

ACTRIS
CCRES

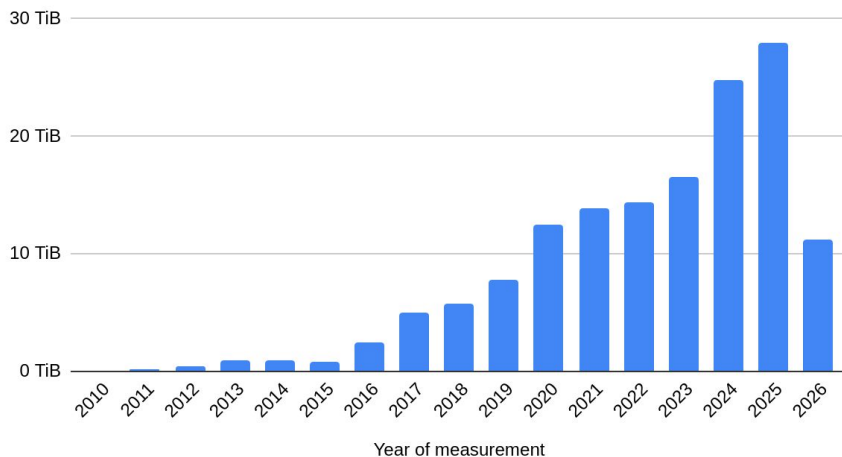
New developments at CLU

Simo Tukiainen, Tuomas Siipola,
Niko Leskinen, Ewan O'Connor

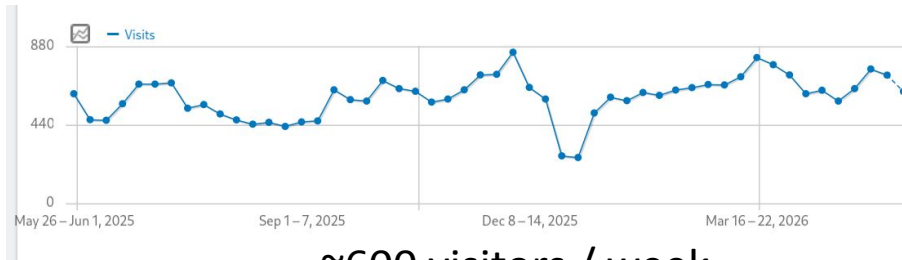
Finnish Meteorological Institute

CCRES/CLU Spring Workshop, online, 1st and 2d of June 2026

Cloudnet statistics

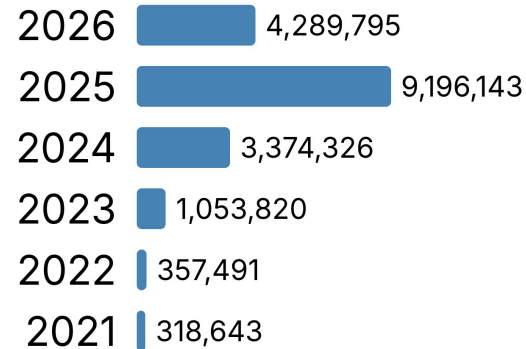


145 TB raw data

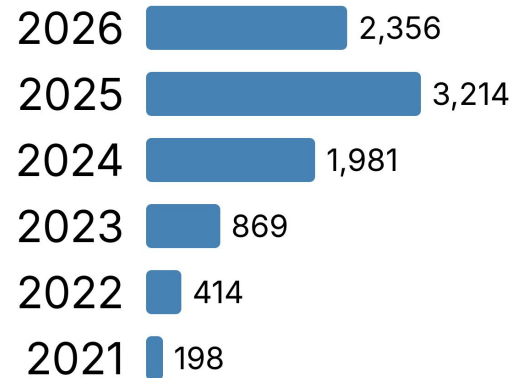


~600 visitors / week

Year Downloads

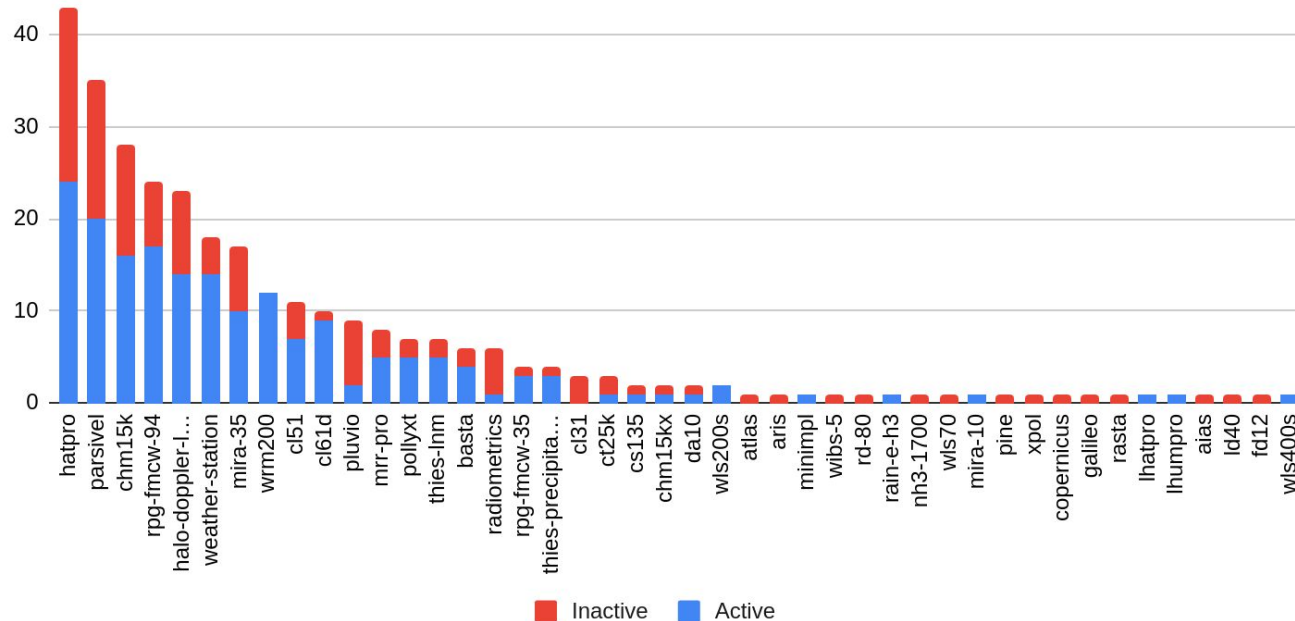


Year Unique IPs



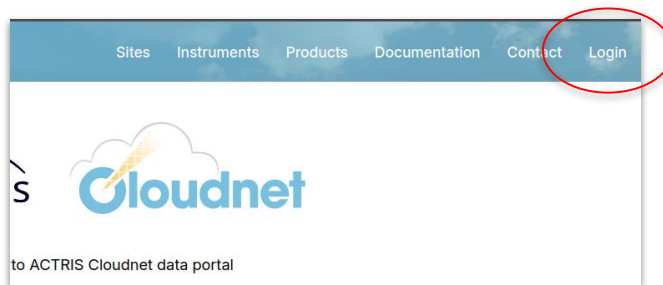
Cloudnet instrument PIDs

- 305 registered instruments (183 active 123 inactive)
- Instrument PID is a crucial part of processing workflow



Authentication and permissions

- Login options:
 - ORCID
 - username / password



- Permissions:
 - Log in
 - Submit data
 - Write logs
 - Read logs
