Screening:
Blacklisting, observation quality control, data thinning

Roger Randriamampianina

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Outline

Need of well selected good observations for data assimilation

Code organisation

-- Blacklisting of (bad) observations

-- Selection of good observations

-- Data thinning

Script tasks flow

-- ODB evolution

Output diagnostic

Need for well selected good observations -- some theoretical backgrounds

-- Data assimilation aims at building a best possible atmospheric state using observations and short range forecasts.

Best Linear Unbiased Estimator (BLUE) analysis:

$$x_a = x_b + K[y_o - H(x_b)] \qquad K = BH^T(HBH^T + R)^{-1}$$

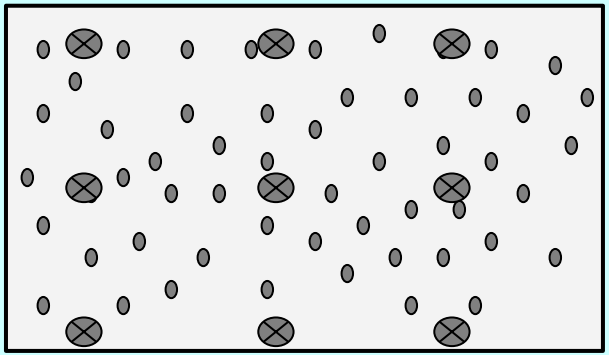
where:

x_a is the analysis; x_b is the first guess or background;
$H(x_b)$ - background value at observation space; and y_o is the observation
B - background error; R - observation error

-- observation and background errors are mutually uncorrelated;

-- observation errors are (horizontally) uncorrelated.

Thinning, superobbing, supermodding

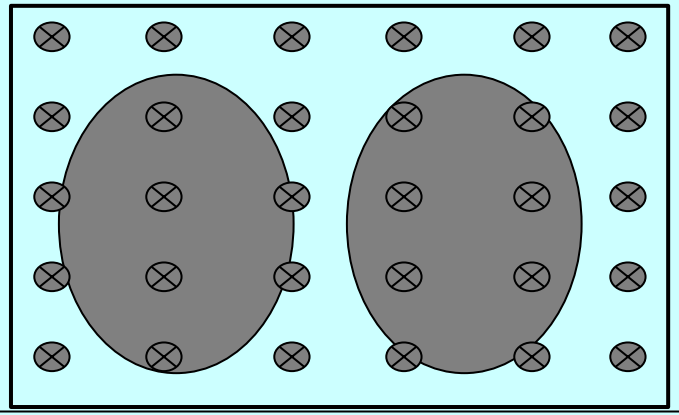


The observation has higher resolution than the model

Do superobbing or thinning before assimilation

-observation

-model grid



The observation has lower resolution than the model

Do supermodding or averaging of background before assimilation

Selection of good observations -- Screening

Some important steps (screen.F90):

-- DEALMOD - Release unnecessary model fields

-- SUSCRE1 - Initialise screening on common lev 1

-- SUFGER - GERGER - Setup FG error into obs location

-- SUFGLIM - Setup FG limits

-- BLINT - Initialise blacklisting interface

-- BTEMPDUP - Find (partial) duplicate of TEMP BUFR reports

-- DECIS - Make screening decision (most of the processes) is done here

-- UPECMA - Update the Extended CMA odb for compression

-- PRSTA - Print screening statistics

-- DEALSCR - Release the arrays used in screening

-- The screening is the last step of the pre-processing of data in Arp/Ald/Arome DA system.

-- We want to remove the wrong data and make the final choice inside the set of data which are said to be potentially acceptable by the quality control and the monitoring system.

-- We need to control them against the background, to verify their vertical consistency and to thin them when their space resolutions are too high.

Selection of good observations -- Preliminary check

Some important steps (decis.F90):

-- GETDB - Get the necessary data

-- PRECH - Preliminary check of datum/reports

-- BLACKHAT - BLACK - Blacklisting

-- FIRST - First guess check

-- FGWND - All winds

-- FGCHK - Other parameters

-- VERTCO - Vertical consistency check

-- REDSL- remove redundancy at surf level

-- TEMP/PILOT - reject redundancy

--FLGTST- Transform datum/report to status

--DUPLI_NO_SQ/DUPLI- remove duplicate airep

--REDUN- All redundancy check, incl lev. selec.

--SCAQC- Scatterometer QC

--NEW_THINN- Thinning of satellite data

PRECH:Preliminary check of observations:

-- Check of completeness of the reports

-- Check of the reporting practice for SYNOP/TEMP /PILOT mass observations [Ps & Z]

-- check that there is observation error, final observation error, first-guess, vertical coordinate, etc…

BLACKHAT/BLACK:Blacklisting:

-- Scanning for blacklisting :

A monitoring blacklist decision is applied for discarding the excessively noisy or biased observations.
A selection of variables for assimilation is done using the data selection part of the blacklist file and the information hard-coded in Arp/Ald/Arome (orographic rejection limit, land-sea rejection…).

Blacklisting of observations (1)

-- There are three ways:

1)-- using the LISTE_LOC files (mainly for blacklisting of satellite instruments)

2)-- using the LISTE_NOIRE_DIAP file (blacklisting parameters (groups) or stations)

3)-- use src/blacklist/mf_blacklist.b convention

For (1) and (2), see presentation about Bator by Alena Trojakova.

