ACTRIS
CCRES

Labelling Operational Services
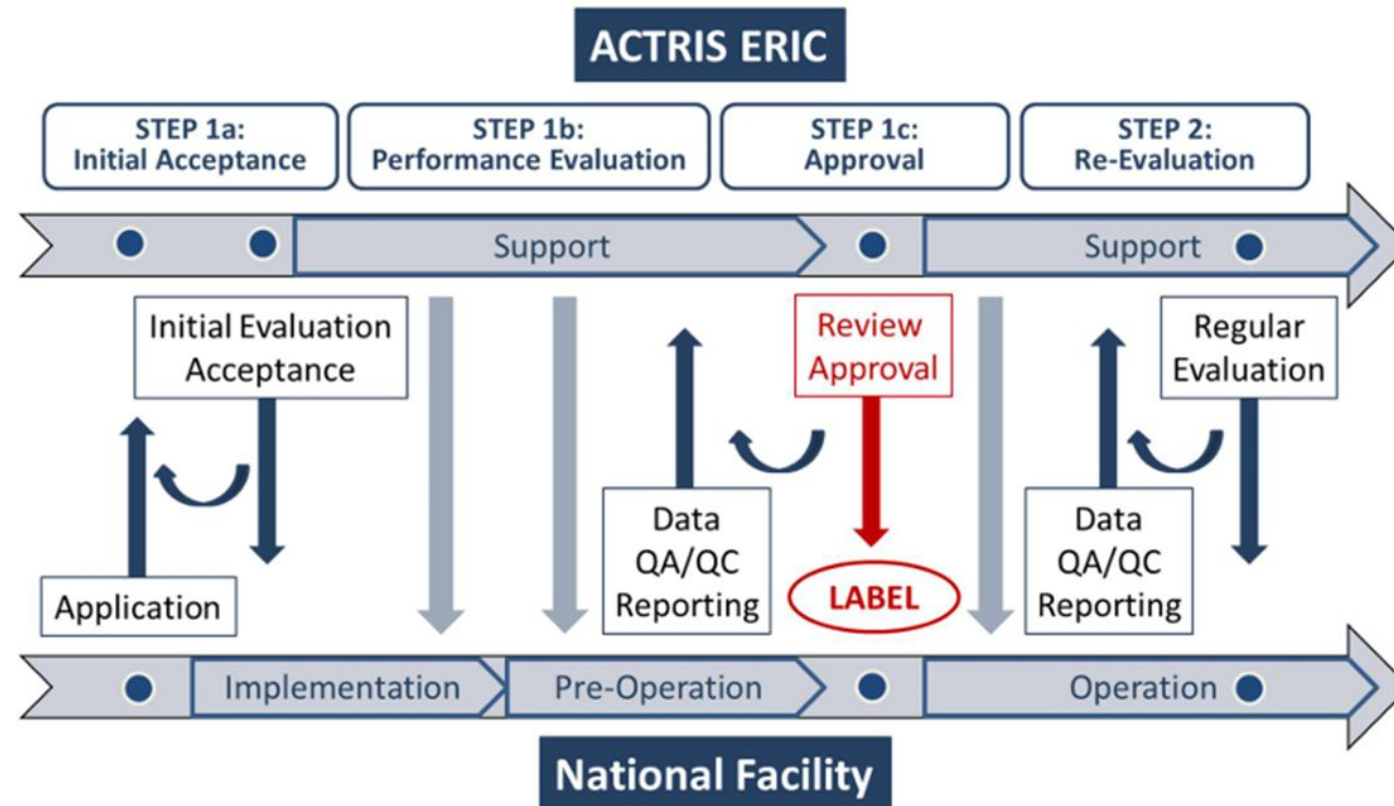## Application to CCRES

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1) ACTRIS labelling process

A stepwise labelling process to monitor the progress of the National Facilities

→ long journey...

1) ACTRIS labelling process

- **Step 1a: Initial acceptance (duration: up to NFs)**
  - General feasibility check, collect of information on variables, instruments and personnel
  - Compliance with CCRES requirements

- **Step 1b: Performance evaluation (duration 2 years)**
  - Data flow and operation support schedule created
  - Tracking of NF data
  - Upgrade of the facility (if necessary → duration longer than 2 years)
  - Compliance with CCRES/CLU data requirements

- **Step 1c: Approval**
  - Full label is granted.
  - Signature of ERIC and NF agreement.

