Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

OPERA ODIM RCLACE RADARS for BATOR cy43T1

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DHMZ SHMU ARSO METEO Slovenia OMSZ ZAMG ROMANIA ANM

201808/201809 Budapest stay

Plan:

- **summarize our actual status (RC-LACE – start with SK, HU, CZ, SL)**
- **OMSZ: wfma: install Bator cycle40T1_43T1backphase**
  - /home/mnestiak/pack/op/.gmkfile/MPIIFORT.WFMA
  - INCLUDEPATH=/opt/netcdf/include:/opt/grib_api-1.10.4/include:/usr/include/libxml2:/home/mnestiak/lib/hdf5-1.8.16/include
  - cp src/local/aeolus/DataStructures/joborder_datastructure.F90
  - There was two versions of module:
    - src/main/aeolus/support/aeolusconstants.F90
    - src/local/odb/pandor/module/aeolusconstants.F90

- **OMSZ: wfma: install odbview**
- **equip access to OIFS for OMSZ**
  - **Meteo FR:** thanks for help to Daniel Idziorek, cmr_odc
  - Daniel checked that nobody from Hungary asked yet for OIFS account creation. OPERA OMSZ delegate Istvan Sebok

OMSZ – first ODIM hdf5 test data FR

- **T_PAZZ50_C_EUOC_20180824120000_frtou.h5**
  (md5sum bb7934e7725fd1831566fb8d33a73719)
- **Hdf5 structure (what I expecting after Bator)**

/dataset1	Group	/dataset10	Group
/dataset2	Group	/dataset11	Group
/dataset3	Group	/dataset12	Group
/dataset4	Group	/dataset13	Group
/dataset5	Group	/dataset14	Group
/dataset6	Group	/dataset15	Group
/dataset7	Group	/dataset16	Group
/dataset8	Group	/dataset17	Group
/dataset9	Group	/dataset18	Group
/how	Group		
/what	Group		
/where	Group		

OMSZ – first ODIM hdf5 test data FR

- **T_PAZZ50_C_EUOC_20180824120000_frtou.h5**
  (md5sum bb7934e7725fd1831566fb8d33a73719)
- **Control bator namelist :**
  - **&HDF5**
    - **HODIM%Resolution =5000.0,**
    - **HODIM%Sample =1000,**
    - **HODIM%ChoosenTask ='pl.imgw.quality.qi_total',**
    - **HODIM%GrpElevName ='dataset',**
    - **HODIM%GrpParamName ='data',**
    - **HODIM%GrpFlagName ='quality',**
    - **HODIM%NoDataName ='nodata',**
    - **HODIM%NoDetectName ='undetect',**
    - **HODIM%BeamWidthName ='beamwidth',**
    - **HODIM%NodeNames must include 'frtou'**

OMSZ – first ODIM hdf5 test data FR

- **T_PAZZ50_C_EUOC_20180824120000_frtou.h5**
  (md5sum bb7934e7725fd1831566fb8d33a73719)

*** INFO - BATOR : File HDF5.site1 prefetched - NbOBS= 92520 NbWag= 3608280
*** INFO - BATOR : Type produit : PVOL
*** INFO - BATOR : Source NOD : frtou
*** INFO - BATOR : Date optimale : 2018-08-24
*** INFO - BATOR : heure optimale : 12:00:00
*** INFO - BATOR : Hauteur : 160.00
*** INFO - BATOR : lat : 43.574440
*** INFO - BATOR : lon : 1.376110
*** INFO - BATOR : BeamWidth : 1.00
*** INFO - BATOR : 18Dataset groups found.

OMSZ – first ODIM hdf5 test data FR

- **T_PAZZ50_C_EUOC_20180824120000_frtou.h5**
  (md5sum bb7934e7725fd1831566fb8d33a73719)

*** INFO - BATOR : elevation = 0.800000
*** INFO - BATOR : selected **dbzh** = dataset8/data1
*** INFO - BATOR : selected **th** = dataset8/data2
*** INFO - BATOR : selected **vrad** = dataset8/data3
*** INFO - BATOR : selected **flag** = dataset8/quality4

…

*** INFO - BATOR : elevation = 10.480000
*** INFO - BATOR : selected dbzh = dataset18/data1
*** INFO - BATOR : selected th = dataset18/data2
*** INFO - BATOR : selected vrad = dataset18/data3
*** INFO - BATOR : selected flag = dataset18/quality4
NbElev : 12ilw : 12NbObs : 92520