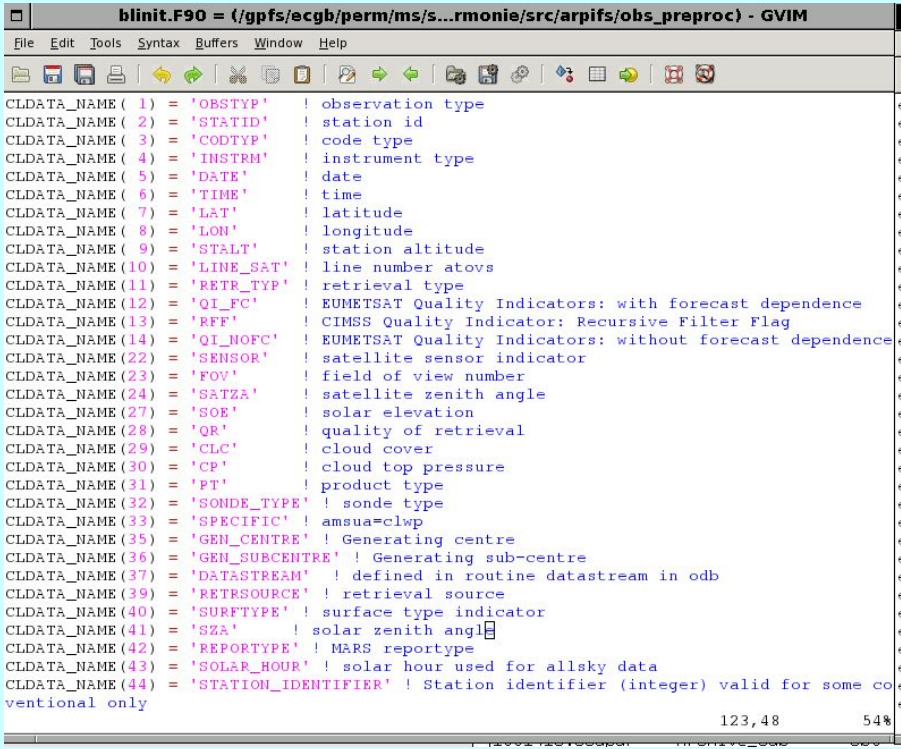
The flags are already in the ODB at this stage

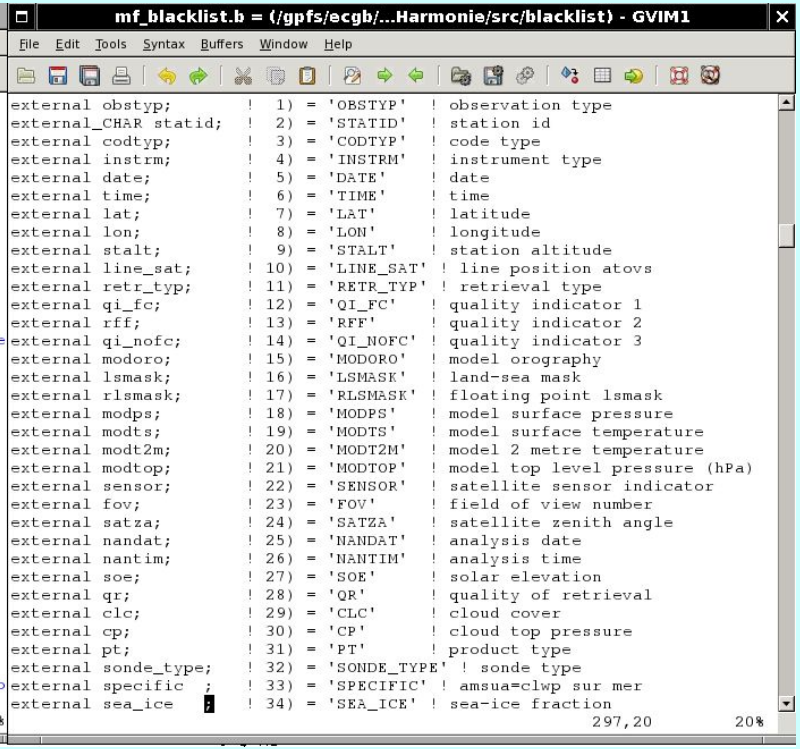
3) uses coding convention *which needs compilation* of the code to be activated.

-- it's initialised in src/arpifs/obs_preproc/blinit.F90

-- Filled in src/arpifs/obs_preproc/black.F90

Blacklisting of observations (2)





blinit.F90

mf_blacklist.b

Blacklisting of observations -- the rules (3)

Example: blacklisting of SYNOP & DRIBU observations

```
!----------------------- SYNOP CONSTANT DATA SELECTION ----------------------

if (OBSTYP = synop) then

    if VARIAB in (t2m,rh2m) then
        if (soe < 10.0 ) then fail(CONSTANT); endif;
    endif;

    if VARIAB in (u10m, v10m) then
        if (SPECIFIC > 0.0 ) then
           if (CODTYP in (11, 14, 16)) then fail(CONSTANT); endif;
           if (RLSMASK > 0.) then fail(CONSTANT); endif;
         end if;
        if (STALT >= 0.) and (abs(STALT - MODORO) > 200.0) then fail(CONSTANT); endif;
    endif;

    if VARIAB in (rh, q) then
        if (PRESS <= 300.) then fail(CONSTANT); endif;
    endif;

    if (VARIAB = rh2m) then
        if (CODTYP in (21, 22, 23, 24)) then fail(CONSTANT); endif;
        if (RLSMASK < 0.5) then fail(CONSTANT); endif;
        if (STALT >= 0.) and (abs(STALT - MODORO) > 200.0) then fail(CONSTANT); endif;
    endif;

endif;

!-------------------- DRIBU CONSTANT DATA SELECTION -------------------------

if (OBSTYP = dribu) then

    if VARIAB in (u10m, v10m) then
        if (RLSMASK > 0.) then fail(CONSTANT); endif;
        if (STALT >= 0.) and (abs(STALT - MODORO) > 200.0) then fail(CONSTANT); endif;
    endif;

endif;

!-------------------- AIREP CONSTANT DATA SELECTION -------------------------

if (OBSTYP = airep) then

    if VARIAB notin (u, v, t) then fail(CONSTANT); endif;
    if (PRESS < 50) then fail(CONSTANT); endif;
    if (PRESS > MODPS) then fail(CONSTANT); endif;
```

