



UNIVERSITY
OF COLOGNE

ACTRIS CCRES

**Microwave Radiometer operational
services**

MWR data processing and monitoring

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CCRES/CLU Workshop, Matera – November 7th, 2024

News concerning processing

- Output from processing software **MWRpy**¹ is used for Cloudnet products
- **Stability indices** can be derived (requires *STA*.ret* retrieval file from RPG); products are not tested yet
- Spectral consistency check possible for **off-zenith** observations
 - **INS*.ret** retrieval files are derived for instrument characteristics and preferred over *SPC*.ret*
- Faster processing due to optimizations by CLU

¹ Marke et al., (2024). MWRpy: A Python package for processing microwave radiometer data. Journal of Open Source Software, 9(98), 6733, <https://doi.org/10.21105/joss.06733>



Location

Select

Show all sites

Date

Current year Last 30 days Today

2024-10-22

Show date range

Product

MWR single pointing x

Show experimental products

Instrument model

Select

Specific instrument

Select

View in visualization search →

[Reset filter](#)

Results

Found 17 results

volatile

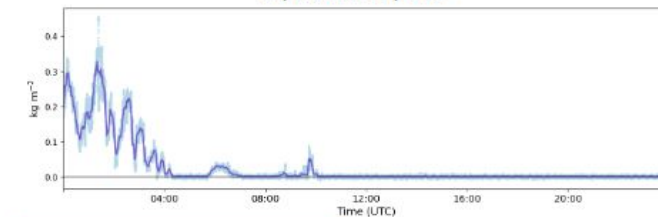
Data object	Date
MWR single pointing from Bucharest	2024-10-22
MWR single pointing from Cabauw	2024-10-22
MWR single pointing from Cabauw	2024-10-22
MWR single pointing from Chilbolton	2024-10-22
MWR single pointing from Galați	2024-10-22
MWR single pointing from Hyytiälä	2024-10-22
MWR single pointing from Jülich	2024-10-22
MWR single pointing from Lampedusa	2024-10-22
MWR single pointing from Leipzig	2024-10-22
MWR single pointing from Limassol	2024-10-22
MWR single pointing from Lindenberg	2024-10-22
MWR single pointing from Mindelo	2024-10-22
MWR single pointing from Munich	2024-10-22
MWR single pointing from Ny-Ålesund	2024-10-22
MWR single pointing from Palaiseau	2024-10-22

Download all
17 files (1.8 GB)

MWR single pointing from Palaiseau

22 October 2024

Liquid water path



Download Details →

Instrument **IPSL HATPRO-G5**
 Location **Palaiseau, France**
 Date **2024-10-22**
 Size **115.3 MB**
 Last modified **2024-10-23 00:30:09 UTC**
 Quality check **Some info, see report.**



Quality Control

Quality flags (per channel) derived for Level 1 data (also provided in product files)