- **Step 2: Re-evaluation**

NF submit data, metadata, HKD data to CLU

• CCRES and CLU are developing and implementing
- Daily diagnostics and visualisation of HKD
- Monthly reports of HKD
- Quality control of metadata conformity
- Quality tests and control of geophysical data

1) ACTRIS labelling process

CCRES labelling

Future ACTRIS stations (5 NFs)	In process for step 1a (5 NFs)	Initially accepted for step 1b (13 NFs)	Step 1c (0 NFs)
Karlsruhe (GER) Leipzig (GER) Maïdo (FR) Melpitz (GER) L'Aquila (ITA)	Cabauw (NL) Limassol (CYP) Pallas (FIN) Rzecin (POL) Warsaw (POL)	Bucharest (ROM)* Cluj (ROM) Galati (ROM) Granada (SPA) Hyytiala (FIN) Juelich (GER)* Lampedusa (ITA) Lindenberg (GER)* Mindelo (C.V) Munich (GER) Palaiseau (FRA)* Payerne (SWI) Potenza (ITA)	

* 2 years period to evaluate NF will be completed end of this spring

ACTRIS Head Office just stated general principles for all Central Facilities

75% Data coverage rule

- Excludes periods when external factors (e.g., instrument maintenance, unsuitable weather conditions, …) prevent valid data
- Coverage is assessed per variable, not per instrument
    - All required instruments must be operational simultaneously

Note for mobile facilities

- All components should be labelled simultaneously
- Audits will be conducted by each TC, with recommendations to follow
- The step 1b statement will be provided by the Mobile Platforms Coordination Group (MPCG)

Exemple/meaning

- An evaluation is done annually to check if the objective is met. If validated for two consecutive years, step 1c is approved

- The 75% data coverage applies per product, not per instrument (e.g., for the classification product, the evaluation is based on the combined product, not individual instruments like ALC, DCR, MWR)

- If an instrument is out for maintenance, associated products will be excluded from the evaluation
  - → Communication with CCRES-CLU is required

Adjustments for CCRES

- No specific focus on cloud periods
- Only applied to nominal instrument used for step 1b

2) How do we proceed ?

Starting point

- Use the the wealth of information & data available on Cloudnet
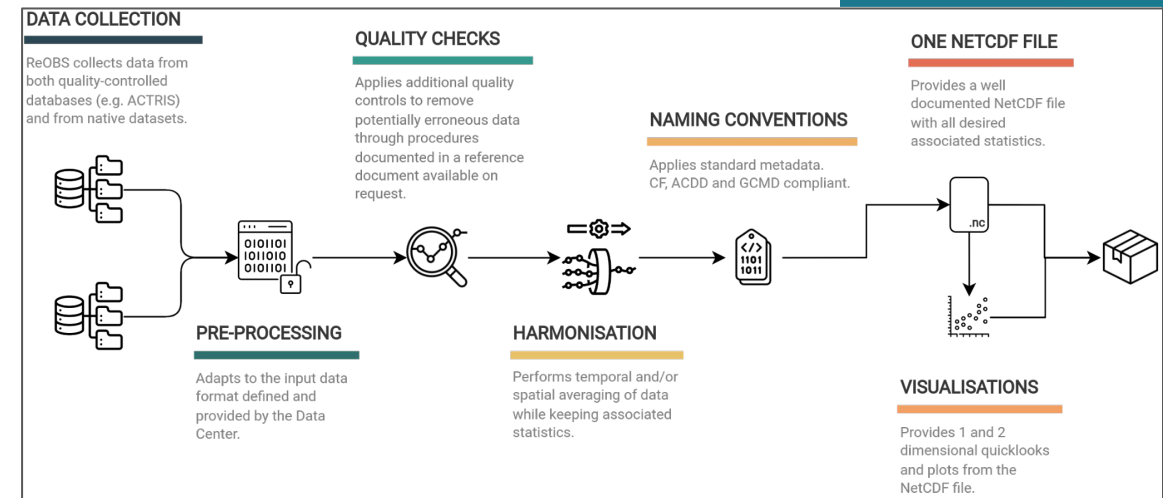
2 levels of assessment

- **Data Availability**
  - NFs' files uploaded to Cloudnet
  - check if minimum of data coverage
  - Information provided by CLU (now available)

- **Data Quality**
  - Use of ReOBS tool (Chiriaco et al., 2018) to synthetize all products into a single .nc with temporal resolution 1h and same vertical grid
  - Additional QCs are used (generally more restrictive flags/status associated with initial products)

2) Current methodology (version 1)

Data Availability (Cloudnet)

Based on data coverage (%) provided by the CLU:

- A predefined sampling interval is expected, e.g., at least one measurement every 30 seconds.

