EUMETNET OPERA Precipitation composites - current status and future plans

INLINE workshop, 26th -28th May 2026

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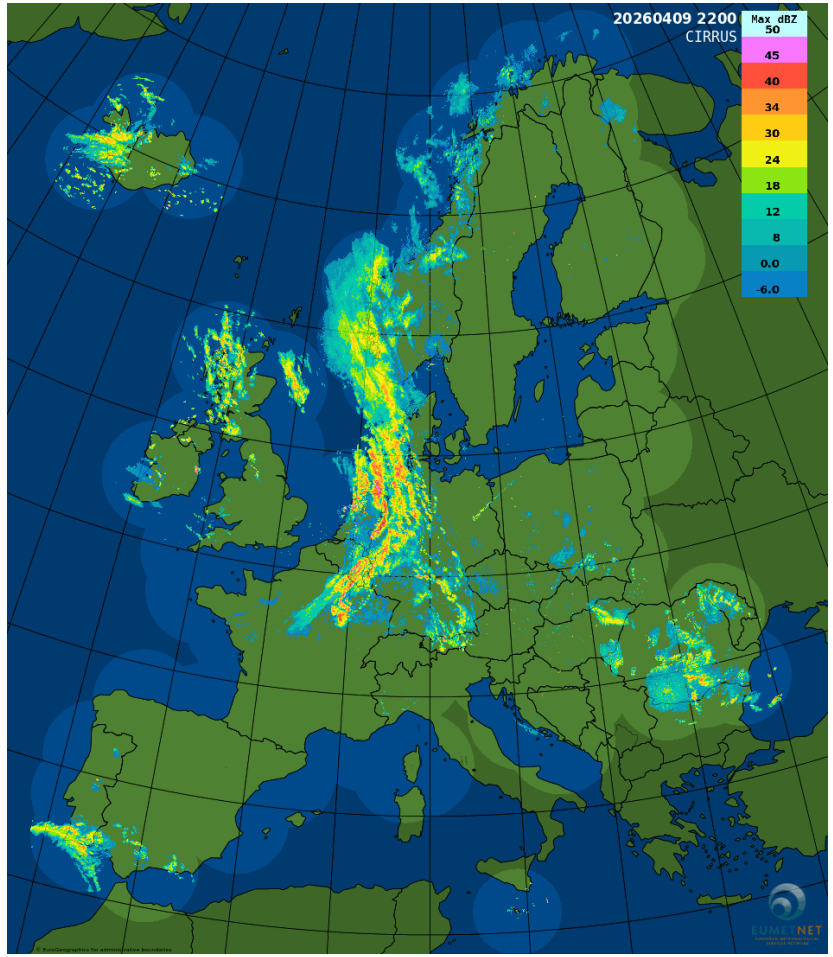
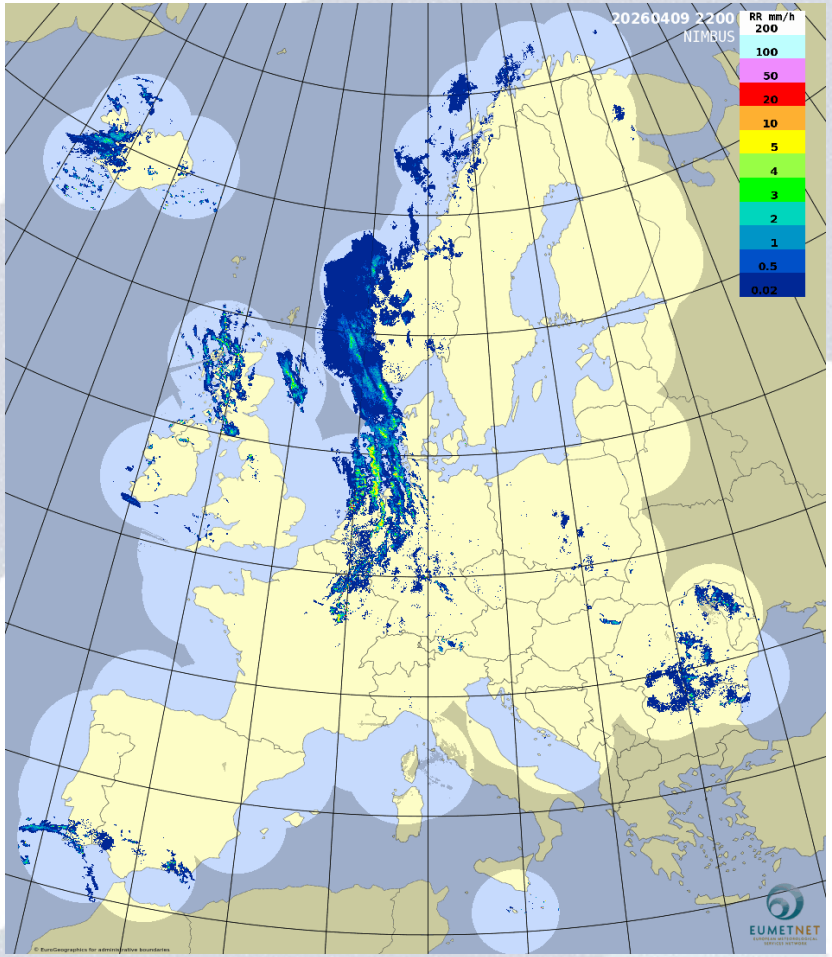
30 YEARS EUMETNET

