND_RAD1C(4)=40000.,
  RMIND_SATAM=25000.,
  RMIND_SATOB=25000.,
/
```

Sreening output

IN LOGFILE:

Valuable summary about screening decisions can be found in HM_Date_YYYYMMDDHH.html:

- **Look for "SCREENING STATISTICS" to get:**

    STATUS summary

    EVENT summary

     Number of variables, departures and missing departures

     Diagnostic JO-table

    + CCMA ODB and updated ECMA ODB

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Sreening output

STATUS SUMMARY OF REPORTS:

OB.TYP	REPORTS	ACTIVE	PASSIVE	REJECTED	BLACKLISTED
1	2028	807	0	1221	0
2	22	22	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	9	9	0	0	0
6	0	0	0	0	0
7	1705	60	0	1645	976
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	0	0	0
11	0	0	0	0	0
12	0	0	0	0	0
13	37632	0	0	37632	37632
14	0	0	0	0	0
15	0	0	0	0	0

TOT	41396	898	0	40498	38608

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Sreening output

EVENT SUMMARY OF REPORTS:

OB.TYP:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	29	0	0	0	0	0	1614	0	0	0	0	0	37632	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1192	0	0	0	0	0	31	0	0	0	0	0	0	0	0

1=NO DATA IN THE REPORT

2=ALL DATA REJECTED

3=BAD REPORTING PRACTICE

4=REJECTED DUE TO RDB FLAG

5=ACTIVATED DUE TO RDB FLAG

6=ACTIVATED BY WHITELIST

7=HORIZONTAL POSITION OUT OF RANGE

8=VERTICAL POSITION OUT OF RANGE

9=TIME OUT OF RANGE

10=REDUNDANT REPORT

11=REPORT OVER LAND

12=REPORT OVER SEA

13=MISSING STATION ALTITUDE

14=MODEL SUR. TOO FAR FROM STAT. ALT.

15=REPORT REJECTED THROUGH THE NAMELIST

16=FAILED QUALITY CONTROL

Sreening output

EVENT SUMMARY OF DATA:

1=MISSING VERTICAL COORDINATE	18=DUPLICATED DATUM/LEVEL
2=MISSING OBSERVED VALUE	19=TOO MANY SURFACE DATA/LEVELS
3=MISSING FIRST GUESS VALUE	20=MULTI LEVEL CHECK
4=REJECTED DUE TO RDB FLAG	21=LEVEL SELECTION
5=ACTIVATED DUE TO RDB FLAG	22=VERTICAL CONSISTENCY CHECK
6=ACTIVATED BY WHITELIST	23=VERTICAL COORDINATE CHANGED FROM Z TO P
7=BAD REPORTING PRACTICE	24=DATUM REJECTED THROUGH THE NAMELIST
8=VERTICAL POSITION OUT OF RANGE	25=COMBINED FLAGGING
9=REFERENCE LEVEL POSITION OUT OF RANGE	26=DATUM REJECTED DUE TO REJECTED REPORT
10=TOO BIG FIRST GUESS DEPARTURE	27=VARIATIONAL QC PERFORMED
11=TOO BIG DEPARTURE IN ASSIMILATION	28=OBS ERR INCREASED
12=TOO BIG OBSERVATION ERROR	29=CLOUD CONTAMINATION
13=REDUNDANT DATUM	30=RAIN CONTAMINATION
14=REDUNDANT LEVEL	31=AEROSOL CONTAMINATION
15=REPORT OVER LAND	
16=REPORT OVER SEA	

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Minimization

Find the best estimate of the true atmospheric state by minimizing the cost function

Data assimilation - 3D-Var

$$J(\mathbf{x}) = \boxed{J_b} + \boxed{J_o} = \boxed{\frac{1}{2}(\mathbf{x}-\mathbf{x^b})^T \mathbf{B}^{-1}(\mathbf{x}-\mathbf{x^b})} + \boxed{\frac{1}{2}(\mathbf{y^o}-H[\mathbf{x}])^T \mathbf{R}^{-1}(\mathbf{y^o}-H[\mathbf{x}])}$$

• **B**, **R** background and observations error covariances matrices, H NL observation operators

The analysis $\mathbf{x^a}$ is deduced from $\mathrm{grad}(J)=0$, supposing **B** and **R** uncorrelated, unbiased innovations and considering linearized versions of H

Model State

Truth

3DVar cycle

Forecasts

observation

J_o

J_b

=minimum

t

Meteorological Institute
Norwegian Meteorological Institute

Reference: Thibaut Montmerle, Radar meeting; Oslo, 2013.
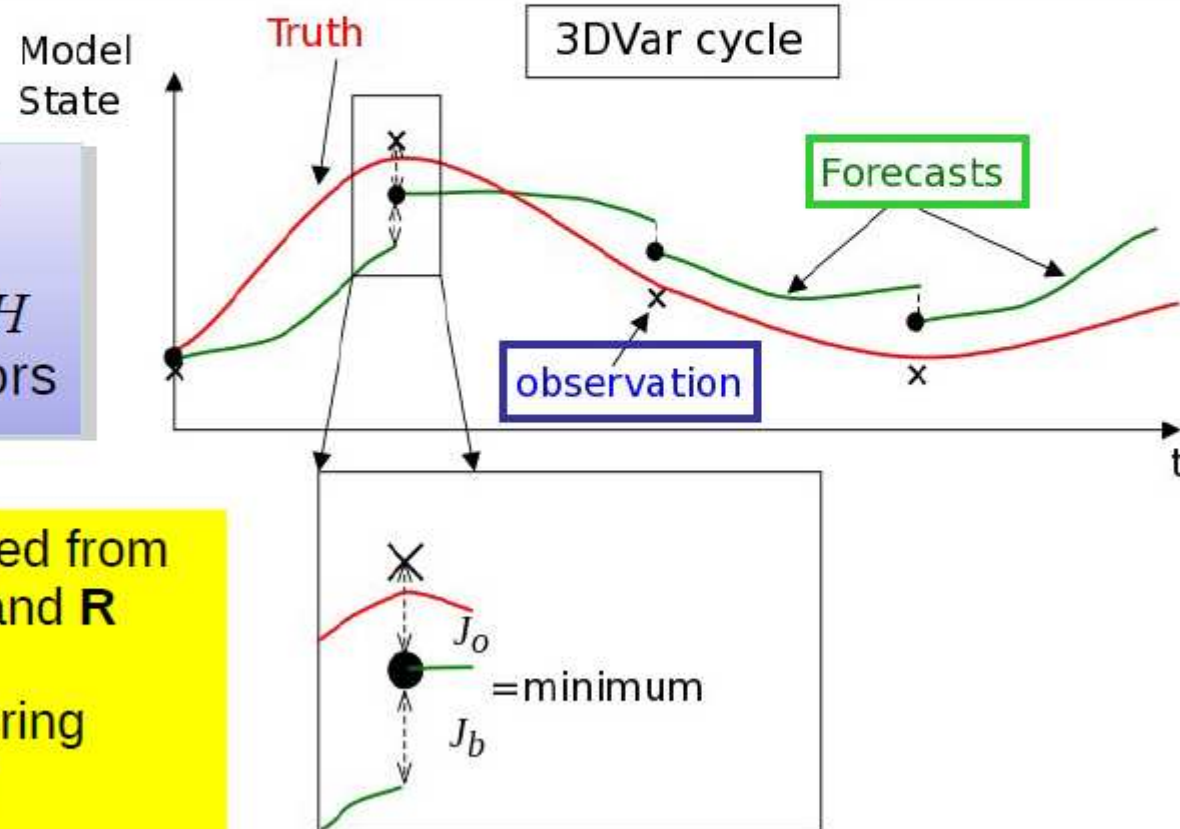
$$J(\mathbf{x}) = (\mathbf{x} - \mathbf{x}_b)^T \mathbf{B}^{-1}(\mathbf{x} - \mathbf{x}_b) + (\mathbf{y} - H[\mathbf{x}])^T \mathbf{R}^{-1}(\mathbf{y} - H[\mathbf{x}])$$