Convention:

fail(constant) --> blacklist

fail(experimental) --> passive assimilation

fail(monthly) --> blacklist

For passive assimilation:
-- check the routine UPECMA to increase the observation error

First-guess/background check

Some important steps (decis.F90):

-- GETDB - Get the necessary data

-- PRECH - Preliminary check of datum/reports

-- BLACKHAT - BLACK - Blacklisting

-- *FIRST - First guess check*

-- *FGWND - All winds*

-- *FGCHK - Other parameters*

-- VERTCO - Vertical consistency check

-- REDSL- remove redundancy at surf level

-- TEMP/PILOT - reject redundancy

--FLGTST- Transform datum/report to status

--DUPLI_NO_SQ/DUPLI- remove duplicate airep

--REDUN- All redundancy check, incl lev. selec.

--SCAQC- Scatterometer QC

--NEW_THINN- Thinning of satellite data

FIRST: Background quality control:

-- It is performed for all the variables to be used in the assimilation

-- The variance of the background departure is estimated by :

$$\langle y - H(x_b), y - H(x_b) \rangle \sim \sigma_o^2 + \sigma_b^2$$

-- The estimate of variance for the normalized departure is given by :

$$(1 + \frac{\sigma_o^2}{\sigma_b^2}) = \lambda$$

-- If $\left(\frac{y - H(x_b)}{\sigma_b}\right)^2 > n * \lambda$ then observation y is suspected

--> n (flag limit) =15 for wind observations, for example

--> $\boldsymbol{\sigma}_o$ and $\boldsymbol{\sigma}_b$ are the observation and background errors

$\boldsymbol{\sigma}_b$ is interpolated from the file called errgrib

Observation errors and its tuning through sigmao_coef

For conventional observations: in bator_init_mod.F90

```
SIGMAO_COEF=1._JPRB
ECTERO(NSYNOP,2,41:42,1)    = ECTERO(NSYNOP,2,41:42,1) * SIGMAO_COEF(NSYNOP)
ECTERO(NAIREP,1,2:4,1:19)   = ECTERO(NAIREP,1,2:4,1:19) * SIGMAO_COEF(NAIREP)
ECTERO(NSATOB,:,3:4,1:19)   = ECTERO(NSATOB,:,3:4,1:19) * SIGMAO_COEF(NSATOB)
ECTERO(NDRIBU,1,1,1)        = ECTERO(NDRIBU,1,1,1) * SIGMAO_COEF(NDRIBU)
ECTERO(NDRIBU,1,41:42,1)    = ECTERO(NDRIBU,1,41:42,1) * SIGMAO_COEF(NDRIBU)
ECTERO(NTEMP,1,2:4,1:19)    = ECTERO(NTEMP,1,2:4,1:19) * SIGMAO_COEF(NTEMP)
ECTERO(NTEMP,1,41:42,1:19)  = ECTERO(NTEMP,1,41:42,1:19) * SIGMAO_COEF(NTEMP)
ECTERO(NPILOT,1,2:4,1:19)   = ECTERO(NPILOT,1,2:4,1:19) * SIGMAO_COEF(NPILOT)
ECTERO(NPILOT,1,41:42,1:19) = ECTERO(NPILOT,1,41:42,1:19) * SIGMAO_COEF(NPILOT)
```

For satellite observations: in defrun.F90

!* 2.6 Modification of sigmaos with coefficient SIGMAO_COEF

```
WRITE(CLFMT,FMT="('(" SIGMAO_COEF(1:',I2,') =',',I2,'F8.3)')")JPNOTP,JPNOTP
WRITE(NULOUT,FMT=CLFMT) SIGMAO_COEF(:)
IF(.NOT.LECMWF)THEN
ROERR_RAD1C(:,:)=ROERR_RAD1C(:,:) * SIGMAO_COEF(NSATEM)
DO JOBT=1,JPNOTP
RBGQC(:,JOBT,:)=RBGQC(:,JOBT,:) / (SIGMAO_COEF(JOBT)*SIGMAO_COEF(JOBT))
ENDDO
RBGQC_RAD1C(:,:,:)=RBGQC_RAD1C(:,:,:) /
(SIGMAO_COEF(NSATEM)*SIGMAO_COEF(NSATEM))
ROERR_QSCAT = ROERR_QSCAT * SIGMAO_COEF(NSCATT)
ENDIF
```

Observation operators

The observation operators HOP (hop.F90)**:**

-- OBSOP_RAD - for radiance

-- OBSOP_RADAR - for radar

-- ***OBSOP_CONV - for conventional and retrievals***

-- OBSOP_GPSRO - for GPS radio occultation

-- OBS_OP_LIMB_RAD - for limb radiance

-- OBS_PRECIP_ACCUM - for accum precipitation

-- OBSOP_GPS_SURFACE - for GPS ZTD

-- OBSOP_COMPOSITION - for atm. composition

-- OBSOP_VARBC - generic VarBC task in H

LGOM_PLUS_DUMP

--> GOM_PLUS_DUMP -- can be run offline

OBSOP_CONV - HRETR_CONV - ...