 - Read stats
 - Admin stuff
 - ...

<https://cloudnet.fmi.fi/login>

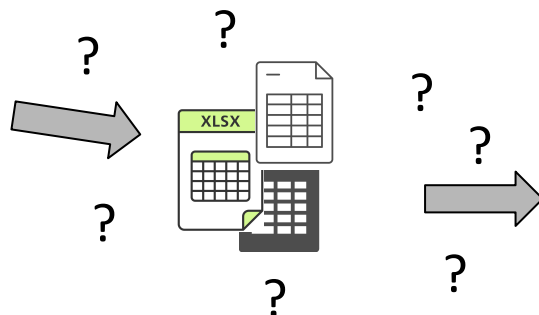
Instrument logbook



GUI/API



- Installation / removal
- Calibration
- Maintenance
- Malfunction
- Note
- Check
- ...



CCRES

Cloudnet logbook GUI

DWD MIRA-35
METEK MIRA-35 cloud radar

[Overview](#) [Raw files](#) [Calibration](#) [Contacts](#) [Logbook](#)

Instrument

PID https://hdl.handle.net/2112132/3_d6cc3d73f9dd4d4b

Owner German Meteorological Service (DWD)

Model METEK MIRA-35

Type Doppler non-scanning cloud radar

Locations

2007-01-01 – now Lindenberg

1. Log in
2. Make sure you have permissions

Add logbook entry

Event type

Detail

Date and time (UTC)
2026-05-28 -- : -- Now

[+ Add end date](#)

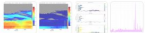

Notes (optional)

Images (optional, max 5)
 No files selected.