Cost function and its gradient

$$\nabla J(\mathbf{x}) = 2\mathbf{B}^{-1}(\mathbf{x} - \mathbf{x}_b) - 2H^T \mathbf{R}^{-1}(\mathbf{y} - H[\mathbf{x}])$$

We need:

- Observations (y), background or first-guess (x_b), observation operator (H), background (B) and observation (R) error statistics;
- Minimizer - M1QN3 (Gilbert and Lemarechal, INRIA) ;
- System to do/realize what we need - **Harmonie**.

scr/Minim

The minimization executable MASTERODB is launched from Minim through:

$MPPEXEC $BINDIR/$MODEL -c131 -maladin -vmeteo -eMIN1 -t001 -ft0 -asli -procs ${NPROC} || exit

Needed Input

x CCMA ODB (observations, departures, sigma-o)

x First guess (ICMSHMIN1INIT, ICMSHMIN1IMIN, ICMRFMIN10000, ELSCFMIN1ALBC000, ELSCFMIN1ALBC)

x Costants, statistics

x Namelists

Output

Updated CCMA ODB and analysis (MXMIN1999+0000)

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scr/Minim needed input: Constants, statistics

gunzip -c ${HM_LIB}/const/jb_data/$f_JBCV.gz > stabal96.cv

gunzip -c ${HM_LIB}/const/jb_data/$f_JBBAL.gz > stabal96.bal

${HM_LIB}/const/bias_corr/rszcoef_fmt

${HM_LIB}/const/sat_const/rt_coef_atovs_newpred_ieee.dat

${HM_LIB}/const/sat_const/rmtberr_airs.dat rmtberr_airs.dat

${HM_LIB}/const/sat_const/var.sat.noaa_chanspec.11

${HM_LIB}/const/sat_const/var.sat.noaa_rmtberr.11

${HM_LIB}/const/bias_corr/cstlim_noaa.dat

${HM_LIB}/const/bias_corr/$tabfile

VARBC.cycle

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scr/Minim needed input: Namelists

sed   -e "s/NBPROC/${NPROC}/g" \

-e "s/NPROCX/${NPROCX}/g" \

-e "s/NPROCY/${NPROCY}/g" \

-e "s/NREDNMC/${REDNMC}/" \

-e "s/NBZONVAR_EW=NBZONVAR_EW/NBZONVAR_EW=$NBZONVAR_EW/g" \

-e "s/LVARBC=LVARBC/LVARBC=$LVARBC/" \

{HM_LIB}/nam/namelist_minimization > fort.4

Change in harmonie_namelists.pm %minimization -> mods in namelist_minimization

namelist_ minimization

&NAMVAR

  LCONGRAD=.FALSE.,

  LJC=.FALSE.,

  LVARBC=LVARBC,,

  NITER=50,

  NSIMU=60,

  RCVGE=1.E-3,

/

&NAMJG

  L3DBGERR=.TRUE.,

  LCLMSFCE=.TRUE.,

  LCORCOSU=.FALSE.,

  LJB_NONLINEAR_BALANCE=.FALSE.,

  LJB_NONLINEAR_CVHUM=.FALSE.,

  LJB_NONLINEAR_CVO3=.FALSE.,

  LJB_OMEGA_BALANCE=.FALSE.,

  REDNMC=NREDNMC,

/

&NAMJO

LQSCATT=.TRUE.,

LTC=.FALSE.,

NOTVAR(1,1)= 0, 0,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

NOTVAR(1,2)= 0, 0,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

NOTVAR(1,3)= 0, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

NOTVAR(1,4)= 0, 0,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

NOTVAR(1,5)= 0,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,

NOTVAR(1,6)= 0, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

NOTVAR(1,7)=-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

NOTVAR(1,8)=-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

NOTVAR(1,9)=0,0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

0=to be used, -1=not to be used

/

src/arp/module/yomcosjo.F90
INTEGER(KIND=JPIM), PARAMETER :: NVAR_U = 1
INTEGER(KIND=JPIM), PARAMETER :: NVAR_U10= 2
INTEGER(KIND=JPIM), PARAMETER :: NVAR_T = 7
INTEGER(KIND=JPIM), PARAMETER :: NVAR_Z = 8
INTEGER(KIND=JPIM), PARAMETER :: NVAR_T2 =11

INTEGER(KIND=JPIM) , DIMENSION(JPXVAR ,JPNOTP) :: NOTVAR

Active or passive?

- Active: Use in the minimisation, i.e. contributing to the analysis

- Passive: Treated as active observations but not used in the minimisation
    - BATOR, screening, monitoring...

This is choosen in the namelist NAMJO:

```
 &NAMJO
 ...
  NOTVAR(1,1)= 0, 0,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,
  NOTVAR(1,2)= 0, 0,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,
 ...
 /END
```

where NOTVAR(1,1) = SYNOP, NOTVAR(1,2) = AIREP
and from "yomcosjo.F90" one can see NVAR_U = 1; NVAR_U10= 2; NVAR_H = 5; NVAR_T = 7; NVAR_Z=8;
Radar reflectivity = 26
Doppler wind   = 44

Active or passive?

```
&NAMJO

...

 NOTVAR(1,1)= 0, 0,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,2)= 0, 0,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,3)= 0, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,4)= 0, 0,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,5)= 0, 0,-1,-1,-1,-1, 0, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,6)= 0, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,7)=-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,8)=-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,9)=0,0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,10)=-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,

 NOTVAR(1,13)=-1,-1,-1,-1,0,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1,-1, 0,-1,-1,-1,-1,-1,-1,-1,-
1,-1,-1,-1,-1,-1,-1,-1,-1, 0,

 ...

 /END
```

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Minimization output

IN LOGFILE:

Open HM_Date_YYYYMMDDHH.html in editor:

Look for' Diagnostic JO-table (JOT) MINIMISATION'

   try

grep -i 'grepcost' HM_Date_YYYYMMDDHH.html

+ MXMIN1999+0000, updated VARBC.cycle, updated CCMA (an_depar)

fg_depar = obs - guess which is bias corrected

By the way   biascorr = bias to be corrected

fg_depar + biascorr = obs - guess before bias correction