Achievements of the COST Action on Opportunistic Precipitation Sensing (OpenSense)

2025-03-17

PrePEP conference – University of Bonn

Achievements of the COST Action on Opportunistic Precipitation Sensing (OpenSense)

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1. What is OpenSense?

2. What are the main achievements of OpenSense?

3. What can we expect in addition, also beyond the duration of OpenSense?

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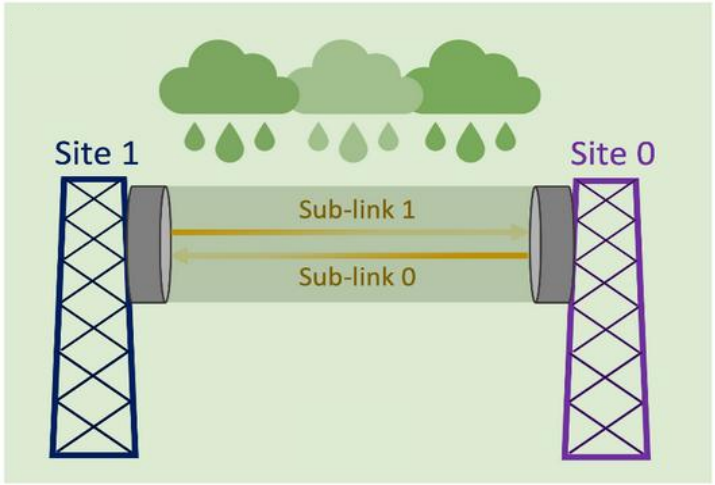
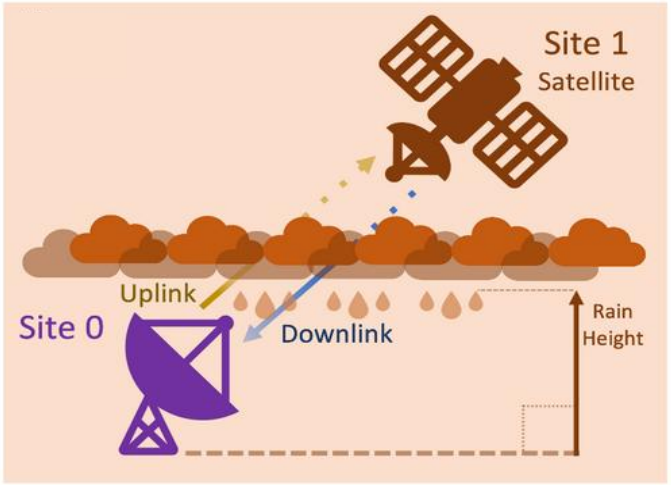
What is „Opportunistic Precipitation Sensing“?

To opportunistically (in a positive sense) use data from devices that were not meant to measure rainfall or which where not meant to provide high-quality rainfall data.