FIRST: Background quality control:

-- It is performed for all the variables to be used in the assimilation

-- The variance of the background departure is estimated by :

$$\langle y - H(x_b), y - H(x_b) \rangle \sim \sigma_o^2 + \sigma_b^2$$

-- The estimate of variance for the normalized departure is given by :

$$(1 + \frac{\sigma_o^2}{\sigma_b^2}) = \lambda$$

-- If $\left(\frac{y - H(x_b)}{\sigma_b}\right)^2 > n * \lambda$ then observation y is suspected

--> n (flag limit) =15 for wind observations, for example

--> $\boldsymbol{\sigma}_o$ and $\boldsymbol{\sigma}_b$ are the observation and background errors

$\boldsymbol{\sigma}_b$ is interpolated from the file called errgrib

Selection of good observations -- Vertical consistency check

Some important steps (decis.F90):

-- GETDB - Get the necessary data

-- PRECH - Preliminary check of datum/reports

-- BLACKHAT - BLACK - Blacklisting

-- FIRST - First guess check

  -- FGWND - All winds

  -- FGCHK - Other parameters

-- VERTCO - Vertical consistency check

-- REDSL- remove redundancy at surf level

  -- TEMP/PILOT - reject redundancy

--FLGTST- Transform datum/report to status

--DUPLI_NO_SQ/DUPLI- remove duplicate (airep)

--REDUN- All redundancy check, incl lev. selec.

--SCAQC- Scatterometer QC

--NEW_THINN- Thinning of satellite data

VERTCO: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 the data is considered as "really bad" these layers are rejected (T&Wind&Hum) or if it's about geopotential, then all data rejected.

DUPLI_NO_SQ/DUPLI:Removal of duplicate reports

-- In case of co-located reports of the same observation types, some or all of the content of one of the reports is rejected.

Selection of good observations -- Redundancy check

Some important steps (decis.F90):

-- GETDB - Get the necessary data

-- PRECH - Preliminary check of datum/reports

-- BLACKHAT - BLACK - Blacklisting

-- FIRST - First guess check

  -- FGWND - All winds

  -- FGCHK - Other parameters

-- VERTCO - Vertical consistency check

-- REDSL- remove redundancy at surf level

  -- TEMP/PILOT - reject redundancy

--FLGTST- Transform datum/report to status

--DUPLI_NO_SQ/DUPLI- remove duplicate (airep)

--REDUN- All redundancy check, incl lev. selec

--SCAQC- Scatterometer QC

--NEW_THINN- Thinning of satellite data

An other complex process involving lot of tasks/routines (see the following slides)

<u>REDSL: for surface level & REDUN: for all reports</u>

Few examples:

-- 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.

-- **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 (observed at the same time and the same station) that are no more than 50hPa above the **Synop** mass observation.

Selection of good observations -- Thinning

Some important steps (decis.F90):

-- GETDB - Get the necessary data

-- PRECH - Preliminary check of datum/reports

-- BLACKHAT - BLACK - Blacklisting

-- FIRST - First guess check

  -- FGWND - All winds

  -- FGCHK - Other parameters

-- VERTCO - Vertical consistency check

-- REDSL- remove redundancy at surf level

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--FLGTST- Transform datum/report to status

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--NEW_THINN- Thinning of satellite data

-- The horizontal and vertical resolutions of several types of observations are too high to allow to use all of them in **Arp**/**Ald**/**Arm** analysis (knowing that no horizontal correlation of observation errors is supported)

-- A horizontal thinning is performed for the Aircraft (**Airep**, **Amdar**, ...), the AMV (**Satob** or **geowind**) and the sat. observations (**Atovs**, **IASI**, ...etc) reports

-- A vertical thinning is also performed for the Aircraft and the AMV reports

-- A predefined minimum horizontal distance between the nearby reports from the same platform is enforced

-- For moving (sat) platforms, a two steps thinning is performed:

  -- first with a minimum distance of RMIND_{OBSTYPE} is enforced

  -- Then a repeated scan is performed to achieve the final separation of RFIND_{OBSTYPE}

  -- RMIND_* and RFIND_* belong to NAMSCC

Selection of good observations -- Thinning (aircraft)

Some important steps (decis.F90):

-- GETDB - Get the necessary data

-- PRECH - Preliminary check of datum/reports

-- BLACKHAT - BLACK - Blacklisting

-- FIRST - First guess check

  -- FGWND - All winds

  -- FGCHK - Other parameters

-- VERTCO - Vertical consistency check

-- REDSL- remove redundancy at surf level

  -- TEMP/PILOT - reject redundancy

--FLGTST- Transform datum/report to status

--DUPLI_NO_SQ/DUPLI- remove duplicate (airep)

--REDUN- All redundancy check, incl lev. selec

--SCAQC- Scatterometer QC

--NEW_THINN- Thinning of satellite data

MOVPL - THIAIR

THIAIR: thinning of aircraft data

-- One flight consist of a set of reports

-- Thinning is performed for each flight separately

-- 3D boxes are constructed around model levels

-- In each box the report closest to the analysis date with the most active observations is selected

-- Box size is set in metres via **RFIND_AIREP** in **NAMSCC**.

