Communication to Cloud Remote Sensing NFs
June 2024

1. CCRES/CLU Spring Workshop

CCRES and CLU organised an **online workshop on June 11**. Around 50 participants took part in the sessions, enabling interesting sharing of experience among the Cloud Remote Sensing community.

- **Sessions**

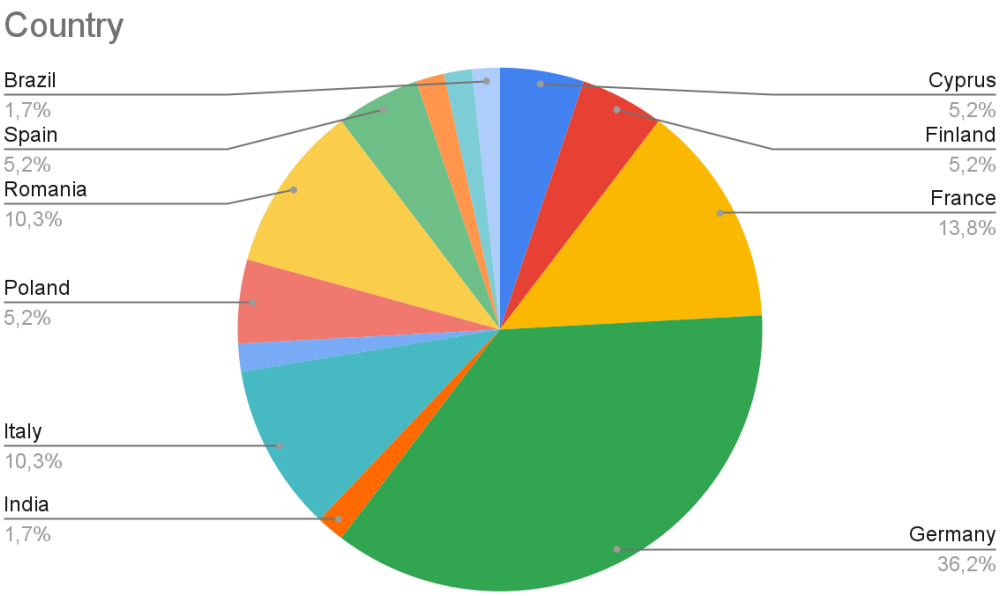
The sessions followed two main axes : the **services developed by CCRES and CLU for ACTRIS National Facilities (NFs)**, and the sharing of **new investigations from the Cloud Remote Sensing community**.

- Regarding the first part, **Doppler Cloud Radar, Microwave Radiometer and Doppler Lidar operational services** were presented by all CCRES Units. CCRES FR also provided updates on **Labelling operational services** implementation, and together with CCRES DE, on **EarthCARE Cal/Val activities**. An overview of latest and planned **developments at CLU** (CloudNet Data Centre) was also discussed.

- Contributions from the CRS community covered a large range of topics : *Parsivel disdrometer calibration evaluation* (S. Kneifel, LMU), *Review of CloudNet observations at the Lindenberg Observatory and future directions to gain Cloudnet data consistency* (C. Knist, MOL-RAO), *Long-term statistics of water vapour and clouds from microwave radiometer observations in Jülich with focus on cloud properties* (B. Pospichal, UCOL), *Cloudnet deficiencies caused by presence targets below first range gate* (H. Griesche, TROPOS), *Techniques for better exploiting cloud radar Doppler spectra* (T. Vogl, Leipzig University) and *A novel approach to cloud classification: first results and challenges encountered* (Matheus da Silva, University of Granada).

Time was left for discussions and feedback collection. In order to improve and better tailor the service provision to the NF needs, CCRES launched a survey to be filled by NF representatives. It is available at this link.

- **Participants**



50 participants representing 10 different countries and 21 stations took part in the workshop.
The following **National Facilities** were represented : AGORA, Cabauw, CIAO, CVAO, JOYCE, KLOCX, Lampedusa, Melpitz, MOL-RAO, München, OPAR, Pallas, Payerne, RADO-Bucharest, RADO-Cluj, RADO-Galati, Rzecin, SIRTA, SMEARII, UNIAQ/CETEMPS, Warsaw.