OPERA composites



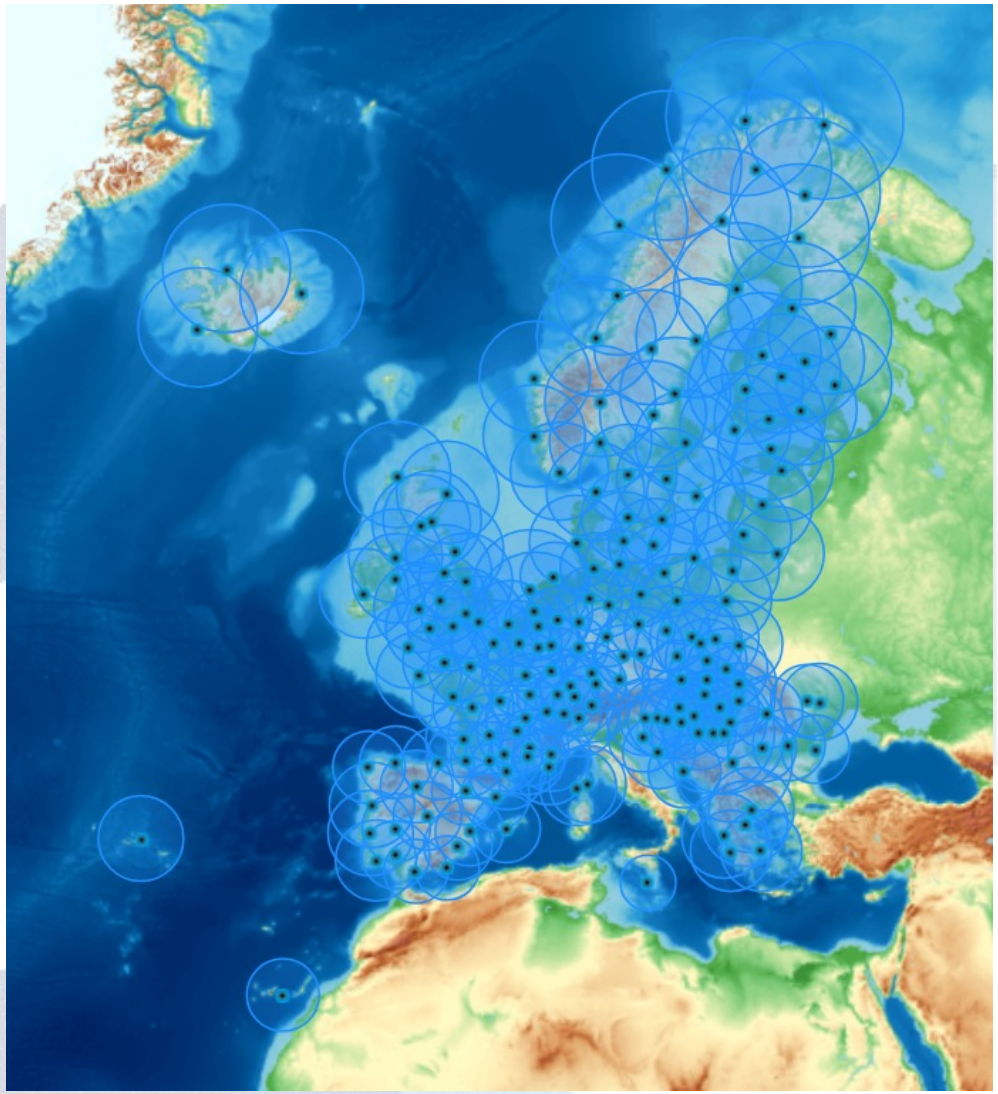
Maximum reflectivity factor composite (CIRRUS) 1 km, 5-minute