-- A minimum distance by **RFIND_AIREP** is enforced

Selection of good observations -- Thinning (satellite)

Some important steps (decis.F90):

-- GETDB - Get the necessary data

-- PRECH - Preliminary check of datum/reports

-- BLACKHAT - BLACK - Blacklisting

-- FIRST - First guess check

  -- FGWND - All winds

  -- FGCHK - Other parameters

-- VERTCO - Vertical consistency check

-- REDSL- remove redundancy at surf level

  -- TEMP/PILOT - reject redundancy

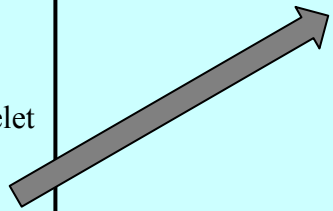
--FLGTST- Transform datum/report to status

--DUPLI_NO_SQ/DUPLI- remove duplicate (airep)

--REDUN- All redundancy check, incl lev. selet

--SCAQC- Scatterometer QC

--NEW_THINN- Thinning of satellite data



New_THINN: thinning of AMV data

-- First a minimum distance of RMIND_SATOB is enforced

-- Then a repeated scan is performed to achieve the final separation of RFIND_SATOB.

-- We want to keep only one obs per box defined horizontally by the minimum distance and vertically around the standard levels

-- The obs will be chosen according to the following criterias :

  -- Number of active data in the report

  -- The closest report to the time that corresponds to the centre of the screening time window

Selection of good observations -- Thinning (satellite)

Some important steps (decis.F90):

-- GETDB - Get the necessary data

-- PRECH - Preliminary check of datum/reports

-- BLACKHAT - BLACK - Blacklisting

-- FIRST - First guess check

  -- FGWND - All winds

  -- FGCHK - Other parameters

-- VERTCO - Vertical consistency check

-- REDSL- remove redundancy at surf level

  -- TEMP/PILOT - reject redundancy

--FLGTST- Transform datum/report to status

--DUPLI_NO_SQ/DUPLI- remove duplicate (airep)

--REDUN- All redundancy check, incl lev. selet

--SCAQC- Scatterometer QC

--NEW_THINN- Thinning of satellite data

New_THINN: thinning of radiance data

-- First a minimum distance of RMIND_RAD1C(sensor) is enforced

-- Then a repeated scan is performed to achieve the final separation of RFIND_RAD1C(sensor).

-- The selection criterias are the following:

  -- A sea sounding is preferred over a land one.

  -- A clear sounding is preferred over a cloudy one.

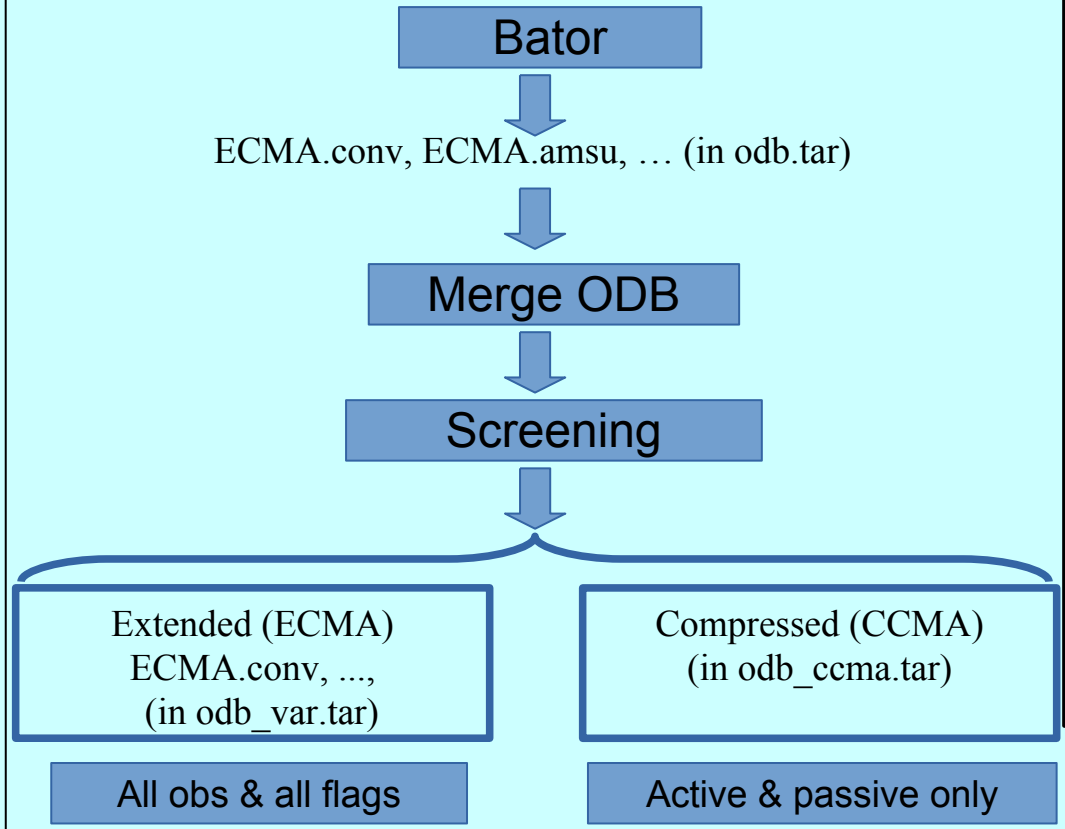
  -- The closest report to the time that corresponds to the centre of the screening time window is prefered