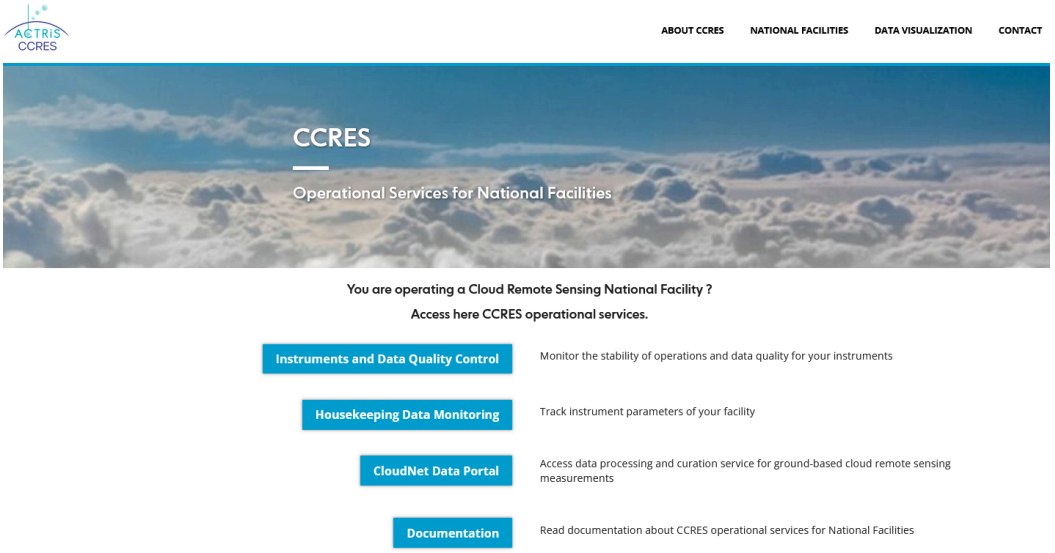
- **Workshop material**

Information on the topics discussed is available here and all presentations can be found at this link and on ACTRIS CCRES website.

2. CCRES Services for NFs

- **CCRES new website for operational services**

A **new website** is being implemented by CCRES to provide a platform for National Facilities to access **operational services**. A beta-version is available for facilities to monitor the stability of operations and data quality, and track instrument parameters of their station, while accessing documentation about CCRES operational services. https://ccres.aeris-data.fr/



General information about CCRES units, services, procedures and news can still be found on the ACTRIS website at this address : https://www.actris.eu/topical-centre/ccres

CloudNet Data portal (https://cloudnet.fmi.fi/) provides access to **all ACTRIS Cloud Remote Sensing data**. It hosts **data processing and curation service** for ground-based cloud remote sensing measurements.

- **Cloud radar calibration**

The **calibration transfer campaign** in Jülich.
With the objective of testing the calibration transfer service of CCRES, the **CCRES-FR reference cloud radar** (94 GHz BASTA) was operated at the JOYCE observatory in Jülich, Germany, next to the local MIRA 35 GHz radar for 3 months (December 2023 - February 2024). Both radars sampled a large number of cloud profiles to be used to transfer the reference calibration to the local radar.

The calibration analysis of CCRES revealed that the JOYCE radar has a mean bias of 0.2 dB with respect to the reference radar, which is negligible when compared to the calibration transfer method uncertainty (0.9 dB; Jorquera et al. 2023). An official calibration report has been written, and a reflection on how to implement re-calibrations within CloudNET products is on-going.

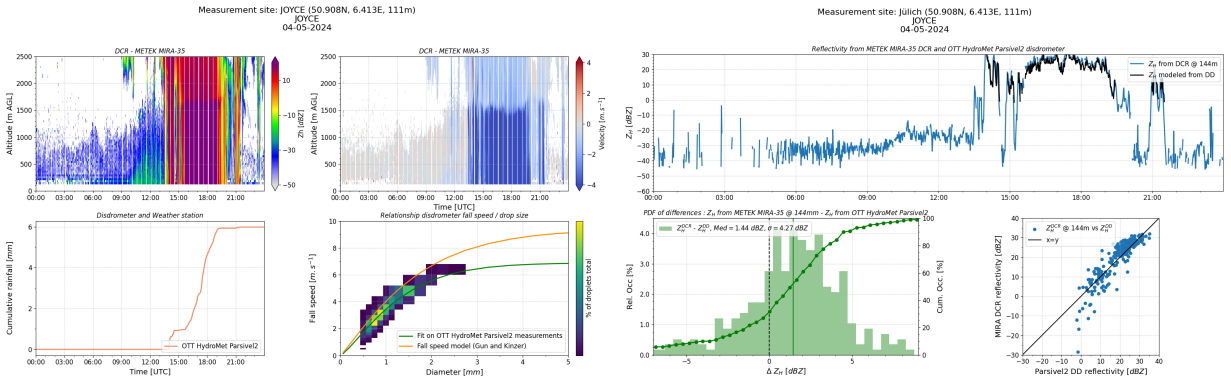
The result has also been validated by calibrating the CCRES reference radar before and after the campaign, where a difference of about 0.2 dB has been found, again well under the experiment uncertainty of 0.8 dB (Toledo et al. 2020). This enables us to affirm that the **reference radar calibration did not change significantly** during the transport to Germany.