OMSZ – first ODIM hdf5 test data FR

- **T_PAZZ50_C_EUOC_20180824120000_frtou.h5**
  (md5sum bb7934e7725fd1831566fb8d33a73719)

- FILTER CLEANER for elevation check
  Begin of Cleaner. N of obs : 7567
  End of Cleaner. N of obs : 5928
  78.3% observations left
- MEDIAN FILTER FOR DOPW
- FILTER CLEANER for pixel check
  Begin of Cleaner. N of obs : 5855
  End of Cleaner. N of obs : 5715
  97.6% observations left

OMSZ – first ODIM hdf5 test data FR

- **T_PAZZ50_C_EUOC_20180824120000_frtou.h5**
  (md5sum bb7934e7725fd1831566fb8d33a73719)

Thinning every 5000 km (each 5 pixels)

Number of obs left after sub-sampling 8296
la valeur de iobs vaut: 92520
Selected Obs = 3210 --> 66037 datas.

Total selected Obs = 3210 --> 66037 datas.

Thinning every 1000 km (each 1 pixels)

Number of obs left after sub-sampling 81584
la valeur de iobs vaut: 92520
Selected Obs = 46264 --> 983028 datas.

Total selected Obs = 46264 --> 983028 datas.

Next step – RC-LACE ODIM hdf5 testing data selection

- T_PAZZ43_C_EUOC_20180824120000_hunap.h5
  - md5sum 8ccae8cba7b175131e787bbaeec87fad
- T_PAZZ41_C_EUOC_20180824120000_skjav.h5
  - md5sum 58d13a34c4454b1ec00171390ec02aef
- T_PAZZ50_C_EUOC_20180824120000_czska.h5
  - md5sum 3bb0489d2487736ec724adabce4fd326

- **50_C_EUOC_20180824120000_frtou.h5**
  - **md5sum bb7934e7725fd1831566fb8d33a73719**

HU
(max "dataset15")

GROUP "dataset1" {
GROUP "data1" {
.....
GROUP "what" {
GROUP "data2" {

GROUP "what" {
GROUP "data3" {
GROUP "what" {
GROUP "quality1" {
GROUP "how" {
GROUP "what" {
GROUP "quality2" {
GROUP "how" {
GROUP "what" {
GROUP "quality3" {
GROUP "how" {
GROUP "what" {
GROUP "quality4" {
GROUP "how" {
GROUP "what" {
GROUP "what" {
GROUP "where" {

FR
(max "dataset18")

GROUP "dataset1" {
GROUP "data1" {
GROUP "how" {
GROUP "what" {
GROUP "data2" {
GROUP "how" {
GROUP "what" {
GROUP "how" {

GROUP "quality1" {
GROUP "how" {
GROUP "what" {
GROUP "quality2" {
GROUP "how" {
GROUP "what" {
GROUP "quality3" {
GROUP "how" {
GROUP "what" {
GROUP "quality4" {
GROUP "how" {
GROUP "what" {
GROUP "what" {
GROUP "where" {

CZ
(max "dataset36")

GROUP "dataset1" {
GROUP "data1" {
.....
GROUP "what" {

GROUP "quality1" {
GROUP "how" {
GROUP "what" {
GROUP "quality2" {
GROUP "how" {
GROUP "what" {
GROUP "quality3" {
GROUP "how" {
GROUP "what" {
GROUP "quality4" {
GROUP "how" {
GROUP "what" {
GROUP "what" {
GROUP "where" {

SK
(max "dataset108")

GROUP "dataset1" {
GROUP "data1" {
.....
GROUP "what" {

GROUP "how" {

GROUP "quality1" {
GROUP "how" {
GROUP "what" {
GROUP "quality2" {
GROUP "how" {
GROUP "what" {
GROUP "quality3" {
GROUP "how" {
GROUP "what" {
GROUP "quality4" {
GROUP "how" {
GROUP "what" {
GROUP "what" {
GROUP "where" {