- The full day is divided into fixed-length time bins (e.g., 30 s), and the ratio of non-empty bins to total bins is computed.

- The expected sampling resolution depends on the instrument type:
  - Radar and lidar: 30-second bins
  - Disdrometer: 1-minute bins
  - Weather station: 10-minute bins

- Daily data coverage is then retrieved, and a monthly average is computed for each product.

Data Quality (ReOBS)

- A set of core variables is defined for each product (e.g., reflectivity and Doppler velocity for radar).

- For each hourly time step, the presence of at least one valid value across relevant dimensions (e.g., height, velocity, diameter) is checked.

- If at least one valid value is found, the time step is considered valid.

- The ratio of valid hourly time steps over the total is computed, yielding a daily percentage of potentially valid quality data.

- A monthly average is then calculated, following the same approach as for availability.
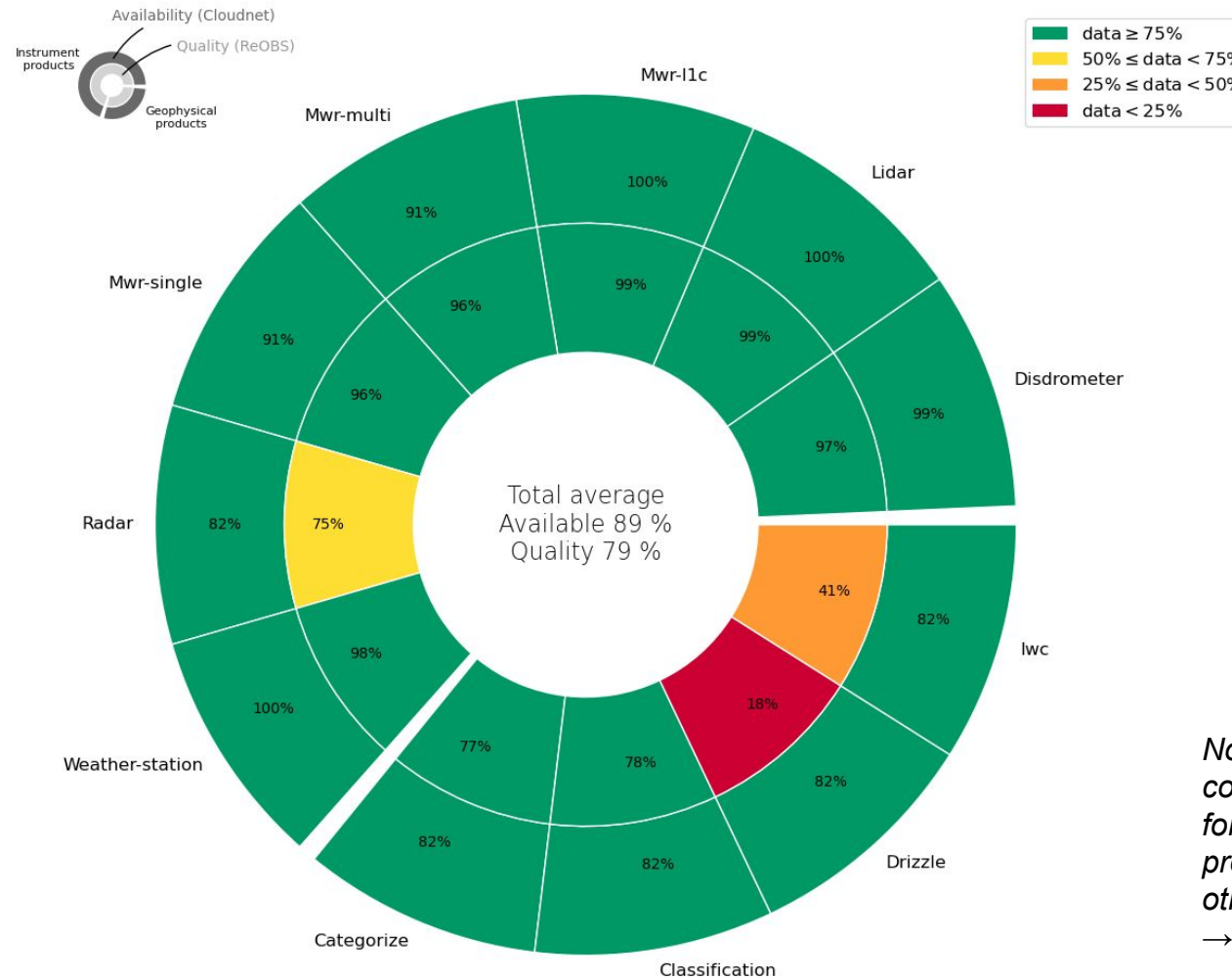
2) List of Evaluated Products