DWD MIRA-35
METEK MIRA-35 cloud radar

[Overview](#) [Raw files](#) [Calibration](#) [Contacts](#) [Logbook](#)

Date (UTC) ▼	Event type	Result	Notes	Added by
2026-03-25	Note	-	same as on 24 March between 12 and 16 UTC	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-03-24	Note	-	Due to a bug in the spectrum processing software (spectrenprocessing), processing was interrupted several times between 10 and 16 UTC. The error occurred in connection with drone flights taking place in the immediate vicinity. These caused unusually broad Doppler spectra, which led to the programme crashing. The bug was fixed by the manufacturer on 25 March. The Doppler spectra were subsequently reprocessed and uploaded to CLU.	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-03-17 08:30	Note	-	Troubleshooting of a fault with LO1 by Metek (M. Bauer), probable cause: a small foreign object in the SMA connector of the cable running from the synthesiser to LO1 (VCO); measurements interrupted from approximately 08:30 to 15:00 UTC	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-03-16 10:00	Malfunction	-	until 16:00 UTC, insufficient frequency stability of LO1 (error message: pinLOCK_LO1), no or wrong data, details see 12.03.2026	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-03-12 00:01	Malfunction	-	until 13:00 UTC, insufficient frequency stability of LO1 (error message: pinLOCK_LO1), AFC can no longer adjust frequency deviation, no or wrong data 	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-03-11 12:00	Malfunction	-	until 24:00 UTC, insufficient frequency stability of LO1 (error message: pinLOCK_LO1), no or wrong data, details see 12.03.2026	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-02-25 10:30	Note	-	Until 23 UTC, interference signals up to approx. 1200 m altitude due to drone flights in the immediate vicinity at 15 to 45-minute intervals, see figures 	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-02-24 17:00	Malfunction	-	insufficient frequency stability of LO1 (error message: pinLOCK_LO1), no or wrong data, details see 12.03.2026	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-02-23 05:00	Malfunction	-	until 12:00 UTC, insufficient frequency stability of LO1 (error message: pinLOCK_LO1), no or wrong data, details see 12.03.2026	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>
2026-02-22 14:00	Malfunction	-	until 15:00 UTC, insufficient frequency stability of LO1 (error message: pinLOCK_LO1), no or wrong data, details see 12.03.2026	Ulrich Görsdorf <input type="button" value="Edit"/> <input type="button" value="Delete"/>

Cloudnet logbook API

1. Generate access token (valid for 1 month)
2. Use API to import old log entries

API token

Generate an API token for programmatic access to the instrument log API.

Use this token with the `X-Auth-Token` header. It is valid for 30 days. Copy it now — it won't be shown again.

```
c37f04f8fdf80f6999d0d7325bbb74107f15c06c73d4519859e0cfe!
```

Copy Close



```
cloudnet-logbook-import.py
1 """
2 Bulk import old instrument logbook entries via the Cloudnet dataportal API.
3 """
4
5 import requests
6
7 BASE_URL = "https://cloudnet.fmi.fi"
8
9 # Replace with the actual instrument PID for your instrument
10 INSTRUMENT_PID = "https://hdl.handle.net/XXXXXXX"
11
12 # Old entries to import. Dates must be historical.
13 # eventType options: calibration | check | installation | maintenance | malfunction | note | removal
14 # result is only used (and required) for "check" events: "ok" or "Fail"
15 # notes is required when eventType="note", detail="other", or result="Fail"
16 ENTRIES = [
17     {
18         "eventType": "installation",
19         "date": "2020-03-15T09:00",
20         "notes": "Initial installation on rooftop.",
21     },
22     {
23         "eventType": "maintenance",
24         "date": "2021-06-10",
25         "detail": "cleaning",
26         "notes": "Cleaned dust from the instrument.",
27     },
28     {
29         "eventType": "check",
30         "date": "2022-01-20T14:30",
31         "result": "ok",
32     },
33 ]
34
35
36 def post_entry(headers: dict, entry: dict) -> None:
37     payload = {"instrumentPid": INSTRUMENT_PID, **entry}
38     response = requests.post(
39         f"{BASE_URL}/api/instrument-logs", json=payload, headers=headers
40     )
41     if response.ok:
42         data = response.json()
43         print(f"Created entry id={data['id']} {entry['eventType']} {entry['date']}")
44     else:
45         print(f"ERROR {response.status_code}: {response.text} {entry}")
46
47
48 def main():
49     # How to get the token:
50     # 1. Log in to https://cloudnet.fmi.fi
51     # 2. Click your profile icon - "API token" - "Generate"
52     # 3. Copy the token value
53     token = "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
54     headers = {"X-Auth-Token": token}
55
56     print(f"Importing {len(ENTRIES)} entries for instrument {INSTRUMENT_PID}...")
57     for entry in ENTRIES:
58         post_entry(headers, entry)
59     print("Done.")
60
61
62 if __name__ == "__main__":
63     main()
```

