

HOOF: Homogenization Of Opera files

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Outline

- Motivation
- Homogenization algorithm
- Usage
- Metadata analysis tool



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Content of input OPERA/OIFS file

- Raw reflectivity (TH)
- Corrected reflectivity(dBZ)
 - Quality 1 (BROPO module, many filters including wlan removal, attenuation, beam blockage)
 - Quality 2 (Satellite check)
 - Quality 3 (Beam block index)
 - Quality 4 (Total quality flag)
- Radial winds
- Other quantities ...



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Organization of input data

- General structure:

- /how
- /what
- /where
- /dataset/
 - /data
 - /what
 - /data
 - /quality
 - /what
 - /data
 - /how
 - /what
 - /where

General structure is fixed, but data is organized slightly differently between radars:

- Data groups are grouped in datasets or each in its own dataset.
- Some attributes are missing or displaced.

Several measurements can be packed into one OIFS file due to 15 minute aggregation interval (1-3 measurements)



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Homogenization algorithm (1)

- Split OIFS file to measurements
 - Find the elevation angle of dataset/elevation containing dBZ with minimal starttime – this is the beginning of the first measurement
 - Find all other datasets containing dBZ with the same elevation angle and sort them by starttime – these are beginnings of other measurements
 - All other datasets are then grouped into measurements by comparing starttimes
 - Each measurement is written into a separate file
- Motivation: Selecting a single/most appropriate measurement and reducing the size of input data set.



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Homogenization algorithm (2)

- Bator only operates with DBZ (DBZH), TH and VRAD (VRADH). All other quantities (deduced from dataset/data/what/quantity attribute) are discarded.
- A flexible output file content is implemented via namelist. User can decide which attributes are mandatory and provide default values.
- Specific default values of any attribute can also be changed for individual radars.
- Every measurement is validated according to the set mandatory attributes. If a set group or attribute does not exist, a default value is taken (warning). If the default value of an attribute is None and attribute does not exist, the output file is not written (error).



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Homogenization algorithm (3)

- Output file structure is fixed:
 - *Reflectivity datasets*:
 - dataset/data1 (DBZ)
 - dataset/data2 (TH)
 - dataset/quality1-4
 - Radial winds datasets
 - dataset/data1 (VRAD)
 - The how, what, where groups are retained
 - If TH is missing, DBZ is encoded also as TH



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Namelist

Namelist items:

- FileExtensions: the files in the input folder with these extensions will be homogenized
- SavedQuantities: here, all possible names for DBZ, TH and VRAD quantities are specified
- DbzQualityGroups: list of numbers (1-4) of the quality groups attached to DBZ to retain in the output
- RadarAttributes common (the most important namelist item): list of radar attributes which will be written to the output file and their default values (in case they are not present in the input file)
- RadarAttributes NOD: a list of radar attributes, specific to radar with the specified NOD (opera site identification)

```
1 [FileExtensions]
2 {.h5 .hdf}
3 [SavedQuantities]
4 DBZ = {DBZ DBZH}
5 TH = {TH}
6 VRAD = {VRAD VRADH}
7 [DbzQualityGroups]
8 {1 2 3 4}
9 [RadarAttributes common]
10 /what/object = None
11 /what/source = None
12 /what/date = None
13 /what/time = None
14 /how/beamwidth = 0.9
15 /where/lat = None
16 /where/lon = None
17 /where/height = None
18 /dataset/what/startdate = None
19 /dataset/what/starttime = None
20 /dataset/what/enddate = None
21 /dataset/what/endtime = None
22 /dataset/where/elangle = 2.0
23 /dataset/where/nrays = 100
24 /dataset/where/nbins = None
25 /dataset/where/rscale = None
26 /dataset/where/rstart = None
27 /dataset/data/what/quantity = None
28 /dataset/data/what/gain = None
29 /dataset/data/what/offset = None
30 /dataset/data/what/nodata = None
31 /dataset/data/what/undetect = None
32 /dataset/quality/how/task = None
33 /dataset/quality/what/gain = None
34 /dataset/quality/what/offset = None
35 [RadarAttributes silis]
36 #/where/height = 500.0
37 [RadarAttributes sipas]
38 #/dataset/how/wmoid = 11111
39
```