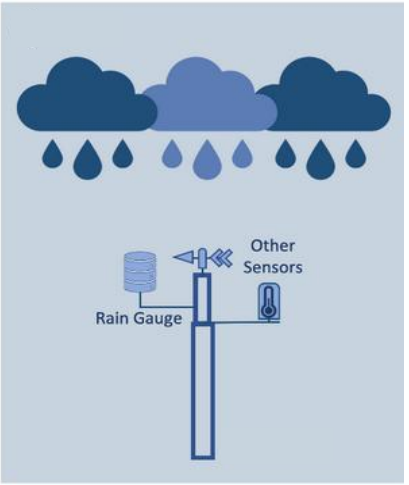
CML

Commercial microwave link



SML

Satellite microwave link



PWS

Personal
weather station

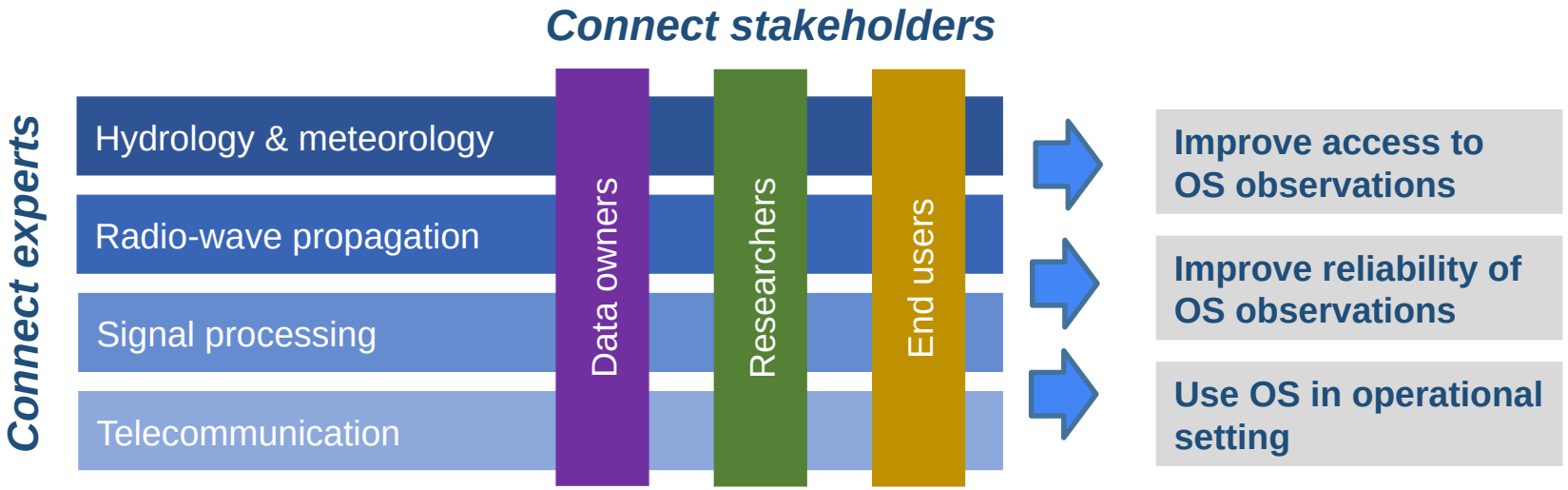
What are the goals of OpenSense?

Improve access to OS observations

Improve reliability of OS observations

Use OS in operational setting

What are the goals of OpenSense?