- Contains checks of TB values, system parameters, and spectral consistency



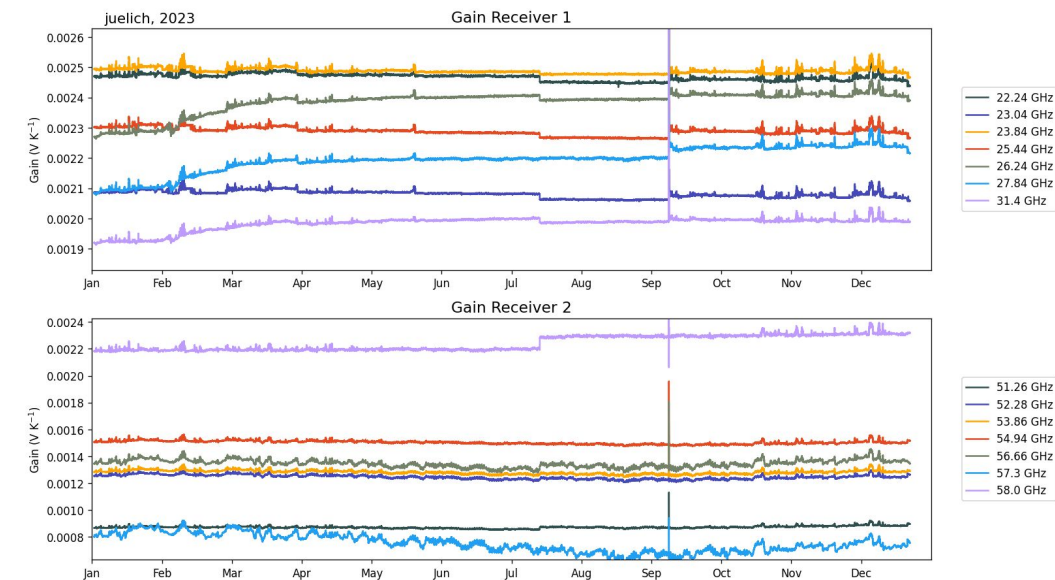
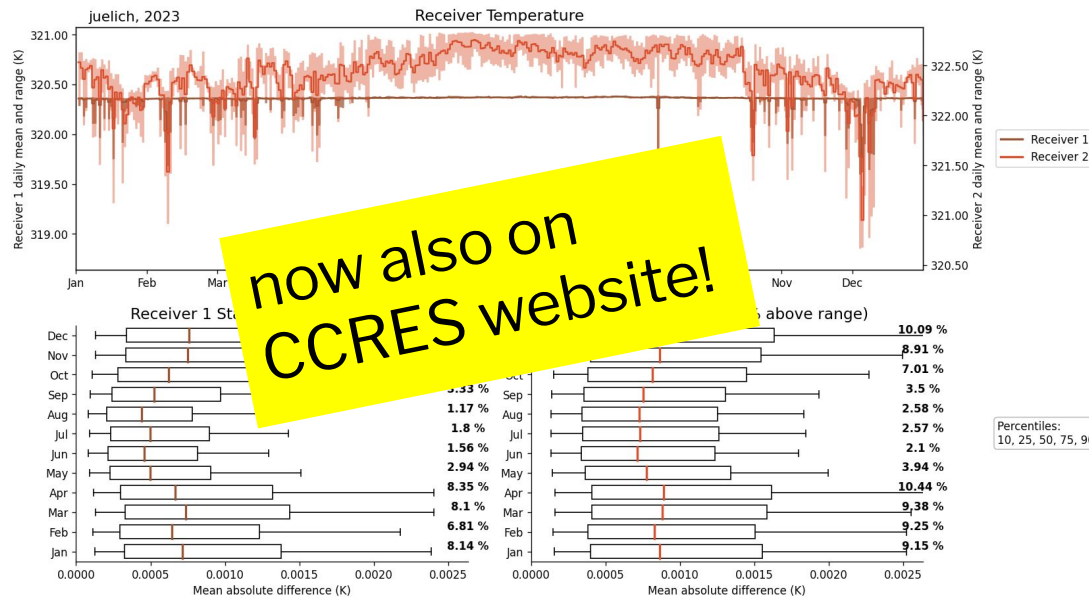
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Long term quality assessment

- Checks availability / quality of data and whether SOPs are being followed
- Detection of malfunction possible in operational use
- Statistical analysis and reports are planned in ReOBS (labelling step 1b)



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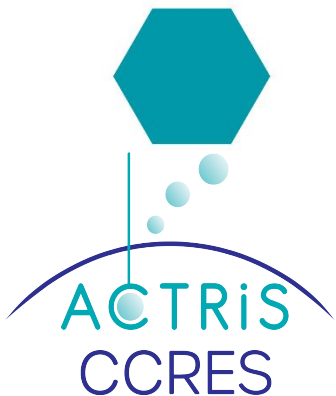
- Contains checks of TB values, system parameters, and spectral consistency

Long term quality assessment

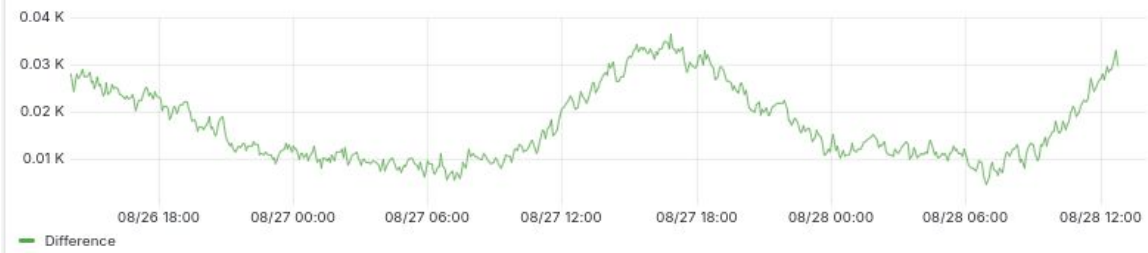
- Checks availability / quality of data and whether SOPs are being followed
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Centralized housekeeping data (HKD) monitoring