Testing HOOF – RH.py

- OMSZ: wfma: install /opt/rh/python27/root/usr/bin/python2.7
  - OMSZ: wfma: install h5py
  - OMSZ: wfma: numpy
  - export LD_LIBRARY_PATH=/opt/rh/python27/root/usr/lib64
- first RCLACE forum version (md5sum 3e6ea24dbdb3b3c0dc56ffae822cb35d)
  - need some "fine tuning" and exchange some versions (Peter S., Benedikt S.)
- **Final RH.py** (md5sumSUM: 3f7182b887e22518612fcb59570cbbf9)
- change in RH namelist
  - VRAD = {VRAD VRADH}

SHMU ODIM hdf5 test data

- T_PAZZ41_C_EUOC_20180824120000_skjav.h5
  - md5sum 58d13a34c4454b1ec00171390ec02aef

```
*** INFO - BATOR : Type produit        : PVOL
*** INFO - BATOR : Source NOD          : skjav
*** INFO - BATOR : Date optimale       : 2018-08-24
*** INFO - BATOR : heure optimale      : 12:00:00
*** INFO - BATOR : Hauteur             :  600.00
*** INFO - BATOR : lat                 :   48.256100
*** INFO - BATOR : lon                 :   17.153100
*** INFO - BATOR : BeamWidth           :    0.92
*** INFO - BATOR :  24Dataset groups found.
```

SHMU ODIM hdf5 test data

- T_PAZZ41_C_EUOC_20180824120000_skjav.h5
  - md5sum 58d13a34c4454b1ec00171390ec02aef

*** INFO – BATO
*** INFO - BATOR : elevation = 0.000000
*** INFO - BATOR : selected th = dataset1/data2
*** INFO - BATOR : selected vrad = dataset13/data1
*** INFO - BATOR : elevation = 0.500000
*** INFO - BATOR : selected th = dataset2/data2
*** INFO - BATOR : selected vrad = dataset14/data1
...
*** INFO - BATOR : selected **th** = dataset6/data2
*** INFO - BATOR : selected **vrad** = dataset18/data1
*** INFO - BATOR : elevation = 3.400000

NbElev : 12ilw : 12NbObs : 86400

SHMU ODIM hdf5 test data

- T_PAZZ41_C_EUOC_20180824120000_skjav.h5
  - md5sum 58d13a34c4454b1ec00171390ec02aef

```
- FILTER CLEANER for elevation check
   Begin of Cleaner. N of obs :       12626
   End of Cleaner. N of obs :         9892
 78.3%  observations left
- MEDIAN FILTER FOR DOPW
- FILTER CLEANER for pixel check
   Begin of Cleaner. N of obs :       10878
   End of Cleaner. N of obs :        10793
 99.2%  observations left
- FILTER CLEANER for elevation check
   Begin of Cleaner. N of obs :       13629
   End of Cleaner. N of obs :        11393
 83.6%  observations left
- MEDIAN FILTER FOR DOPW
- FILTER CLEANER for pixel check
   Begin of Cleaner. N of obs :       12765
   End of Cleaner. N of obs :        12747
 99.9%  observations left
```

SHMU ODIM hdf5 test data

- T_PAZZ41_C_EUOC_20180824120000_skjav.h5
  - md5sum 58d13a34c4454b1ec00171390ec02aef

Thinning every 5000 km (each 5 pixels)
Number of obs left after sub-sampling 7236
la valeur de iobs vaut: 86400
Selected Obs = 819 --> 4352 datas.
Total selected Obs = 819 --> 4352 datas.