Instrumental Products	Geophysical Products
Disdrometer	Categorize
Lidar	Classification
MWR - L1c (brightness temp.)	Drizzle
MWR - Single pointing	IWC
MWR - Multi pointing	
Radar	
Weather Station	

Note: Doppler Lidar, Ice/Droplet effective radius products are not yet considered (v1)

2) Preliminary results for CCRES evaluation

Palaiseau (48.717°N, 2.209°E, 156m)
From 2023-04-01 to 2025-02-28

Legend:
- data ≥ 75%
- 50% ≤ data < 75%
- 25% ≤ data < 50%
- data < 25%

Total average
Available 89 %
Quality 79 %

Note: ReOBS quality controls are likely too strict for the Drizzle and IWC products (same results for other NFs)
→ need to be adjusted

2) Preliminary results for CCRES evaluation

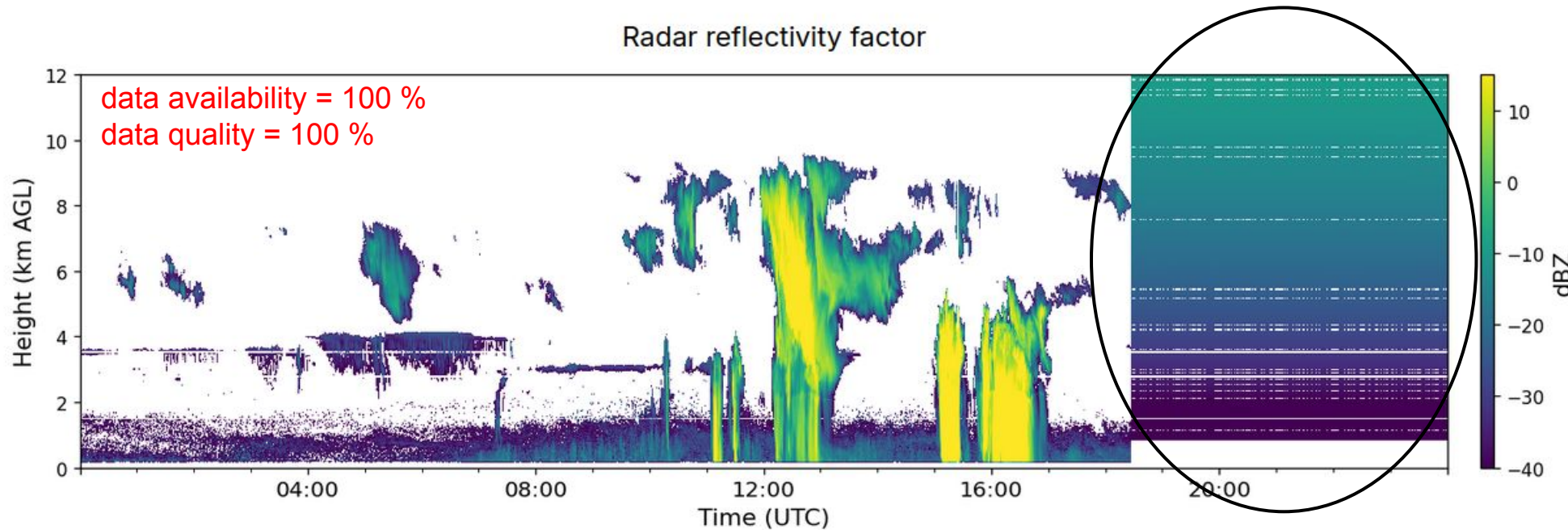| Station	Total data availability (Cloudnet)	Total data quality (ReOBS)	Potential validation
Bucharest (ROM)	83 %	68 %	✅
Juelich (GER)	91 %	85 %	✅
Lindenberg (GER)	96 %	83 %	✅
Palaiseau (FRA)	89 %	79 %	✅

For the step 1b evaluation, which metric will be considered: data availability ? or both data availability and quality ?

→ To be defined by CCRES

→ Probably both

2) Some limitations of version 1

- **Some products are currently missing (IER, DER, LWC, …)**

- **About "*number of hourly time steps with at least one valid data point*"**
    - For a product with 5 variables, if only 1 is valid and the other 4 are not, all 5 are still considered valid
    - Maybe we should define a subset of "super-core" variables that must be valid by default ?