Where sensor: 0 ➔ HIRS 16 ➔ IASI

1 ➔ MSU 3 ➔ AMSU-A

4 /15➔ AMSU-B/MHS … etc

Observations processing and executable



Screening configuration: **002**

MASTERODB -c002 -maladin -vmeteo -eMIN1 -t001 -ft0 -asli -procs ${NPROC}

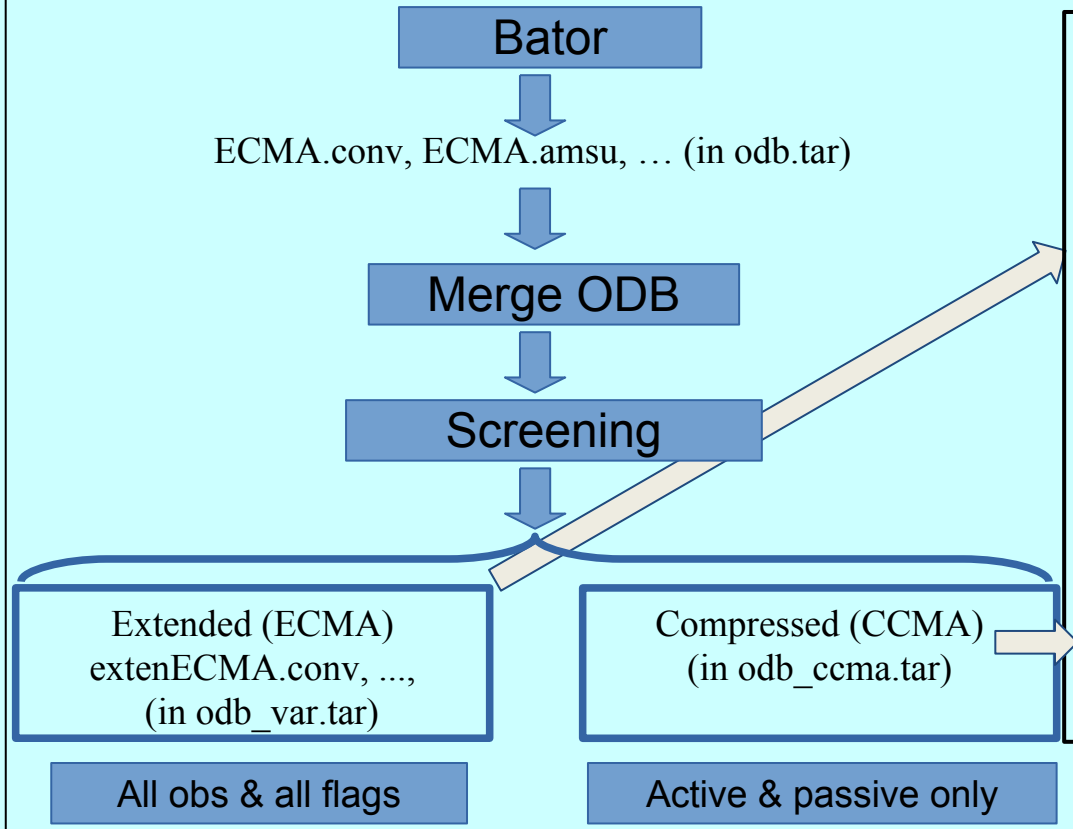
Needed Input

- ECMA ODB (observations, observation error)
- First guess (ICMSHMIN1INIT, ICMSHMIN1IMIN, ICMRFMIN10000, ELSCFMIN1ALBC000, ELSCFMIN1ALBC)
- Constants, statistics
- Namelists

Output

ODB CCMA and UPDATED ODB ECMA

Observations processing and executable



ODB settings:

Process and inline merge the ODB ECMA

```
#--- ODB settings for screening
export ODB_ECMA_CREATE_POOLMASK=1
export ODB_CMA=ECMA
export ODB_SRCPATH_ECMA=${d_DBVAR}/ECMA
export ODB_DATAPATH_ECMA=${d_DBVAR}/ECMA
export ODB_ANALYSIS_DATE=${YMD}
export ODB_ANALYSIS_TIME=${HH}0000
export ODB_MERGEODB_DIRECT=1
export ODB_ECMA_CREATE_POOLMASK=1
export ODB_ECMA_POOLMASK_FILE=
                    ${d_DBVAR}/ECMA/ECMA.poolmask
```

Inline create the ODB CCMA

```
export ODB_CCMA_CREATE_DIRECT=1
export ODB_CCMA_CREATE_POOLMASK=1
export ODB_SRCPATH_CCMA=${d_DB_OUT}/CCMA
export ODB_DATAPATH_CCMA=${d_DB_OUT}/CCMA
export ODB_CCMA_POOLMASK_FILE=
                    ${d_DB_OUT}/CCMA/CCMA.poolmask
export IOASSIGN=${d_DB_OUT}/CCMA/IOASSIGN
```

some important namelists

Namelists:

Thinning of moving platforms

```
&NAMSCC
 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.,
 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.,
  /
```

```
&NAMCT0
 LSCREEN=.TRUE.,
(L_SCREEN_CALL=.FALSE.,)
 LOBS=.TRUE.,
 LSIMOB=.FALSE.,
 LOBSC1=.TRUE.,
 /

 &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,
 /
```

Please don't be confused. This is not needed. Except for screening without QC, for ex. the case of obs simulation or verification against all obs, ...