Thinning every 1000 km
Total selected Obs = 14528

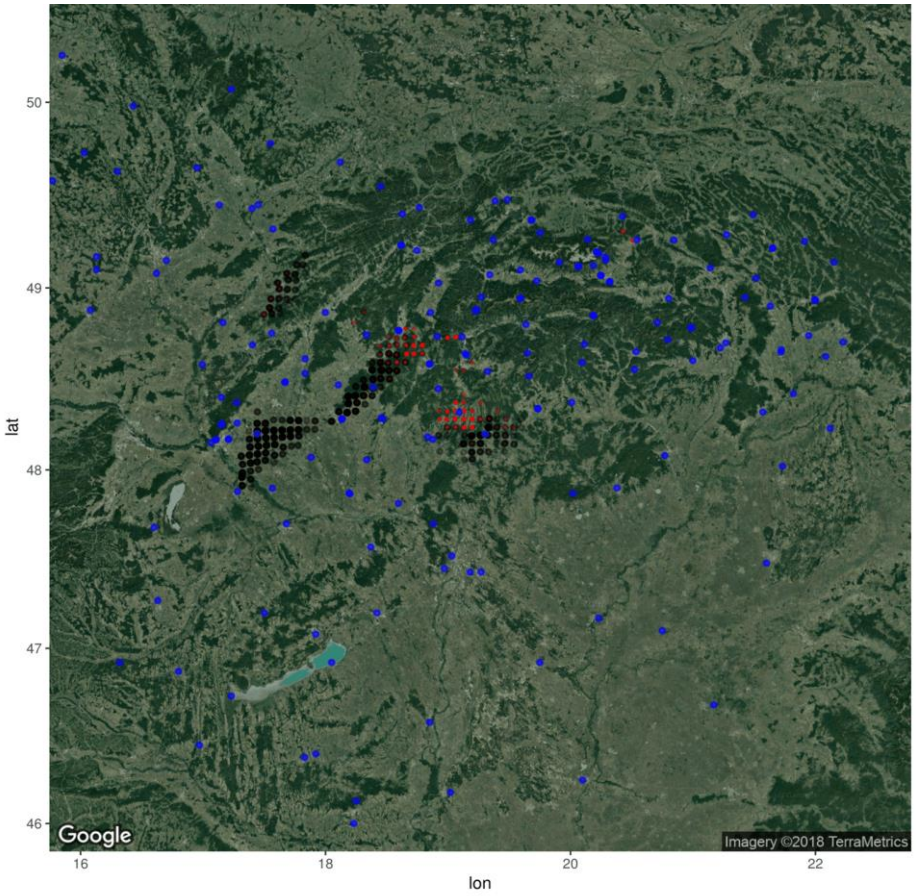
SHMU ODIM hdf5 test data

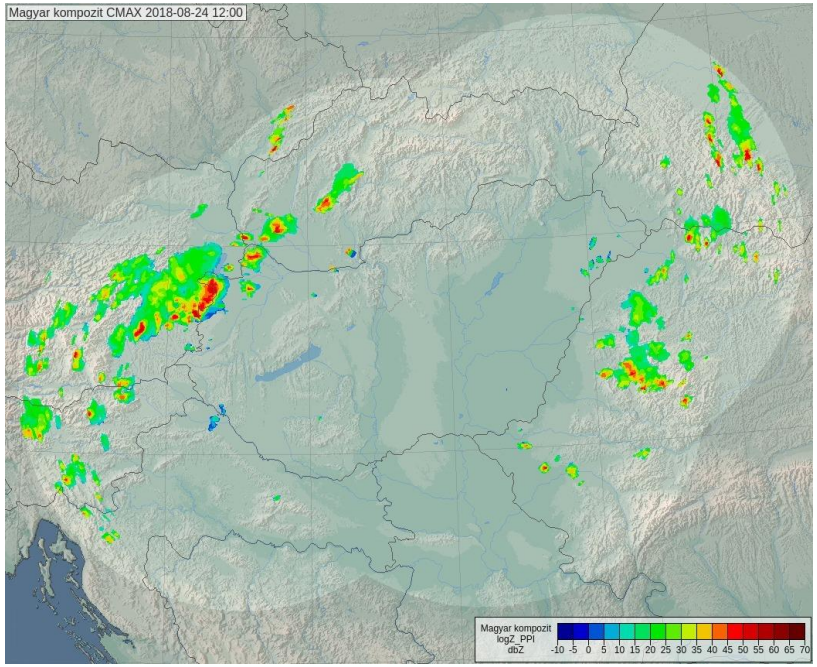
- T_PAZZ41_C_EUOC_20180824120000_skjav.h5
  - md5sum 58d13a34c4454b1ec00171390ec02aef

Thinning every	after sub-sampling	Total selected Obs
1000	75464	14528
2000	39896	5061
3000	19759	2264
5000	7236	819

Impact on thinning on number of total selected Obs

SHMU ODIM hdf5 test data





CHMU ODIM hdf5 test data

- T_PAZZ50_C_EUOC_20180824120000_czska.h5
  - md5sum 3bb0489d2487736ec724adabce4fd326

*** INFO - BATOR : Type produit : PVOL
*** INFO - BATOR : Source NOD : czbrd
*** INFO - BATOR : Date optimale : 2018-08-24
*** INFO - BATOR : heure optimale : 12:00:00
*** INFO - BATOR : Hauteur : 916.00
*** INFO - BATOR : lat : 49.658300
*** INFO - BATOR : lon : 13.817800
*** INFO - BATOR : BeamWidth : 1.00
*** INFO - BATOR : **24Dataset** groups found.