Rain rate composite (NIMBUS) 2 km, 15-minute

OPERA Status

- EUMETNET OPERA has 32 Members
- Number of radars: 221 → Active radars: 184 (~170 radars in the composite)
- Members with major upgrades
  - AEMet, HNMS, Met Éireann, LEGMC
- Data exchange
  - Currently 97% of active radar have dual-pol
  - to extent to dual-pol variables in summer 2026 (demo)
  - Plans to implement dual-pol algorithms in scheduled to 2027-2028
- OPERA database can be downloaded via EUMETNET-website in json, xslx, csv-formats



OPERA production – incoming data

- Most Members are scanning with 5-minute scanning cycle (3 exceptions)
- Data arrives in OPERA within 5 minutes in 73% and 7 minutes in 99.5%
- Data availability 95%
- The OPERA data release schedule is seen as decreases in the EUCOS monitoring, e.g. Czechia radars with changed scanning schedule or AEMET radar upgrade
- Problems in one radar are seen in the monitoring for the whole network

	Avg. timeliness (mins)			Breakthrough timeliness % (HH+5 mins)		Threshold timeliness % (HH+7 mins)		Avg. data availability (%)			Observation cycle (mins)		
Target	5-7	2-5	<2	<95%	≥95%	<95%	≥95%	85%	95%	99%	15	10	5

Q1/2025

	Avg. timeliness	Breakthrough timeliness %	Threshold timeliness %	Data Availability %	Observation cycle
Network Average	3.1	74.4	99.4	95.7	5.4

ICD Whole Network

Q2/2025

	Avg. timeliness	Breakthrough timeliness %	Threshold timeliness %	Data Availability %	Observation cycle
Network Average	3.0	72.6	99.6	96.0	5.3

ICD Whole Network

Q3/2025

	Avg. timeliness (mins)	Breakthrough timeliness (%)	Threshold timeliness (%)	Data Availability (%)	Observation cycle (mins)
Network Average	3.0	72.7	99.7	95.0	5.2

ICD Whole Network

Q4/2025

	Avg. timeliness (mins)	Breakthrough timeliness (%)	Threshold timeliness (%)	Data Availability (%)	Observation cycle (mins)
Network Average	7.3	73.2	98.6	93.9	5.3