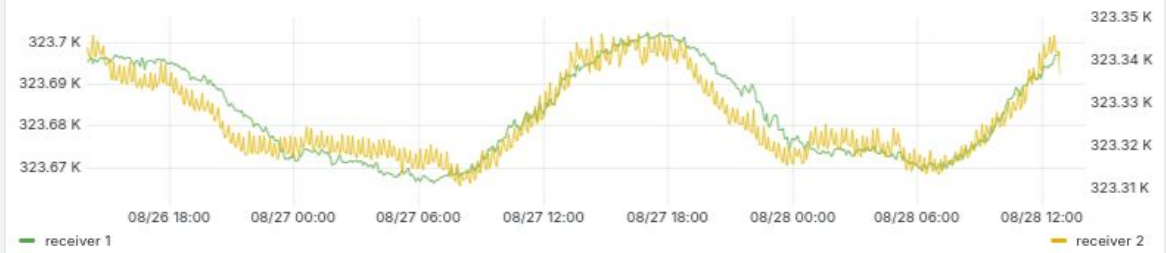
- Synchronizes HKD data with CCRES data center
- Includes instrument type specific thresholds and alert settings
- Helps operator to take action and increase uptime of instruments



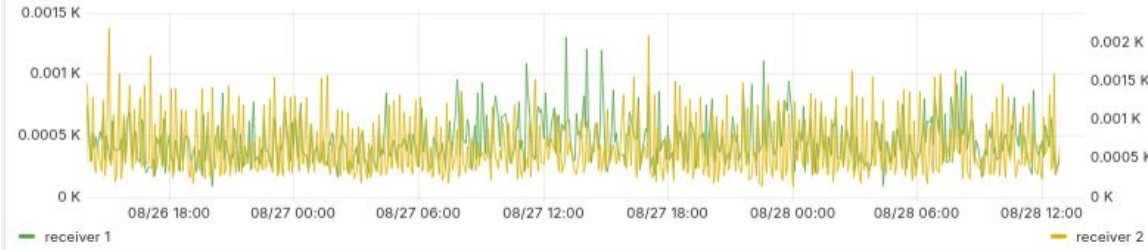
Temperature of ambient target



Temperature of receivers