<https://gist.github.com/tukiains/984eb41a12af24ee1d00f53830502464>

Cloudnet logbook API

- Permanent access with username / password

➔ CCRES can monitor logs

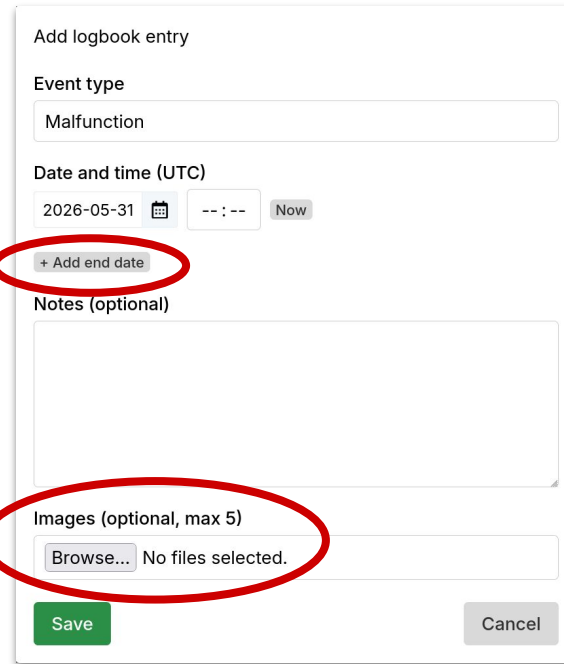
[https://cloudnet.fmi.fi/api/instrument-logs?
instrumentPid=https://hdl.handle.net/21.1
2132/3.70dd09553d13484d](https://cloudnet.fmi.fi/api/instrument-logs?instrumentPid=https://hdl.handle.net/21.12132/3.70dd09553d13484d)



```
0:
  id: 505
  eventType: "check"
  date: "2026-05-18T00:00:00.000Z"
  detail: "Radome condition"
  result: "OK"
  endDate: null
  notes: null
  createdAt: "2026-05-22T12:10:14.235Z"
  updatedAt: null
  instrumentUuid: "70dd0955-3d13-484d-9a03-35fd0e645db0"
  instrumentPid: "https://hdl.handle.net/21.12132/3.70dd09553d13484d"
  images: []
  createdBy:
    id: 83
    username: "krispin-bisek"
    fullName: "Krispin Bisek"
    updatedBy: null
1:
  id: 485
  eventType: "check"
  date: "2026-05-06T00:00:00.000Z"
  detail: "Radome condition"
  result: "OK"
  endDate: null
  notes: null
  createdAt: "2026-05-07T13:31:38.580Z"
  updatedAt: null
  instrumentUuid: "70dd0955-3d13-484d-9a03-35fd0e645db0"
  instrumentPid: "https://hdl.handle.net/21.12132/3.70dd09553d13484d"
  images: []
  createdBy:
    id: 83
    username: "krispin-bisek"
    fullName: "Krispin Bisek"
    updatedBy: null
2:
```

Beta testing so far

- 18 users
- 410 log entries
 - 122 maintenance
 - 83 malfunction
 - 80 check
 - 64 calibration
 - 40 note
 - 26 installation
 - 4 removal
- Based on feedback:
 - Optional time range for all event types
 - Option to add images



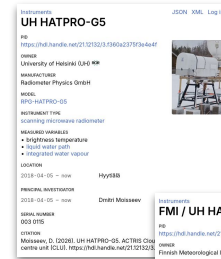
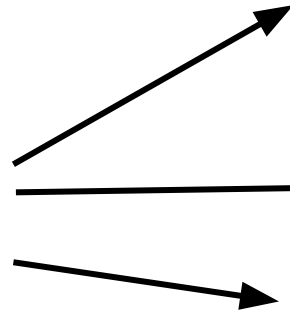
The screenshot shows a web form titled "Add logbook entry". The form contains the following fields and controls:

- Event type:** A dropdown menu with "Malfunction" selected.
- Date and time (UTC):** A date input field showing "2026-05-31" with a calendar icon, a time input field showing "-- : --", and a "Now" button.
- + Add end date:** A button highlighted with a red circle, with an arrow pointing to the "Based on feedback" section of the list.
- Notes (optional):** A large text area.
- Images (optional, max 5):** A section with a "Browse..." button and the text "No files selected.", highlighted with a red circle, with an arrow pointing to the "Option to add images" in the list.
- Save:** A green button at the bottom left.
- Cancel:** A grey button at the bottom right.