CHMU ODIM hdf5 test data

- T_PAZZ50_C_EUOC_20180824120000_czska.h5
  - md5sum 3bb0489d2487736ec724adabce4fd326

*** INFO - BATOR : elevation = 0.100000
*** INFO - BATOR : selected **th** = dataset12/data2
*** INFO - BATOR : selected **vrad** = dataset24/data1
*** INFO - BATOR : elevation = 0.500000
*** INFO - BATOR : selected th = dataset11/data2
*** INFO - BATOR : selected vrad = dataset23/data1
*** INFO - BATOR : elevation = 0.900000
*** INFO - BATOR : selected th = dataset10/data2
*** INFO - BATOR : selected vrad = dataset22/data1
*** INFO - BATOR : elevation = 1.300000
...
*** INFO - BATOR : elevation = 21.600000
*** INFO - BATOR : selected th = dataset1/data2
*** INFO - BATOR : selected vrad = dataset13/data1
NbElev : 12ilw : 12NbObs : 93600

- FILTER CLEANER for elevation check
  Begin of Cleaner. N of obs : 16990
  End of Cleaner. N of obs : 14382
  84.6% observations left
- MEDIAN FILTER FOR DOPW
- FILTER CLEANER for pixel check
  Begin of Cleaner. N of obs : 16690
  End of Cleaner. N of obs : 15184
  91.0% observations left
- FILTER CLEANER for elevation check
  Begin of Cleaner. N of obs : 17614
  End of Cleaner. N of obs : 15195
  86.3% observations left

CHMU ODIM hdf5 test data

- T_PAZZ50_C_EUOC_20180824120000_czska.h5
  - md5sum 3bb0489d2487736ec724adabce4fd326

Thinning every 1000 km (each 1 pixels)
Number of obs left after sub-sampling 82664
la valeur de iobs vaut: 93600
Selected Obs = 19351 --> 91087 datas.
Total selected Obs = 19351 --> 91087 datas.

bator_module.F90

```
USE BATOR_DATETIME_MOD
! definition reference radar
TYPE REF_RADAR
  INTEGER(KIND=JPIM)          :: ident
  CHARACTER(LEN=8)            :: type
  REAL(KIND=JPRB)             :: lat
  REAL(KIND=JPRB)             :: lon
  REAL(KIND=JPRB)             :: stalt
  REAL(KIND=JPRB)             :: antenht
  REAL(KIND=JPRB)             :: beamwidth
  REAL(KIND=JPRB)             :: frequency
END TYPE REF_RADAR
```

odb/pandor/module/bator_decodhdf5_mod.F90

43t2: 87326a2297c12de4380f470fc87fea23 bator_decodhdf5_mod.F90
43t2: e1bff7e1c386a225f6070ba10e6227b8 bator_decodhdf5_mod.F90