ICD Whole Network

OPERA production – composite production

OPERA 2025 Q1

	Composites total	Avg. data availability	Avg. timeliness	Breakthrough timeliness %	Threshold timeliness %	Observation cycle
(Cirrus) Max reflectivity	25919.0	100.0	4.6	99.1	99.9	5.0
(Nimbus) Hourly accumulation	8640.0	100.0	8.9	99.8	99.9	15.0
(Nimbus) Surface rain rate	8632.0	99.9	8.9	99.8	99.8	15.0

OPERA 2025 Q2

	Composites total	Avg. data availability	Avg. timeliness	Breakthrough timeliness %	Threshold timeliness %	Observation cycle
(Cirrus) Max reflectivity	26192.0	100.0	4.6	99.8	100.0	5.0
(Nimbus) Hourly accumulation	8732.0	100.0	8.8	99.8	100.0	15.0
(Nimbus) Surface rain rate	8710.0	99.7	8.8	99.8	100.0	15.0

Composite Products

OPERA 2025 Q3

	Composites total	Avg. data availability (%)	Avg. timeliness (mins)	Breakthrough timeliness (%)	Threshold timeliness (%)	Observation cycle (mins)
(Cirrus) Max reflectivity	26480.0	100.0	4.6	99.8	99.9	5.0
(Nimbus) Hourly accumulation	8782.0	99.4	8.8	100.0	100.0	15.0
(Nimbus) Surface rain rate	8761.0	99.2	8.8	100.0	100.0	15.0

OPERA 2025 Q4

	Composites total	Avg. data availability (%)	Avg. timeliness (mins)	Breakthrough timeliness (%)	Threshold timeliness (%)	Observation cycle (mins)
(Cirrus) Max reflectivity	26490.0	100.0	4.3	99.7	99.9	5.0
(Nimbus) Hourly accumulation	8765.0	99.2	8.7	99.9	100.0	15.0
(Nimbus) Surface rain rate	8747.0	99.0	8.7	99.9	100.0	15.0

Composite Products

- In general, CIRRUS and NIMBUS productions are fulfilling SLA
- Average timeliness for CIRRUS is 4.6 minutes and for NIMBUS 8.8 minutes
- With some significant data disruptions in 2025 in NIMBUS, the availability score is less than 100%, with 99.0 - 99.7 %

OPERA performance standards

Composite targets

Product	Avg. data availability (%)			Avg. timeliness (mins)			Breakthrough timeliness % (HH+5 mins)		Threshold timeliness % (HH+7 mins)		Observation cycle (mins)		
Max reflectivity (Cirrus)	95%	99%	99.9%	15	7	5	<95%	≥95%	<90%	≥90%	15	10	5
Hourly accumulation (Nimbus)	95%	99%	99.9%	20	15	12.5	<95%	≥95%	<90%	≥90%	15	10	5
Surface rain rate (Nimbus)	95%	99%	99.9%	20	15	12.5	<95%	≥95%	<90%	≥90%	15	10	5

OPERA 2025b data release

- 2 new radars new sites in Lithuania (EYHM40 & EYHM41)
- 4 new radars existing sites (LEMM42, LEMM45, LEMM50 & LEMM51) & 1 new radar new site in Spain (LEMM61)
- 1 new radar new site in Finland (EFKL55)
- 1 new radar new site in Denmark (EKMI46)
- 2 new radars new sites in Portugal (LPMG46 & LPMG47) - located outside of OPERA composite domain
- Israeli data flow (LLBD40) is cut, as IMS is no longer Member of OPERA

OPERA 2026a data release

- 4 new radars existing sites (LEMM47, LEMM52, LEMM53 & LEMM60) & 1 new radar new site in Spain (LEMM62)
- 2 radars with improved DBZH, add dual-pol, 8 bit to 16 bit (EHDB) in Netherlands
- Change in data exchange source (EEMH40 & EEMH41) with two radars, 1 new (SSPA) and 1 old radar in Estonia
- Improved radial resolution (1 km to 0.5 km) in volume data for all 10 radars (SOWR) in Poland
- Reintroduction of radar (LFPW51) in France
- Members have changed/updated their WSI