Information about the procedure and the time and personnel resources needed were shared during the CCRES workshop of the 11th of June 2024. This information will also be useful for a cost-benefit evaluation of calibration transfer as a service.

From left to right: Reference BASTA-Mini radar from CCRES-FR, Jean-Paul Vinson (LATMOS), Felipe Toledo (CCRES-FR), Lukas Pfitzenmaier (CCRES-DE), Bernhard Pospichal (CCRES-DE) and the JOYCE Observatory MIRA radar.

- **Cloud radar stability monitoring**

A **new method** is being developed by CCRES to **monitor cloud radar stability using rain droplet size distributions measured by disdrometers.** This method is composed of two different parts: one pre-processing program to format and derive reflectivity from disdrometer size distributions, and one processing part to evaluate and compare measured and calculated reflectivities. Part 1 is operational for 7 NF stations: Palaiseau, Hyytiälä, Jülich, Lindenberg, Granada, Rado-Bucharest and Rado-Galati. Daily visualizations are now available on the CCRES-service web page for 2024.



Part 2 is close to being operational and quicklooks of the detected rain events used for the calibration monitoring (with keys to understanding the plotted data) will be available soon on the CCRES webpage. An enhanced version of the processing, that we expect to provide more robust results thanks to the use of weather station data for quality control, is also being implemented.
Next step is to gather the information and results obtained for each identified rain period in order to produce some long-term visualizations (time series, pdf of reflectivity differences) useful for the monitoring of the calibration over time.
A **python code to ensure disdrometer raw data acquisition** is now available online for the NFs that are not yet transferring disdrometer data to the CLU data centre (CloudNet). Please contact *jean-charles.dupont@ipsl.fr* for more information.
Parsivel disdrometer calibration has been evaluated by S. Kneifel (LMU). CCRES units plan to pursue this investigation in collaboration with LMU.

- **Doppler lidar processing**

New **python package doppy** (https://github.com/actris-cloudnet/doppy) for Doppler lidar processing and quality control is now operational and includes support for generating winds from both **Halo Streamline** and **Vaisala (Leosphere) WindCube** long-range instruments, with visualisation at the CLU data centre. New updates include support for the Leosphere WindCube WLS70 model operating at Palaiseau.

- **Housekeeping Data**

A **grafana server** is available at https://ccres.ipsl.fr/grafana/ to monitor the HouseKeeping Data of the ACTRIS CRS NFs instruments. The method to create an account is available at https://ccres.ipsl.fr/docs/.

- A **training session** for stations was organised online on May 7 for Grafana users. More than 20 participants took part in the meeting. The presentation is available here.

- Dashboards have been added to monitor the **RPG HATPRO microwave radiometer housekeeping data, Lufft CHM15k and RPG FMCW 35 and 94**. Dashboards are available for

16 NFs : Bucharest, Cabauw, Galati, Granada ,Hyytiälä, Jülich, Lampedusa, Leipzig, Lindenberg, Mindelo, Munich, Palaiseau, Payerne, Potenza, Rzecin, Warsaw.

3. Labelling process

- **Update on labelling step 1a**

  - **Stations recently entered labelling step 1a**: AGORA (Spain).

  - **Stations in process to enter labelling step 1a :** CIAO Potenza (Italy). Lampedusa (Italy), München (Germany), Pallas (Finland).

  - **Stations to enter the process in 2024 :** Cabauw (Netherlands), RADO-Cluj (Romania), Cape Verde, Payerne (Switzerland), CARO (Cyprus), Chilbolton (UK).