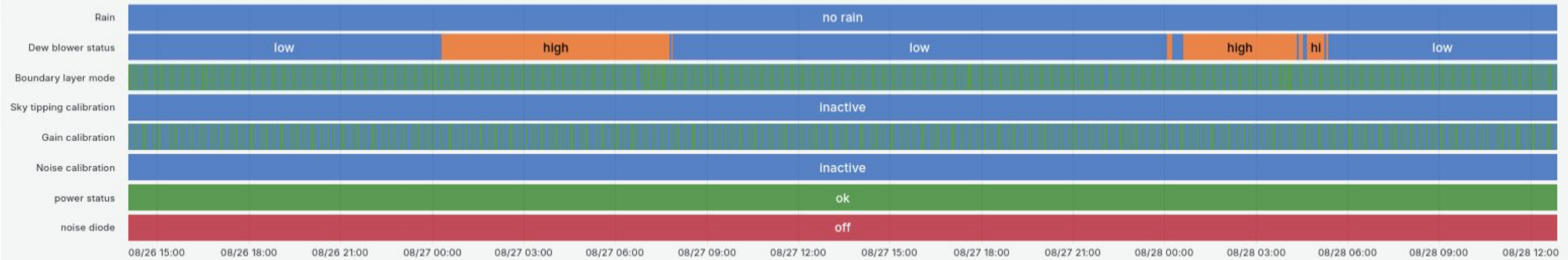
Temperature stability of receiver



Remaining flash memory



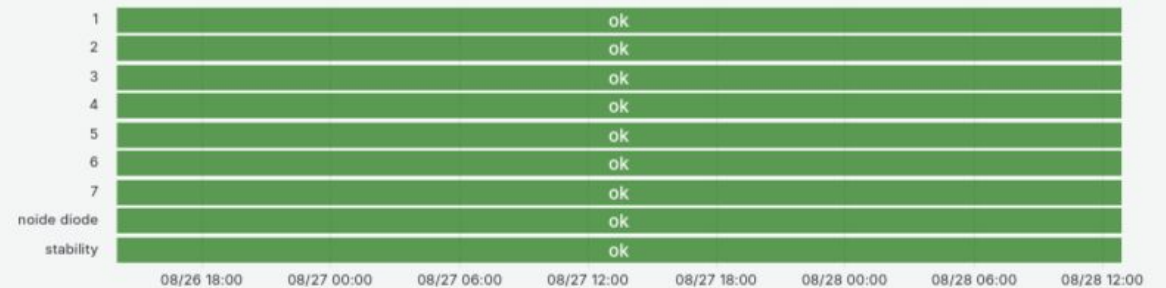
status



Status of receiver 1

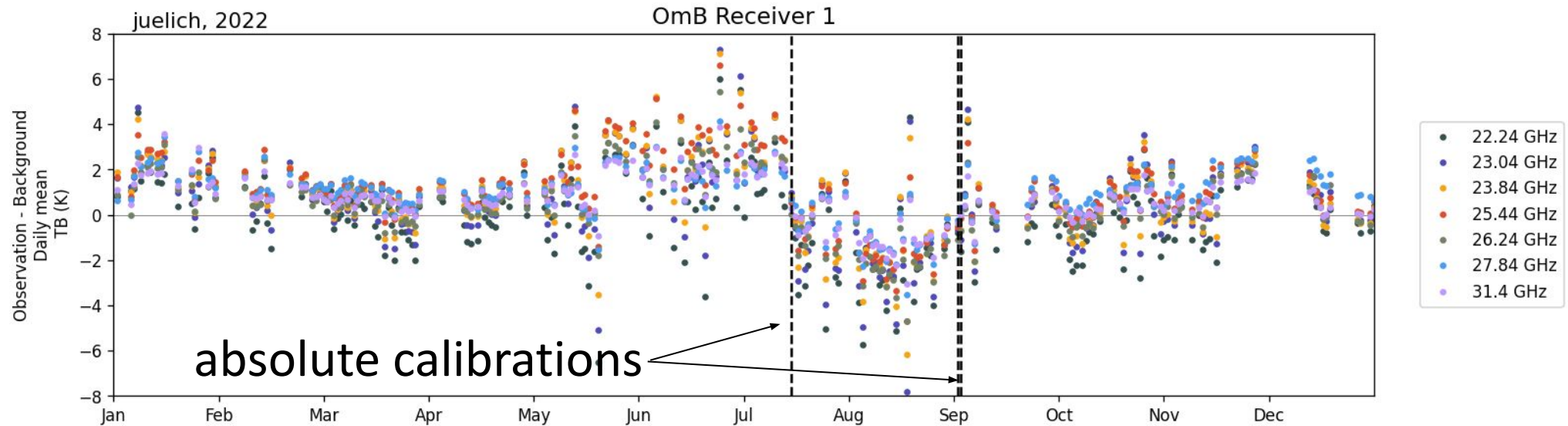


Status of receiver 2



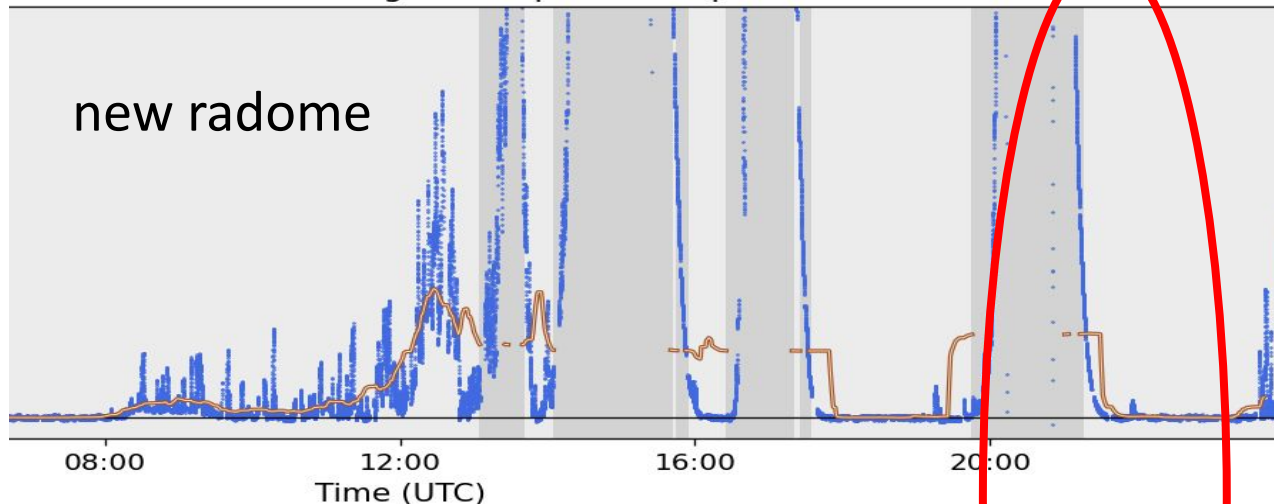
Observation minus Background (O-B) Monitoring of TB