Define the horizontal interpolation technique

Reinitialize the observation error

Few tips on how to check the outputs?

grep “SCREENING STATISTICS”

You can see all this:

STATUS SUMMARY OF REPORTS:

STATUS SUMMARY OF DATA:

EVENT SUMMARY OF REPORTS:

EVENT SUMMARY OF DATA:

NUMBER OF VARIABLES IN DIFFERENT OBSERVATION TYPES:

NUMBER OF DEPARTURES IN DIFFERENT OBSERVATION TYPES:

NUMBER OF MISSING DEPARTURES IN DIFFERENT OBSERVATION TYPES:

```
*** SCREENING STATISTICS
    --------------------
*** FOR WHOLE OBSERVATION ARRAY

STATUS SUMMARY OF REPORTS:

 OB.TYP       REPORTS        ACTIVE       PASSIVE      REJECTED  BLACKLISTED
      1          4919           633             0          4286            0
      2          2538          2255             0           283            0
      3             0             0             0             0            0
      4             0             0             0             0            0
      5            25             3             0            22            0
      6             0             0             0             0            0
      7             0             0             0             0            0
      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             0             0             0             0            0
     14             0             0             0             0            0
     15             0             0             0             0            0
     16             0             0             0             0            0
     17             0             0             0             0            0
     18             0             0             0             0            0
    ---------------------------------------------------------------------------
    TOT          7482          2891             0          4591            0

STATUS SUMMARY OF DATA:

 OB.TYP       REPORTS        ACTIVE       PASSIVE      REJECTED  BLACKLISTED
      1         28499          1820          3355         12604        16359
      2          7667          6824             0           942          139
      3             0             0             0             0            0
      4             0             0             0             0            0
      5         16663          2407             0          8507         5941
      6             0             0             0             0            0
      7             0             0             0             0            0
      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             0             0             0             0            0
     14             0             0             0             0            0
     15             0             0             0             0            0
     16             0             0             0             0            0
     17             0             0             0             0            0
     18             0             0             0             0            0
    ---------------------------------------------------------------------------
    TOT         52829         11051          3355         22053        22439
```

Few tips on how to check the outputs?

grep “Diagnostic”

and more ...

```
Diagnostic JO-table (JOT) SCREENING JOB     T0323 NCONF=      1 NSIM4D=      0 NUPTRA=      0
================================================================================================

      Obstype     1 === SYNOP, Land stations and ships
      ------------------------------------------------
        Codetype    11 === SYNOP Land Manual Report
          Variable          DataCount          Jo_Costfunction          JO/n       ObsErr      BgErr
            U10                 498          127.2994859928           0.26    0.200E+01   0.000E+00
            H2                  254          94.04037027786           0.37    0.100E+00   0.000E+00
            %                   240          70.08362358227           0.29    0.785E+02   0.000E+00
            T2                  256          119.0692975021           0.47    0.140E+01   0.000E+00
        Codetype    14 === SYNOP Land Automatic Report
          Variable          DataCount          Jo_Costfunction          JO/n       ObsErr      BgErr
            U10                2692          878.0823445974           0.33    0.200E+01   0.000E+00
            H2                 1313          678.7437649819           0.52    0.100E+00   0.000E+00
            %                  1035          268.1328401761           0.26    0.785E+02   0.000E+00
            T2                 1348          618.4797321929           0.46    0.140E+01   0.000E+00
        Codetype    21 === SYNOP-SHIP Report
          Variable          DataCount          Jo_Costfunction          JO/n       ObsErr      BgErr
            U10                  46          41.07659586235           0.89    0.270E+01   0.000E+00
            H2                   20          20.02603520739           1.00    0.100E+00   0.000E+00
            %                    23          877.0615862535          38.13    0.785E+02   0.000E+00
            T2                   22          23.02903612921           1.05    0.140E+01   0.000E+00
            TS                   14          3.050308098383           0.22    0.150E+01   0.000E+00
        Codetype    24 === SYNOP Automatic SHIP Report
          Variable          DataCount          Jo_Costfunction          JO/n       ObsErr      BgErr
            U10                 552          160.4898414612           0.29    0.270E+01   0.000E+00
            H2                  355          165.2673491480           0.47    0.100E+00   0.000E+00
            %                   376          60.71227402200           0.16    0.785E+02   0.000E+00
            T2                  392          205.1963606272           0.52    0.140E+01   0.000E+00
            TS                   60          31.76533099757           0.53    0.150E+01   0.000E+00
        Codetype   170 === BUFR Land SYNOP Report
          Variable          DataCount          Jo_Costfunction          JO/n       ObsErr      BgErr
            U10                4262          1290.646000818           0.30    0.200E+01   0.000E+00
            H2                 2182          1163.419225604           0.53    0.100E+00   0.000E+00
            %                  1590          434.8511007921           0.27    0.785E+02   0.000E+00
            T2                 2232          1038.055585436           0.47    0.140E+01   0.000E+00
        Codetype   182 === BUFR Ship SYNOP Report
          Variable          DataCount          Jo_Costfunction          JO/n       ObsErr      BgErr
            U10                 712          353.7903727960           0.50    0.200E+01   0.000E+00
            H2                  451          192.3136516557           0.43    0.100E+00   0.000E+00
            %                   471          951.6244067424           2.02    0.785E+02   0.000E+00
            T2                  488          242.8647646806           0.50    0.140E+01   0.000E+00
            TS                  103          39.39188034788           0.38    0.150E+01   0.000E+00
                          ----------    ----------------------    --------
      ObsType  1 Total:      21987           10148.56316598           0.46

      Obstype     2 === AIREP, Aircraft data
      ------------------------------------------------
        Codetype   141 === AIREP Aircraft Report
          Variable          DataCount          Jo_Costfunction          JO/n       ObsErr      BgErr
            U                    2          0.6100299231297           0.31    0.279E+01   0.000E+00
```

Few tips on how to check the outputs?

grep “SCREENING STATISTICS”

You can see all this:

and more … further down ...