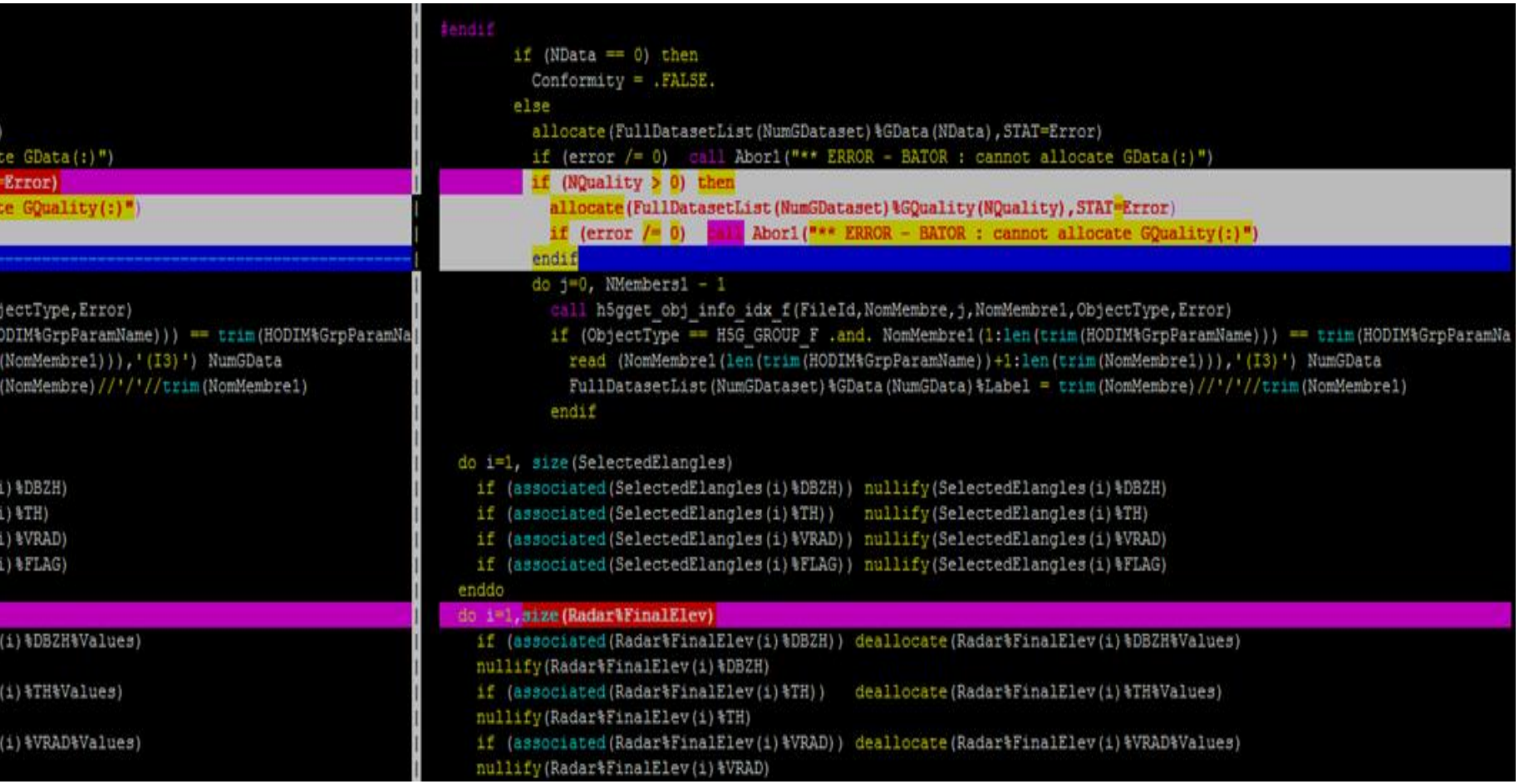
```
#endif
        if (NData == 0) then
          Conformity = .FALSE.
        else
          allocate(FullDatasetList(NumGDataset)%GData(NData),STAT=Error)
          if (error /= 0)  call Abor1("*** ERROR - BATOR : cannot allocate GData(:)")
          allocate(FullDatasetList(NumGDataset)%GQuality(NQuality),STAT=Error)
          if (error /= 0)  call Abor1("*** ERROR - BATOR : cannot allocate GQuality(:)")

          do j=0, NMembers1 - 1
            call h5gget_obj_info_idx_f(FileId,NomMembre,j,NomMembre1,ObjectType,Error)
            if (ObjectType == H5G_GROUP_F .and. NomMembre1(1:len(trim(HODIM%GrpParamName))) == trim(HODIM%GrpParamNa
              read (NomMembre1(len(trim(HODIM%GrpParamName))+1:len(trim(NomMembre1))),'(I3)') NumGData
              FullDatasetList(NumGDataset)%GData(NumGData)%Label = trim(NomMembre)//'/'//trim(NomMembre1)
            endif

  do i=1, size(SelectedElangles)
    if (associated(SelectedElangles(i)%DBZH)) nullify(SelectedElangles(i)%DBZH)
    if (associated(SelectedElangles(i)%TH))   nullify(SelectedElangles(i)%TH)
    if (associated(SelectedElangles(i)%VRAD)) nullify(SelectedElangles(i)%VRAD)
    if (associated(SelectedElangles(i)%FLAG)) nullify(SelectedElangles(i)%FLAG)
  enddo
  do i=1,NbSelectedElangles
    if (associated(Radar%FinalElev(i)%DBZH)) deallocate(Radar%FinalElev(i)%DBZH%Values)
    nullify(Radar%FinalElev(i)%DBZH)
    if (associated(Radar%FinalElev(i)%TH))   deallocate(Radar%FinalElev(i)%TH%Values)
    nullify(Radar%FinalElev(i)%TH)
    if (associated(Radar%FinalElev(i)%VRAD)) deallocate(Radar%FinalElev(i)%VRAD%Values)
    nullify(Radar%FinalElev(i)%VRAD)
```