OPERA 2026a software release

- Wind profile production to be run on operational servers

Release 2026a planned on June 9th

- **Example files.** They will be released in OPERA GitHub opera-releases repository: https://github.com/opera-radar/opera-releases/tree/main/examples
- **Release notes.** They will be released in OPERA GitHub opera-releases repository: https://github.com/opera-radar/opera-releases/tree/main/release-notes

OPERA Plans 2026

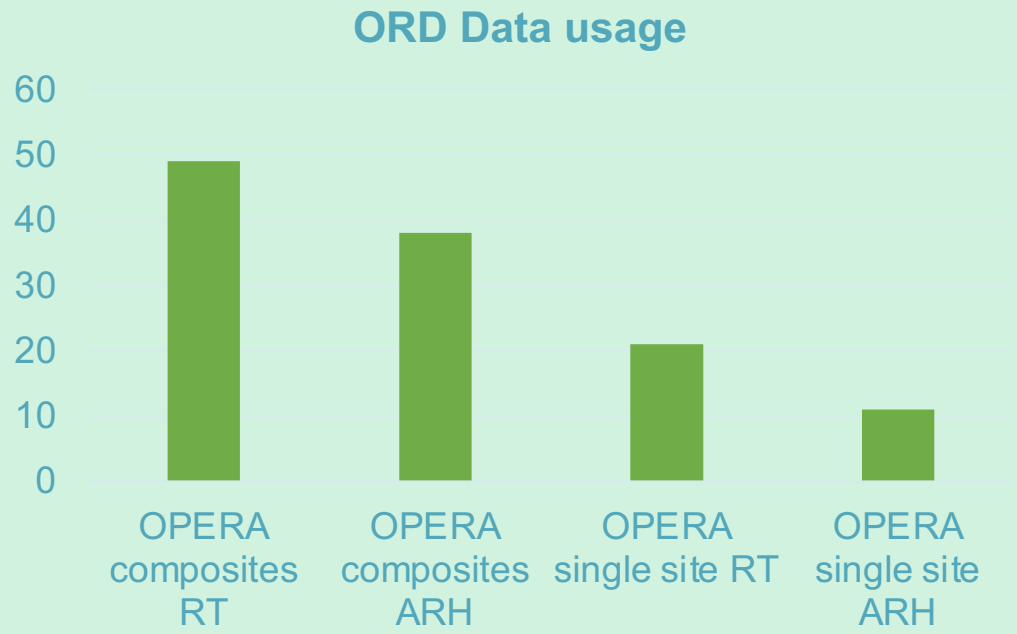
- **Improve the quality of the OPERA products** through the implementation of software algorithms to the production lines (dealiasing, satellite filter, dual-pol quality algorithms)
  - Dealiasing algorithm adopting torus mapping developed in SMHI and modified in ARSO
  - **Satellite filter recoded and using Cloud Type product**
- Production line development tasks
  - Surplus funding received to **improve the NIMBUS compositing algorithm**
- Surplus funding expected **to improve and unify the quality index within composite products**
- **Roadmap and development for coexistence/merging ODIM and FM301**
  - Converter development together with xradar and WMO
  - Webinar to survey user needs and requests (June 8th)
- A new statement for wind turbine assessments (previous one 2010)
  - Surplus funding received **to make an impact study of WTI** and with this outcome update the wind turbine recommendations