End of JO-table (JOT)

Observation usage summary

Obstype 1 === SYNOP, Land stations and ships

Codetype	Variable	DataCount	datum_status % Activ	Pass	Rej	Black	datum_event1 % 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
11 SYNOP Land Manual Report	U10	498	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 SYNOP Land Manual Report	H2	254	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 SYNOP Land Manual Report	1	240	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0
11 SYNOP Land Manual Report	T2	256	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 SYNOP Land Automatic Report	U10	2692	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 SYNOP Land Automatic Report	H2	1313	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14 SYNOP Land Automatic Report	1	1035	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0
14 SYNOP Land Automatic Report	T2	1348	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SYNOP-SHIP Report	U10	46	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0
21 SYNOP-SHIP Report	H2	20	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SYNOP-SHIP Report	1	23	0.0	0.0	4.3	100.0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SYNOP-SHIP Report	T2	22	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21 SYNOP-SHIP Report	TS	14	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 SYNOP Automatic SHIP Report	U10	552	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0
24 SYNOP Automatic SHIP Report	H2	355	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0
24 SYNOP Automatic SHIP Report	1	376	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
24 SYNOP Automatic SHIP Report	T2	392	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 SYNOP Automatic SHIP Report	TS	60	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
170 BUFR Land SYNOP Report	U10	4262	3.7	0.0	10.5	85.8	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0
170 BUFR Land SYNOP Report	H2	2182	18.9	0.0	59.9	21.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	60	0	0	0	0	0	0
170 BUFR Land SYNOP Report	1	1590	24.8	0.0	75.2	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	0	100	0	0	0	0
170 BUFR Land SYNOP Report	T2	2232	24.2	0.0	75.8	0.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	76	0	0	0	0	0	0
182 BUFR Ship SYNOP Report	U10	712	18.3	0.0	76.4	5.3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	77	0	0	0	0	0	0
182 BUFR Ship SYNOP Report	H2	451	0.9	0.0	6.0	93.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0	0	0	0	0	0
182 BUFR Ship SYNOP Report	1	471	17.0	0.0	83.0	0.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	83	0	17	0	0	0	0
182 BUFR Ship SYNOP Report	T2	488	16.8	0.0	83.2	0.0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	84	0	0	0	0	0	0
182 BUFR Ship SYNOP Report	TS	103	20.4	0.0	79.6	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	0	0	0	0

Obstype 2 === AIREP, Aircraft data

Codetype	Variable	DataCount	datum_status % Activ	Pass	Rej	Black	datum_event1 % 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
141 AIREP Aircraft Report	U	2	100.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
141 AIREP Aircraft Report	T	1	100.0	0.0	0.0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
146 WIGOS AMDAR Aircraft Report	U	5008	88.8	0.0	10.9	0.2	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	11	0	0	0	0	0	0
146 WIGOS AMDAR Aircraft Report	T	2537	88.8	0.0	10.8	0.3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0

Few tips on how to check the outputs? *datum_status and datum_event1*

Obstype 5 === TEMP, Radiosondes

Codetype	Variable	DataCount	datum_status % Activ	Pass	Rej	Black	datum_event1 % 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
35 TEMP Land Report	U	1970	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 TEMP Land Report	U10	22	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 TEMP Land Report	H	639	0.0	0.0	6.7	100.0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0
35 TEMP Land Report	H2	11	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 TEMP Land Report	T	639	0.0	0.0	5.3	100.0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 TEMP Land Report	%	607	0.0	0.0	1.2	100.0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 TEMP Land Report	T2	11	0.0	0.0	0.0	100.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35 TEMP Land Report	Q	556	0.0	0.0	18.5	116.9	0	17	17	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0
109 BUFR Land TEMP	U	4014	24.4	0.0	75.5	0.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	76	0	0	0	0	0	0
109 BUFR Land TEMP	U10	24	0.0	0.0	8.3	91.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0
109 BUFR Land TEMP	H	2007	16.1	0.0	50.2	33.8	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	50	0	0	0	0	0
109 BUFR Land TEMP	H2	12	16.7	0.0	66.7	16.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0	0	0	0	0
109 BUFR Land TEMP	T	2007	24.4	0.0	75.5	0.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	76	0	0	0	0	0	0
109 BUFR Land TEMP	%	2019	14.0	0.0	85.8	0.2	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	11	0	0	76	0	0	0	0	0	0
109 BUFR Land TEMP	T2	12	16.7	0.0	66.7	16.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	67	0	0	0	0	0	0
109 BUFR Land TEMP	Q	2019	16.1	0.0	50.2	33.7	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	51	0	0	0	0	0	0

(rounded UP to nearest integer, see key below)

datum_event1 key

1= MISSING VERTICAL COORDINATE
2= MISSING OBSERVED VALUE
3= MISSING FIRST GUESS VALUE
4= REJECTED DUE TI RDB FLAG
5= ASSIM OF CLOUD-AFFECTED RADIANCE
6= BAD REPORTING PRACTICE
7= VERTICAL POSITION OUT OF RANGE
8= TOO BIG FIRST GUESS DEPARTURE
9= TOO BIG DEPARTURE IN ASSIMILATION
10= TOO BIG OBSERVATION ERROR
11= DEDUNDANT DATUM
12= REDUNDANT LEVEL
13= NOT AN ANALYSIS VARIABLE
14= DUPLICATED DATUM/LEVEL
15= TOO MANY SURFACE DATA/LEVELS
16= LEVEL SELECTION
17= VERTICAL CONSISTENCY CHECK
18= VERTICAL COORDINATE CHANGED FROM % TO P
19= COMBINED FLAGGING
20= DATUM REJECTED DUE TO REJECTED REPORT
21= VARIATIONAL QC PERFORMED
22= OBS ERROR INCREASED
23= CLOUD CONTAMINATION
24= RAIN CONTAMINATION
25= AEROSOL CONTAMINATION
26= BAD EMISSIVITY

Thank you

Thank you for your attention

Köszönöm a figyelmet