- **NFs instruments**

  - **Reminder for labelling** : One disdrometer (OTT Parsivel2 or Thies LNM for example) is mandatory for the NF labelling.
  - A discussion concerning Weather stations that should be operated at Cloud Remote Sensing NFs will be conducted soon to provide more precise recommendations to CRS NFs (see calendar information below).

  - Update on the **actual state of NFs instruments** : (Operational/*in progress*)

		DCR	MWR	Ceilometer	Doppler Lidar	Disdrometer	Weather Station
Cyprus	**CARO (Limassol)**	*Metek MIRA35*	*Rpg HATPRO G2*	Lufft CHM15k	*Halo Streamline*	*OTT Parsivel2*	
Finland	**Pallas/Kenttärova**	Rpg DCR94		Vaisala CL61	Halo Streamline		Weather station
Finland	**SMEAR II/Hyytiälä**	Rpg DCR94	Rpg HATPRO G5	Vaisala CL61	Halo Streamline	OTT Parsivel2	Weather station
France	**SIRTA**	Latmos BASTA94	Rpg HATPRO G5	Lufft CHM15k	Vaisala WLS70	OTT Parsivel2	Weather station
Germany	**CVAO**	*Metek MIRA35*	Rpg HATPRO G5	PollyXT	Halo Streamline	*OTT Parsivel2*	*Vaisala WXT536*
Germany	**JOYCE**	Metek MIRA35	Rpg HATPRO G5	Lufft CHM15k	Halo Streamline	OTT Parsivel2	*Weather station*
Germany	**MOL-RAO**	Metek MIRA35	Rpg HATPRO G5	Lufft CHM15k	Halo Streamline	Thies LPM	*Weather station*
Germany	**München**	Metek MIRA35	Rpg HATPRO G4	Lufft CHM15k		OTT Parsivel2	Weather station
Ireland	**Mace Head**	*Metek MIRA35*	Rpg HATPRO G5	Lufft CHM15k			
Italy	**CIAO (Potenza)**	Metek MIRA35	Rpg HATPRO G5	Vaisala CL51	Halo Streamline	?	*Vaisala AWS310*
Italy	**Lampedusa**	Metek MIRA35	Rpg HATPRO G5	Lufft CHM15k		Thies LPM	Weather station
Italy	**UNIAQ/CETEMPS**	Rpg DCR94		Vaisala CL51	Vaisala WLS100	Thies LPM	WXT536 (Vaisala)
Netherlands	**Ruisdael Obs./Cabauw**	Rpg DCR94	Rpg HATPRO G5	Lufft CHM15k	Vaisala 200s	OTT Parsivel2	Weather station
Norway	**Ny Alesund**	Rpg DCR94	Rpg HATPRO G2	Vaisala CL51		OTT Parsivel2	
Poland	**Warsaw**		Rpg HATPRO G2		Halo Streamline	OTT Parsivel2	
Romania	**RADO-Bucharest**	Metek MIRA35/RPGDCR94	Rpg HATPRO G5	Lufft CHM15k	Halo Streamline	OTT Parsivel2	Weather station
Romania	**RADO-Cluj**	*Rpg DCR94*	*Rpg HATPRO G5*	*Lufft CHM15k*	*Halo Streamline*	*OTT Parsivel2*	*Theis Clima*
Romania	**RADO-Galati**	Rpg DCR94	Rpg HATPRO	Lufft CHM15k		*OTT Parsivel2*	Weather station
Spain	**Granada**	Rpg DCR94/DCR35	Rpg HATPRO G2	Lufft CHM15k	Halo Streamline	OTT Parsivel2	Campbell CR1000X
Sweden	**NORUNDA**	Rpg DCR94		Vaisala CL51		OTT Parsivel2	
Switzerland	**Payerne(PAY)**		Rpg HATPRO G5	Lufft CHM15k	Vaisala WLS200	*Thies LPM*	
UK	**Chilbolton Obs.**	RAL Copernicus/MIRA?	Rpg HATPRO G5	Vaisala CL51	Halo Streamline	*Thies LPM*	
Poland	**Rzecin**	BASTA94		Lufft CHM15k		*OTT Parsivel2*	
Germany	**Melpitz Research Station**			Lufft CHM15k			Weather station

If your instruments are not listed in this table or if you see an error, please inform Elisa Villard : elisa.villard@ipsl.fr.