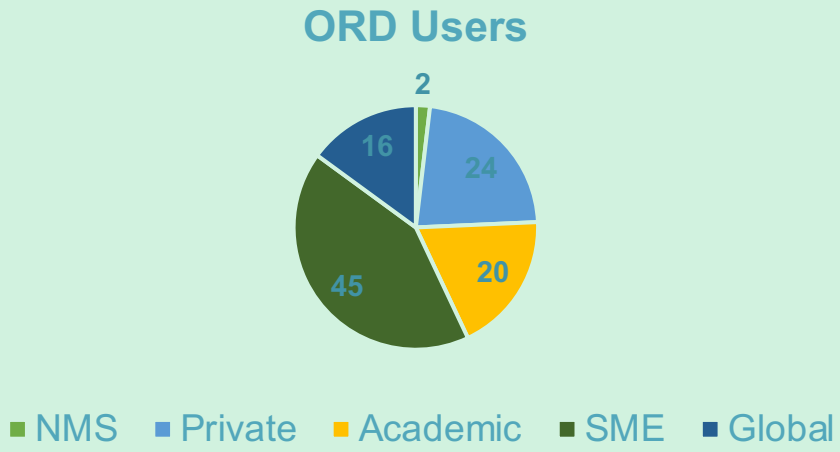
Open Radar Data (ORD) API

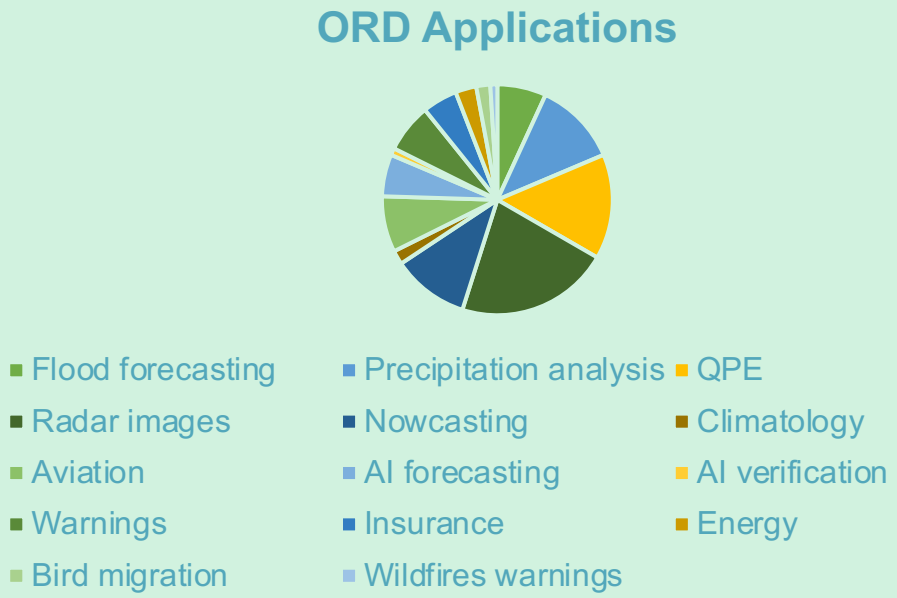
- **Timeline & Uptake**
  - External testing as pre-operational started **Oct 17th, 2025**
  - Integration with MeteoGate (meteogate.eu) on **May 20th, 2026**
- **Technical:**
  - Backend: **European Weather Cloud (EWC)**
  - Ingestion completed:
    - **24h single-site data** (OPERA STRATUS)
    - **Composites** (OPERA NIMBUS and CIRRUS, real-time and archive, in HDF5 and CoG)
    - Links to **national products**
  - Ongoing:
    - Populating volume radar data archive: gradual (newest → oldest)
    - Data and products searchable and composites visualizied in MeteoGate Data Explorer

Open Radar Data (ORD) API

- **Licensing:**
  - OPERA composites approved for CC BY 4.0 licence and open delivery from OPERA 2025b release (Nov 18)
  - Authorise use of single-site data, by default CC BY 4.0 (Météo-France data with Etalab 2.0)
- **ORD API usage:**
  - Currently circa 100 users/entities







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SNC EUMETNET
European Meteorological Services' Network
www.eumetnet.eu

More info:

- https://www.eumetnet.eu/activities/observations-programme/current-activities/opera/
- https://meteogate.eu

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