- **Currently, we do not yet account for periods when instruments are under maintenance (i.e., no data available)**
    - There is a need for a shared ACTRIS-CLU tool (like a logbook?) where NFs could report such information → very difficult to reconstruct the full history when you're not on-site
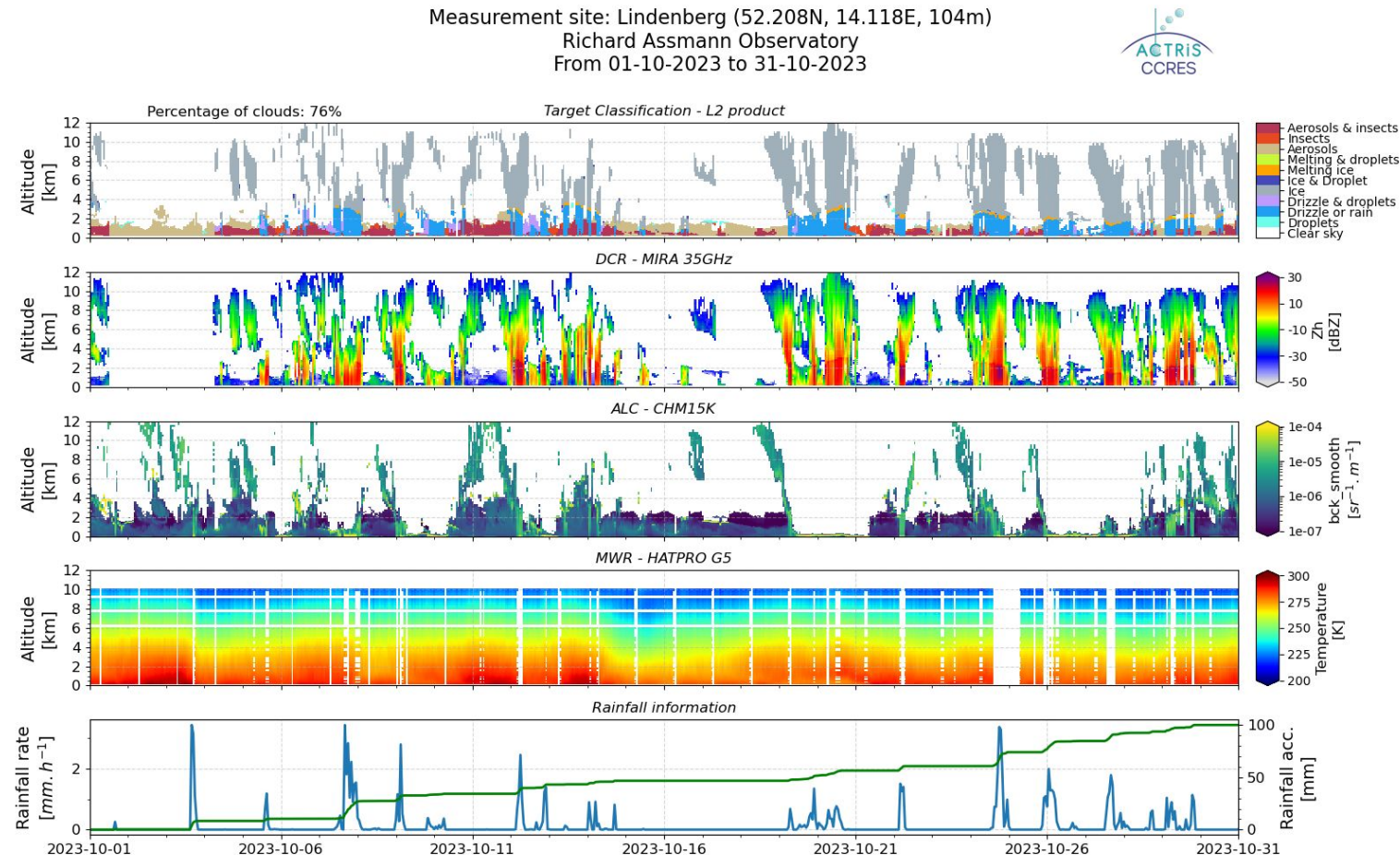
2) Some limitations of version 1

Radar reflectivity factor

data availability = 100 %
data quality = 100 %

- **Some bad data or problematic periods are sometimes not filtered out**
  - Yet the data still have a "geophysical" meaning, and are included in data availability and data quality (even with ReOBS QC)