- **Idea:** Identify faulty calibrations or larger drifts/jumps in brightness temperatures
- **Method:** Simulate TB using radiative transfer with a “background” (radiosonde, model), during liquid water cloud free scenes, and compare to observations
- **Difficulties:** Attribution of differences due to uncertainties (model, radiative transfer, etc); small drifts are likely within expected O-B spread

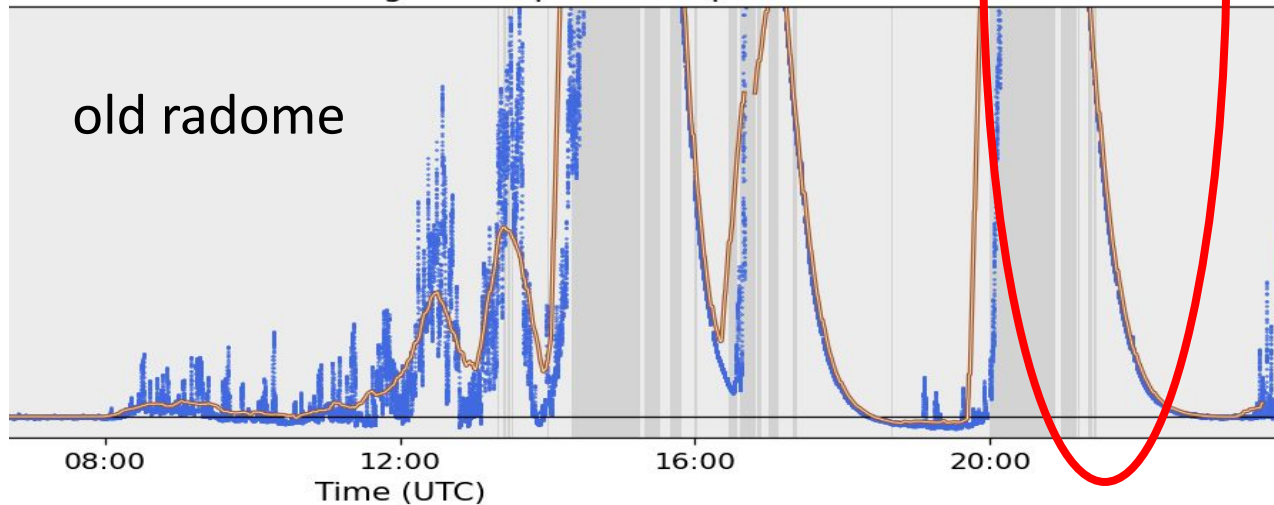


Radome Monitoring

Retrieved column-integrated liquid water path



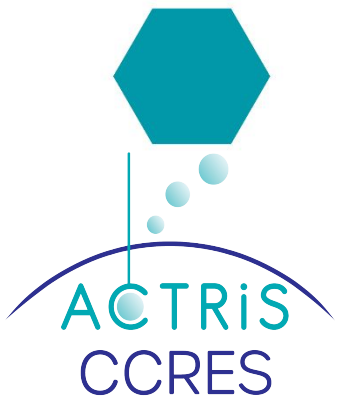
Retrieved column-integrated liquid water path



- Work is done in collaboration with DWD
- **Idea:** evaluate “time-to-dry” of radome after rain events
- Uses spectral consistency retrieval (comparison of retrieved and observed TBs)
- Helps with instrument **maintenance** (radome change)

Retrieval Development - ACTRIS

- **Goal:** derive homogeneous data streams focused on clouds/water cycle and retrieve quantities with a high temporal resolution (for atmospheric variability):
 - **Statistical retrieval** method (Neural Network including auxiliary information)
 - Retrieval training with **ERA5 climatology** (comparison with radiosondes)
 - Rosenkranz 2024 absorption model for radiative transfer
 - MWR + IRT **synergy retrieval** for LWP
 - Include **89 GHz channel** of cloud radar / LHUMPRO for improvements in LWP retrieval