Access to logbook?

- Inform CLU which people need access to which instruments

ORCID:
[0000-0002-0651-4622](https://orcid.org/0000-0002-0651-4622)



UH HATPRO-G5

PI: https://hdl.handle.net/21.12132/1.290642/2793-6e4f

owner: University of Helsinki JRC

manufacturer: Radometer Physics GmbH

MODEL: HRP HATPRO-G5

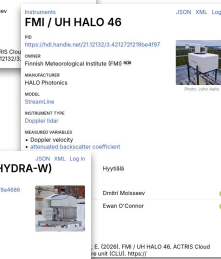
INSTRUMENT TYPE: SCATTERING (Polarization: radometer)

MEASURED VARIABLES:

- Lightscat temperature
- Total scatter gain
- High speed motor vapour

LOCATION: 2018-04-05 - now Hyvinko

PI: Daniel Mäkelä



FMI / UH HALO 46

PI: https://hdl.handle.net/21.12132/1.41272/2278e48f

owner: Finnish Meteorological Institute FMI

manufacturer: HALO Photonics

MODEL: STARS-10

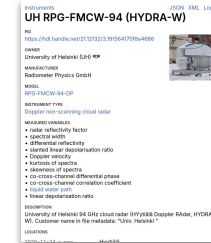
INSTRUMENT TYPE: Doppler radar

MEASURED VARIABLES:

- Doppler velocity
- Attenuated backscatter coefficient

LOCATION: E. QUORE FM / UH HALO 46: ACTRIS Cloudnet unit SCUR: https://

PI: Daniel Mäkelä, Ewan O'Connor



UH RPG-FMCW-94 (HYDRA-W)

PI: https://hdl.handle.net/21.12132/1.395840/701ba895

owner: University of Helsinki JRC

manufacturer: Radometer Physics GmbH

MODEL: HRP FMCW-94-CP

INSTRUMENT TYPE: Doppler non-scattering cloud radar

MEASURED VARIABLES:

- radar reflectivity factor
- specific attenuation
- differential reflectivity
- vertical linear depolarization ratio
- Doppler velocity
- vertical R specific
- skewness of spectra
- co-cross channel correlation coefficient
- bias ratio (dB)
- linear depolarization ratio

LOCATION: University of Helsinki: SE City cloudnet (Hyvinko) Doppler: RKAAR, HYDRA-W: Customer name in the metadata: Terve, Helsinki

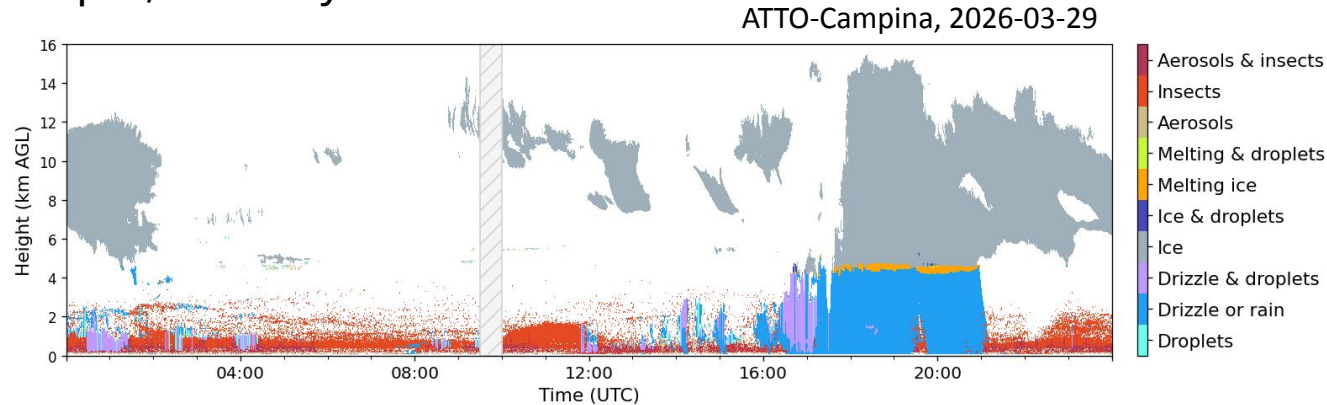
PI: Daniel Mäkelä

actris-cloudnet@fmi.fi

New sites

New Cloudnet sites:

- ATTO-Campina, Brazil
- Melpitz, Germany

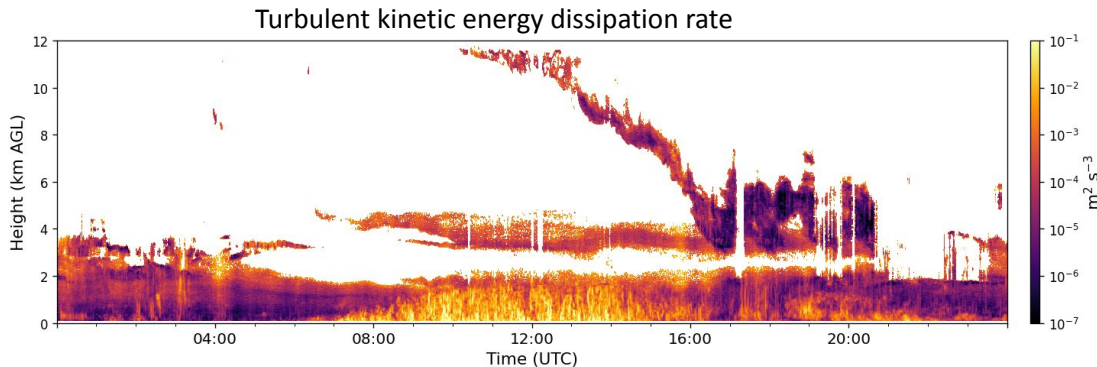


Campaign data from:

- Invercargill, New Zealand
- Tāwhaki, New Zealand
- Falkenberg, Germany

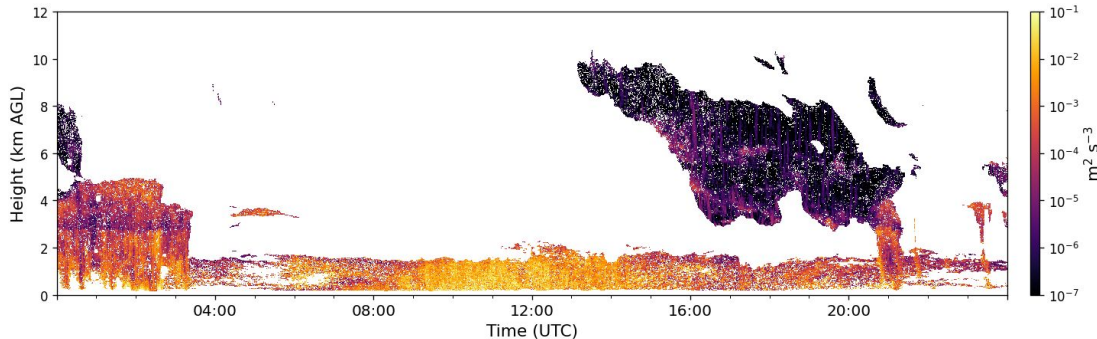
Turbulence products

From
Doppler lidar



Based on:
O'Connor et al.
(2010)

From radar
and model

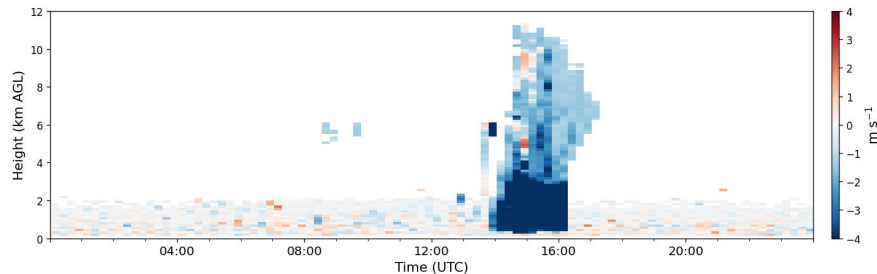


Based on:
Griesche et al.
(2020)

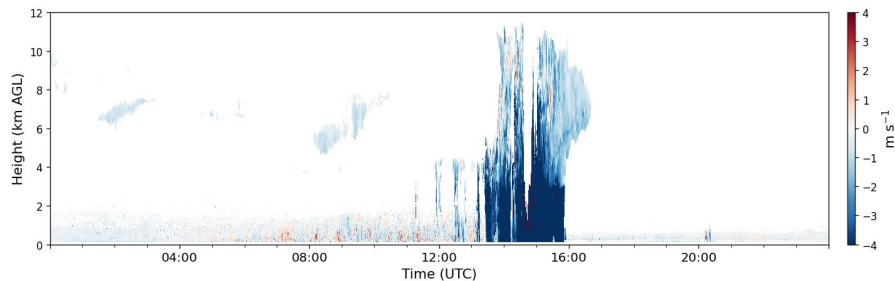
Bucharest, 2025-05-08

Vertical weather radar data

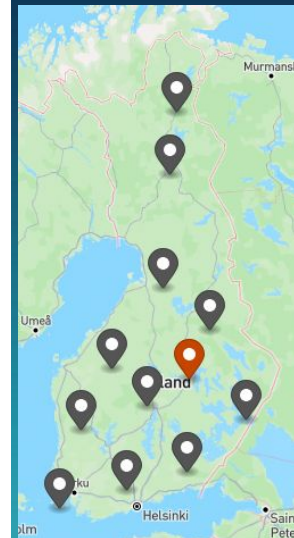
Doppler velocity, 2025-08-01



Vertical-pointing “birdbath scan”
from FMI weather radar (5.6 GHz)
in Kuopio, Finland