odb/pandor/module/bator_decodhdf5_mod.F90

43t2: 87326a2297c12de4380f470fc87fea23 bator_decodhdf5_mod.F90
43t2: e1bff7e1c386a225f6070ba10e6227b8 bator_decodhdf5_mod.F90



odb/pandor/module/bator_decodhdf5_mod.F90

```
43t2: 87326a2297c12de4380f470fc87fea23 bator_decodhdf5_mod.F90
43t2: e1bff7e1c386a225f6070ba10e6227b8 bator_decodhdf5_mod.F90


do i=1,size(FullDatasetlist)
   do j=1,size(FullDatasetList(i)%GData)
      if (any((/'TH','DBZH','VRAD','VRADH'/) ==
trim(FullDatasetList(i)%GData(j)%Attrib%Quantity))) then

do i=1,size(FullDatasetlist)
    do j=1,size(FullDatasetList(i)%GData)
       if (any((/'TH   ','DBZH ','VRAD ','VRADH'/) ==
trim(FullDatasetList(i)%GData(j)%Attrib%Quantity))) then
```

odb/pandor/module/bator_decodhdf5_mod.F90

```
call GetData(GroupId,HODIM%GrpParamName,WaitedRank,WaitedAtomic,Iret)
where (real2buf(:,:) == Radar%FinalElev(i)%DBZH%Attrib%NoData)   real2buf(:,:) = rabso
where (real2buf(:,:) == Radar%FinalElev(i)%DBZH%Attrib%NoDetect) real2buf(:,:) = -rabsi
where (abs(real2buf(:,:)) /= rabsi) &
& real2buf(:,:) = real2buf(:,:) * Radar%FinalElev(i)%DBZH%Attrib%gain +
Radar%FinalElev(i)%DBZH%Attrib%offset
allocate(Radar%FinalElev(i)%DBZH%Values(Radar%NPoints,Radar%NRayons),STAT=Error)
if (Error /= 0) call Abor1("* ERROR - BATOR : cannot allocate Radar%FinalElev(i)%DBZH%Values(:,:)")
Radar%FinalElev(i)%DBZH%Values = rabsi
call h5gclose_f(GroupId,Error)

good: (c424fe4b761d6ae16e2cb5ddda609720 45t1)
call GetData(GroupId,HODIM%GrpParamName,WaitedRank,WaitedAtomic,Iret)
where (real2buf(:,:) == Radar%FinalElev(i)%DBZH%Attrib%NoData)   real2buf(:,:) = rabso
where (real2buf(:,:) == Radar%FinalElev(i)%DBZH%Attrib%NoDetect) real2buf(:,:) = -rabsi
where (real2buf(:,:) /= -rabsi .and. real2buf(:,:) /= rabso) &
& real2buf(:,:) = real2buf(:,:) * Radar%FinalElev(i)%DBZH%Attrib%gain +
Radar%FinalElev(i)%DBZH%Attrib%offset
allocate(Radar%FinalElev(i)%DBZH%Values(Radar%NPoints,Radar%NRayons),STAT=Error)
if (Error /= 0) call Abor1("* ERROR - BATOR : cannot allocate Radar%FinalElev(i)%DBZH%Values(:,:)")
Radar%FinalElev(i)%DBZH%Values = rabsi
call h5gclose_f(GroupId,Error)
```

Very near future plans …

- Re-run the RCLACE stay case with new bugfixed Bator
- Investigation of behaviour FILTER CLEANER
- Investigation selected th, vrad from dataset/data
- Solve missing selected **flag** = dataset/quality4 in RC-LACE radars from OIFS
- Finish comparison of 2-day (48h) OIFS RCLACE data sample (go throught 5min intervals)
- Move to screening, minimalization to analyze
- Reborn SIMREFL on cy43t1

Thanks for support …

- Alenka Trojakova
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- Peter Smerkol
- Benedikt Strajnar
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- Kullmann Laszlo
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