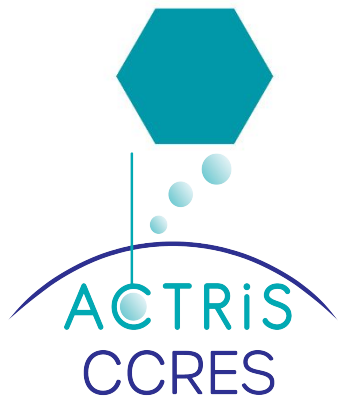
Retrieval Development - E-Profile

Collaboration for a better cross network compatibility

- Enables stations to participate in both networks
- Similar file types and data format (including metadata, quality flags)
- Common SOP (with minimum requirements of both networks), including:
 - Calibration procedures and intervals
 - Scanning strategy

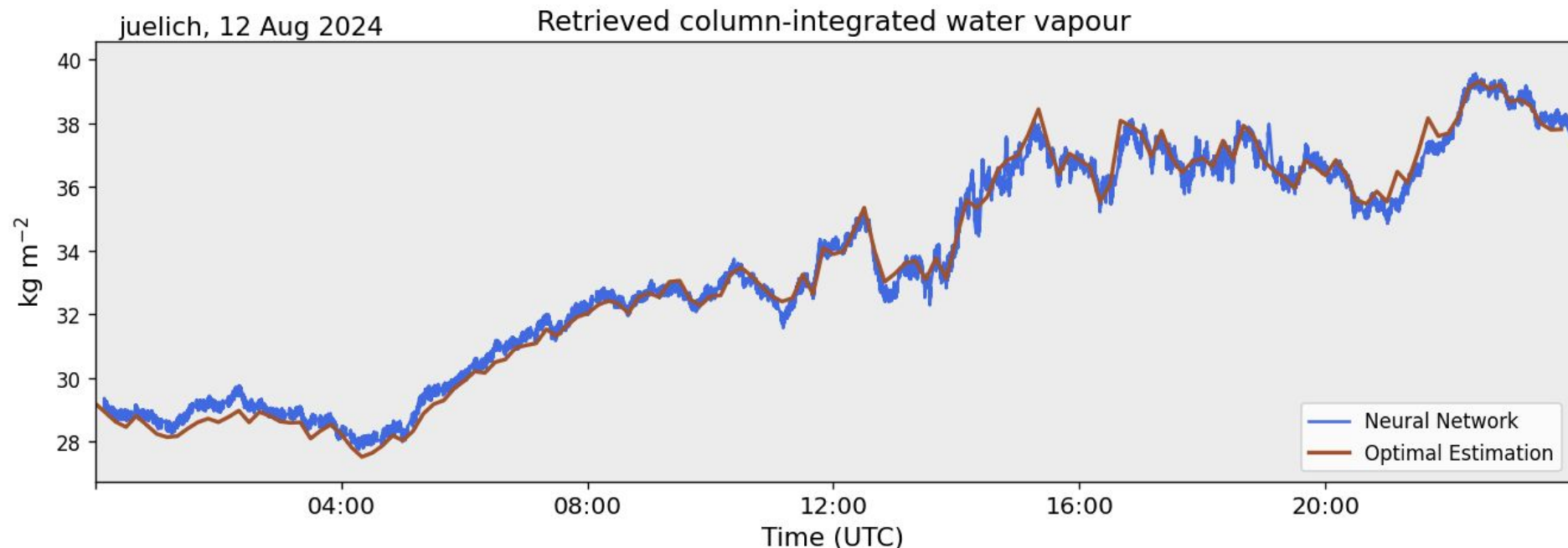
Differences in generating products (retrieval method)

- Focus: nowcasting and data assimilation into weather forecast models
- Physical retrieval approach: TROPoe (optimal estimation)
- Lower temporal resolution (10 min)



Retrieval Development - Comparison

- PANAME (PARis region urbaN Atmospheric observations and models for Multidisciplinary rEsearch) campaign is used as **testbed**
- Comparison of statistical and physical retrievals at different sites



Summary and Outlook

- MWRpy is operationally used in the Cloudnet processing chain
- Methods for long term quality assessment in development
 - Collaboration with IPSL (Jean-François) to generate statistics/reports in ReOBS for labelling step 1b
- Retrieval development is starting and will benefit from inter-comparison exercises
- MWR expert meeting planned
- Contact: actris-ccres-mwr@uni-koeln.de (Tobias Marke, Bernhard Pospichal)



Thank you