MIRA (35 GHz) in Vehmasmäki



Model data

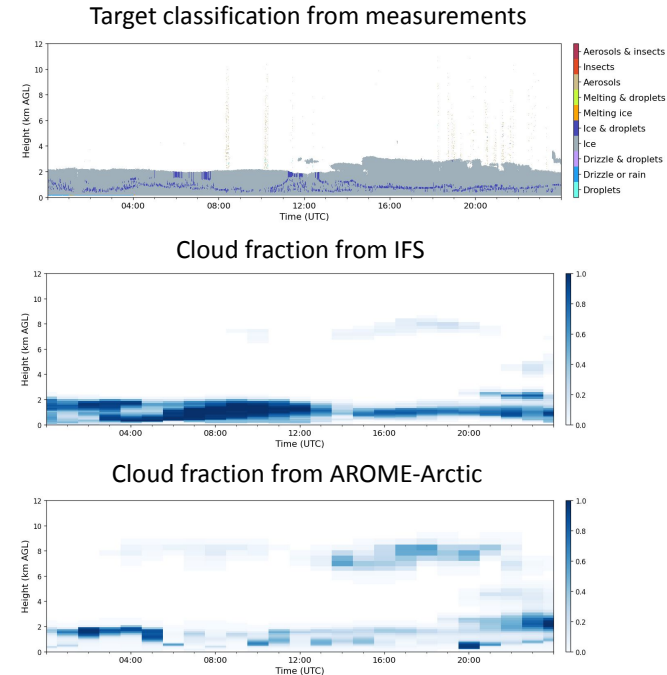
Model data coming to Cloudnet:

- AROME (Météo-France)
- ARPEGE (Météo-France)
- ERA5 (ECMWF)
- ICON-D2 (DWD)
- IFS (ECMWF)
- ...
- AROME-Arctic (MET Norway)
- MEPS (FMI, SHMI, MET Norway)

Different models could be used in processing depending on the site / region.

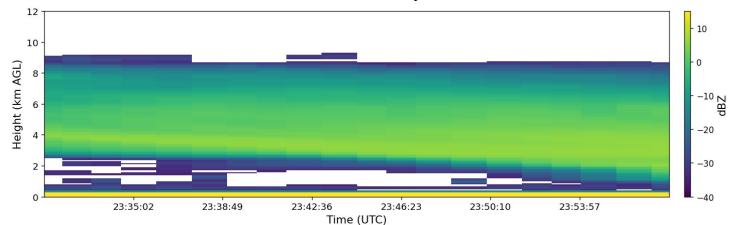
Model evaluation is planned in the future.

Ny-Ålesund, 2026-05-26



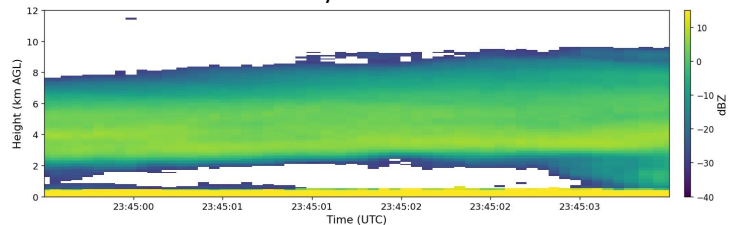
EarthCARE validation products

Simulated radar reflectivity from MIRA-35



→ Experimental simulation, overpass and comparison products (CPR_NOM_1B, CPR_TC_2A) are available in the portal:

Radar reflectivity from EarthCARE CPR

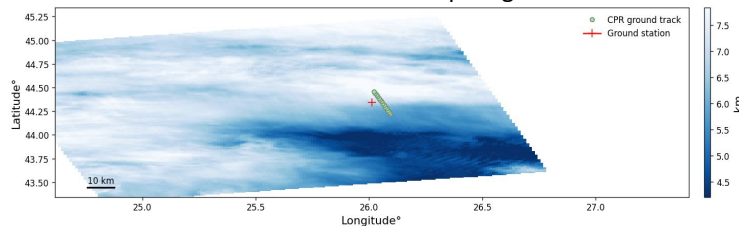


Product

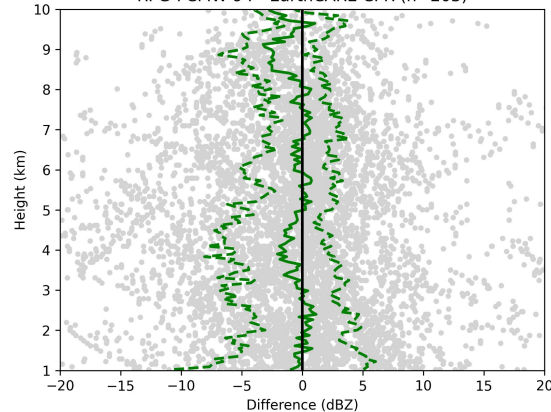
- EarthCARE CPR Level 1 ×
- EarthCARE CPR classific... ×

Show experimental products

EarthCARE MSI cloud top height



RPG-FCMW-94 - EarthCARE CPR (n=203)



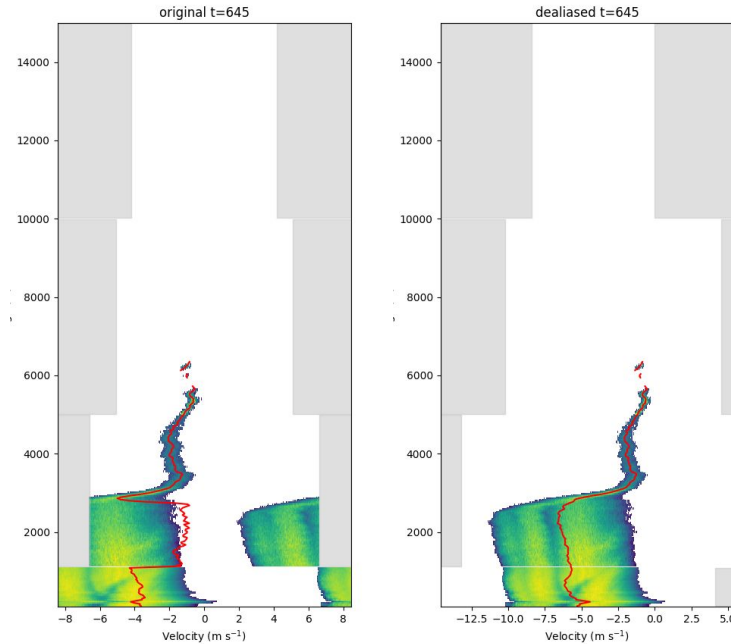
<https://cloudnet.fmi.fi/file/5c5995af-6be8-41c1-9a76-a5e3bf72f6e>

Spectral processing


Processing spectral data from RPG LV0 files not yet in production:

- Reproduction of moment and polarimetric calculations to match RPG LV1 files (mostly understood)
- Velocity unfolding/dealiasing (developing and testing methods)

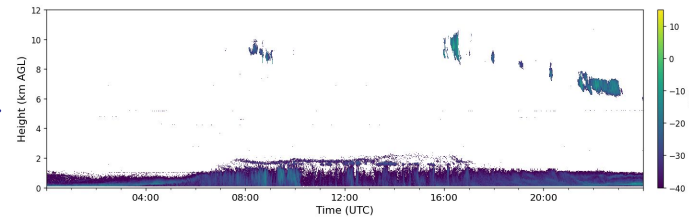
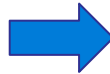
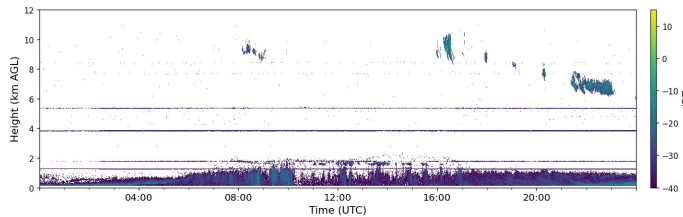
Spectral data from MIRA and BASTA radars in the future?



Small stuff

-  **atmoslib** python library
- Schneefernerhaus MIRA and model height problems fixed
- Rain attenuation based on ITU-R P.838-3
- CloudnetPy CLI improvements
- Improved insect detection using SLDR
- Improved RPG stripe filtering (prevalent in few sites)

Hyytiälä 2025-07-10



About publications

- **Important metrics at FMI**
 - Cloudnet is continuously expanding, increasing overall workload
 - Limited time available for first-author publications
 - We highly value and appreciate all collaborative papers with the community



Thank you !