Usage

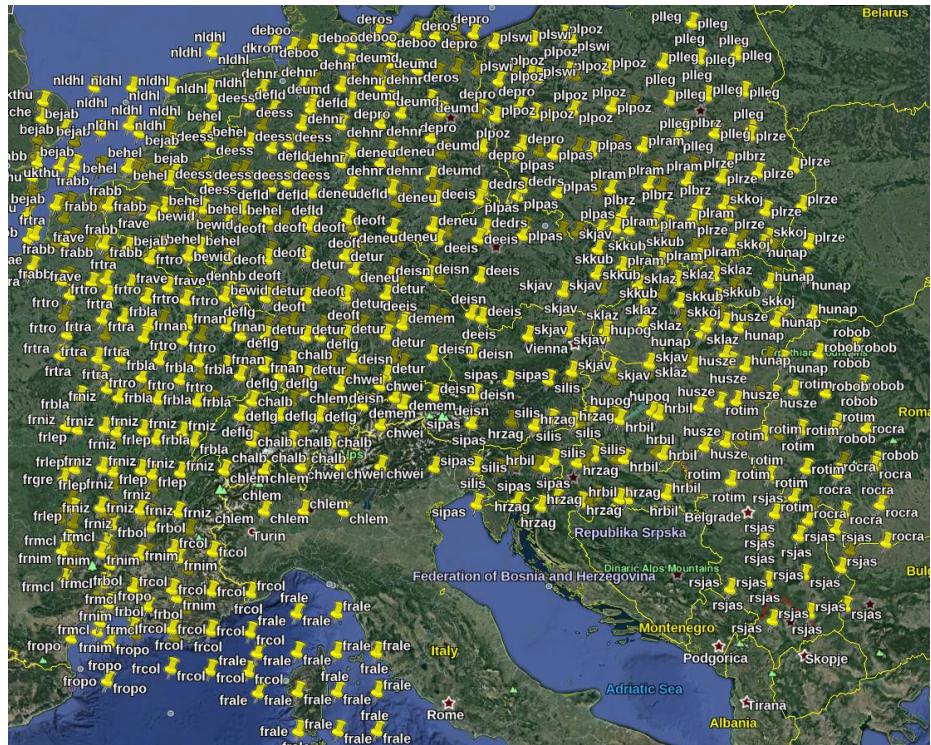
```
./HOOF.py <namelist file> <input folder> <output folder>
```

HOOF = Homogenization Of Opera Files
Any better idea for the name?

Important: The tool is written for Python 2.7 and uses H5py package and Anaconda environment.

It was beta-tested with Bator cy43.

All Opera data within ALADIN/SI domain as read in Bator cy43 (thinned to 80 km)



Metadata analysis tool

- Written for debug purposes and expanded into a GUI
- Scans all files in a folder and constructs union of all unique attributes
- For each attribute, displays and counts all possible values
- For each value of the attribute, shows containing files
- For each file with this value of the attribute, shows all groups with this attribute and value

Attribute Names	Attribute Values	Number	Attribute Files	Attribute Places in Files
Conventions dataset://data/how/CSR dataset://data/how/LOG dataset://data/how/SQL dataset://data/what/gain dataset://data/what/nodata dataset://data/what/offset dataset://data/what/quantify dataset://data/what/undetect dataset://how/Dclutter dataset://how/NEZ dataset://how/NL dataset://how/ProcMode dataset://how/Vsamples dataset://how/XMTphase dataset://how/averaged_bins dataset://how/avgpowr dataset://how/azangels dataset://how/aztimes dataset://how/elangels dataset://how/highprf dataset://how/lowprf dataset://how/polarization dataset://how/pulsewidth dataset://how/radarconstH dataset://how/radconstH dataset://how/radhoriz dataset://how/rpm dataset://how/task dataset://how/wavelength dataset://quality/how/task dataset://quality/how/task_args dataset://quality/what/gain dataset://quality/what/offset dataset://what/enddate	-0.00392156862745098 0.00392156862745098	89 267	T_PAZZ41_C_EUOC_20180814000000_silis.h5 24 T_PAZZ41_C_EUOC_20180306000000_bewid.33 T_PAZZ41_C_EUOC_20180306001500_nosmn.12 T_PAZZ41_C_EUOC_20180306000000_dkste.t20	dataset1/quality1/what dataset2/quality1/what dataset11/quality1/what dataset12/quality1/what dataset13/quality1/what dataset14/quality1/what dataset15/quality1/what dataset16/quality1/what dataset17/quality1/what dataset18/quality1/what dataset19/quality1/what dataset2/quality1/what dataset20/quality1/what dataset21/quality1/what dataset22/quality1/what dataset23/quality1/what dataset24/quality1/what dataset3/quality1/what dataset4/quality1/what dataset5/quality1/what dataset6/quality1/what dataset7/quality1/what dataset8/quality1/what dataset9/quality1/what



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