- An interactive map showing the stations status and their instruments is also now available on ACTRIS CCRES website.

- **Update on labelling step 1b**

Since early 2023, **7 NFs** have entered the ACTRIS-CCRES 1b certification phase (Bucharest, Galati, Granada, Hyytiala, Juelich, Lindenberg, Palaiseau).

Based on the data processed and stored on Cloudnet data portal, CCRES is using the "**ReOBS reanalysis and QC tool**" to monitor cloud remote sensing data availability and quality for each NF. This evaluation will be presented as monthly reports. They have been presented and discussed at the next CCRES online workshop on June 11, 2024 .

4. Data in CLU

- **Lampedusa** has successfully implemented data transfer for all of their instruments, including for their disdrometer.

- **Rzecin** has successfully implemented data transfer routines for their cloud radar and lidar ceilometer**.**

- Some stations have trialed **sending data from multiple cloud radars**, including Bucharest, Cabauw, Eriswil and Lindenberg.

- Sites sending **disdrometer data**:
    - **Parsivel**^{2} : Bucharest, Cabauw (x2), Eriswil, **Galați**, Granada, Hyytiälä, Jülich, Lampedusa, Leipzig, Lindenberg, Lutjewad, Norunda, Ny Ålesund, Palaiseau, Warsaw
    - **Thies LNM :** Lindenberg, Palaiseau

- Sites sending **Doppler lidar data**:
    - **Halo:** Bucharest, Chilbolton, Eriswil, (Granada), Hyytiälä, Jülich, (Kenttärova), Leipzig, Lindenberg, Mindelo, Neumayer, Potenza, Warsaw
    - **Vaisala:** Payerne, **Palaiseau**

- The data transfer and ingestion of **weather station data**, **rain gauges** and the METEK **micro-rain radar (MRR)** is also being tested:

- **Weather station**: Granada, Hyytiälä, Jülich, Kenttärova, Lindenberg, Palaiseau
- **MRR**: Leipzig LIM, Neumayer

5. Other news

- **EarthCARE Cal/Val campaign**

EarthCARE was successfully **launched on May 29**. Read more about the mission at this link : EarthCARE launched to study role of clouds and aerosols in Earth's climate (European Space Agency)

EarthCARE Satellite Cal/Val activities are ongoing to prepare the campaign.

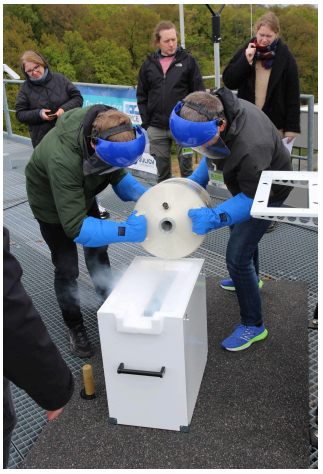
Global information about the campaign is available on the ESA website and updated SOPs are available here.

- **MWR Workshop in Jülich**

A **MWR training workshop** took place in Jülich from 24 to 26 April 2024. The program included :

- Introduction into MWR theory, data processing, software;
- Hands-on training (radome change, calibration);
- Discussions with manufacturer (RPG).

9 participants from 7 countries (of which 6 ACTRIS NF - Cabauw/Delft, Chilbolton, Warsaw, Cluj, Payerne, Bucharest) took part in the workshop.



6. Calendar

- June 23-29 : **Eu Lidar Conference** - Landshut, Germany
- July, 4, 11-12am CEST : **Consultancy session on Weather stations requirements** - Online at this link.
- November 4-8 : The **fall workshop** for the Cloud Remote Sensing community will be organized by CCRES and CLU on November 7, during the **ACTRIS Week 2024** that will take place in Matera, Italy

7. Reference documents

- **Labelling process**

The procedure for labelling is explained further in details in this document presented during our last workshop : **Labelling process**

- **SOPs**

SOPs : At this link, you can find the Standard Operating Procedures for each instrument**.**
SOPs for EarthCARE : At this link, you can find the last version (March 2024) of Standard Operating Procedures related to EarthCARE Cal/Val campaign.

- **Housekeeping data**

The training session on HKD monitoring was organised on May 7, here is the presentation : **Grafana training session**

- **Workshop material**

All CCRES workshops presentations are available here.