    ▪ Potential solutions:
      - The NF can resubmit cleaned data
      - Additional quality control could be considered/developed with ReOBS (e.g., mean profile variability over a given period; …)

3) Monthly report: added scientific value of step 1B compliance/labelling analysis

Make use of ReOBS files to perform statistical analyses of cloud properties for each NF

Overview & statistics on the past month

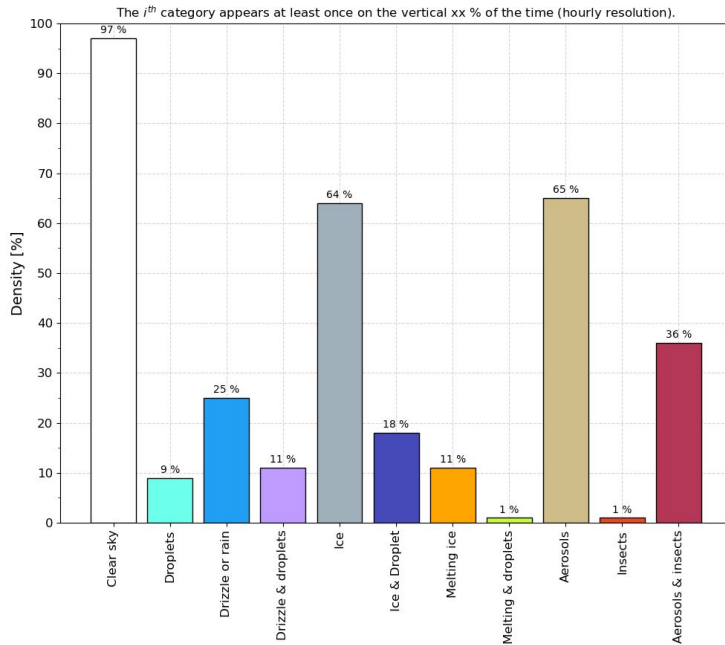*Should be updated soon on ccres website*

Measurement site: Lindenberg (52.208N, 14.118E, 104m)
Richard Assmann Observatory
From 01-10-2023 to 31-10-2023

3) Monthly report: added scientific value of step 1B compliance/labelling analysis

Make use of ReOBS files to perform statistical analyses of cloud properties for each NF

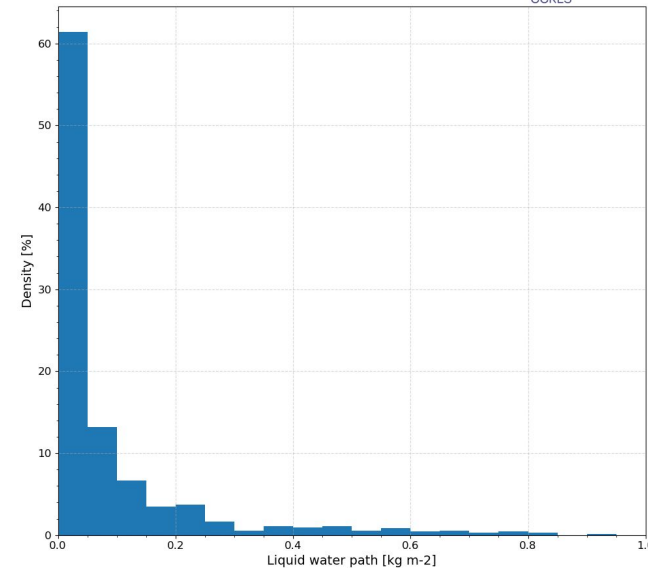Overview & statistics on the past month

Target classification overview

LWP distribution from MWR

Could be generated for all 1D variables

Reflectivity CFAD from DCR

Could be generated for all 2D variables

Conclusions & Perspectives

Step 1b assessment

- A first version was developed jointly with the CLU services
- Version 1 of the algorithm was applied to 4 stations, covering the full 2-year period
- All stations appear to meet the step 1b criteria (preliminary results)
- Some limitations of the v1 algorithm are identified → a more robust v2 is needed
- These results should be made available on the CCRES webpage

Monthly reports

- Make use of ReOBS files to perform statistical analyses of cloud properties for each NF
- An automated algorithm is needed to generate monthly ReOBS files and derive Monthly Reports
- Once validated, ReOBS files should be shared with the CLU for broader distribution (a DOI will also be required)
- Should include HKD analysis

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Thank you !

CCRES/CLU Spring Workshop, online, 19-20 May 2025