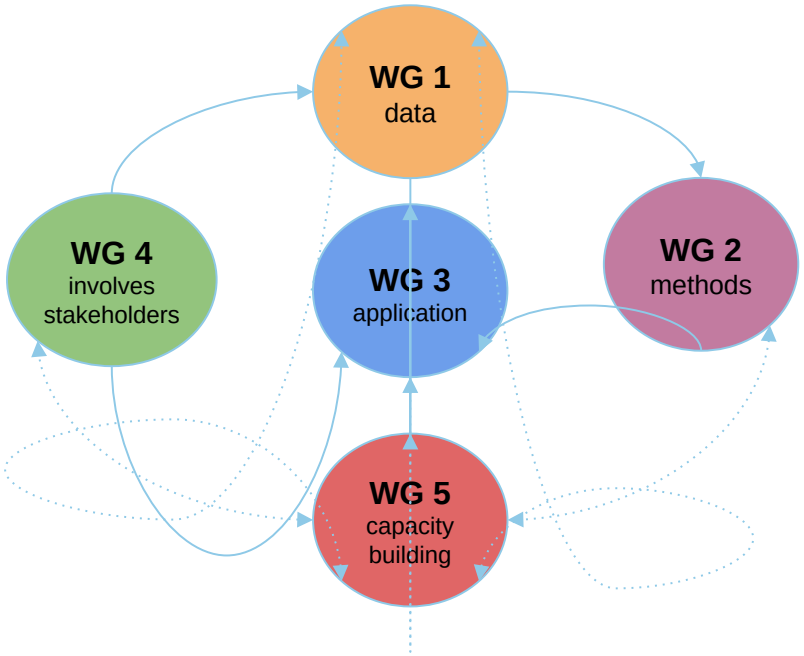


Who we are

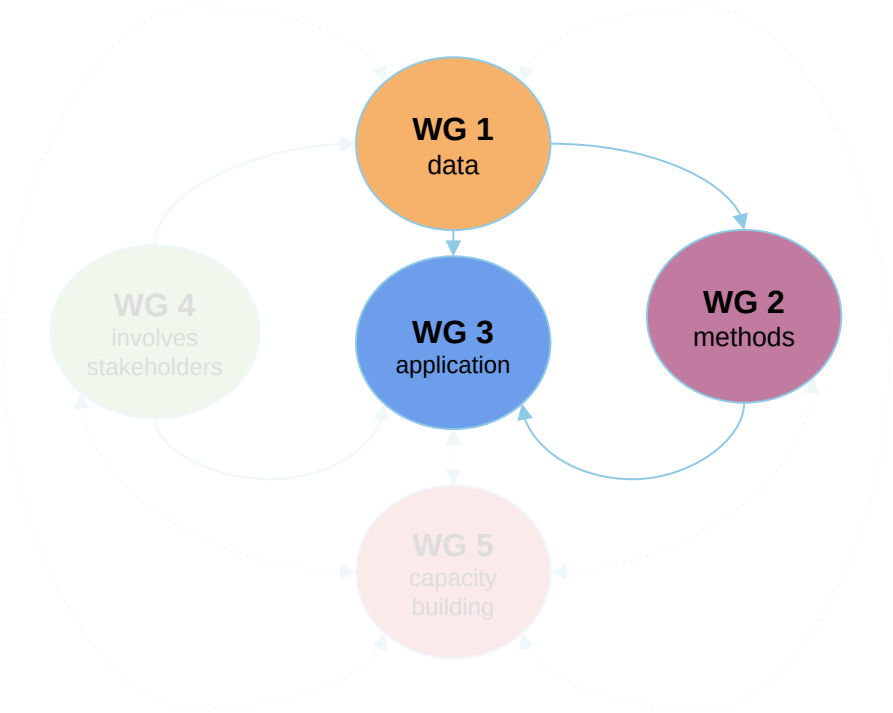
140 members from 33 countries

- Researchers from academia
- EUMETNET + 8 European Met Services
- Telecommunication companies + GSMA
- Consultancy companies

The OpenSense working groups



The OpenSense working groups



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Working group “Data”

- Defined a standard for data storage and naming conventions

Open Research Europe

Rapid publication and open peer review for research stemming from Horizon 2020, Horizon Europe and Euratom funding across all subject areas.

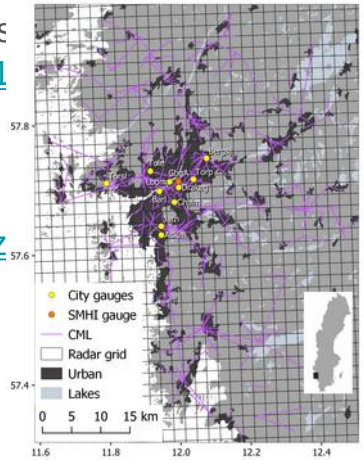
LETTER ▸ Open Res Eur. 2024 Feb 13;3:169. Originally published 2023 Oct 10. [Version 2] doi: 10.12688/openreseurope.16068.2

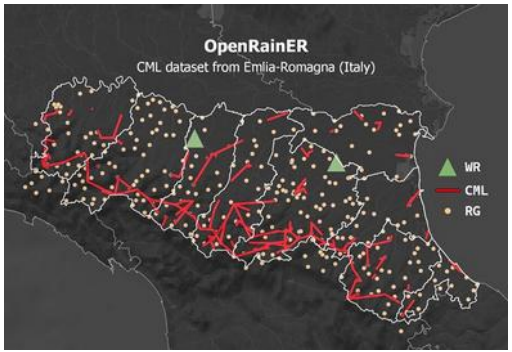
▸ Other versions

Data formats and standards for opportunistic rainfall sensors

Martin Fencl [1,a], Roberto Nebuloni [2], Jafet C M Andersson [3], Vojtech Bares [1], Nico Blettner [4,5], Greta Cazzaniga [6], Christian Chwala [4], Matteo Colli [7], Lotte de Vos [8], Abbas El Hachem [9], Charles Galdies [10], Filippo Giannetti [11], Maximilian Graf [4,5], Dror Jacoby [12], Hai Victor Habi [12], Petr Musil [13], Jonatan Ostrometzky [12], Giacomo Roversi [14,15], Fabiola Sapienza [11], Jochen Seidel [9], Anna Spackova [1], Remco van de Beek [3], Bas Walraven [16], Karina Wilgan [17], Xin Zheng [12,18]

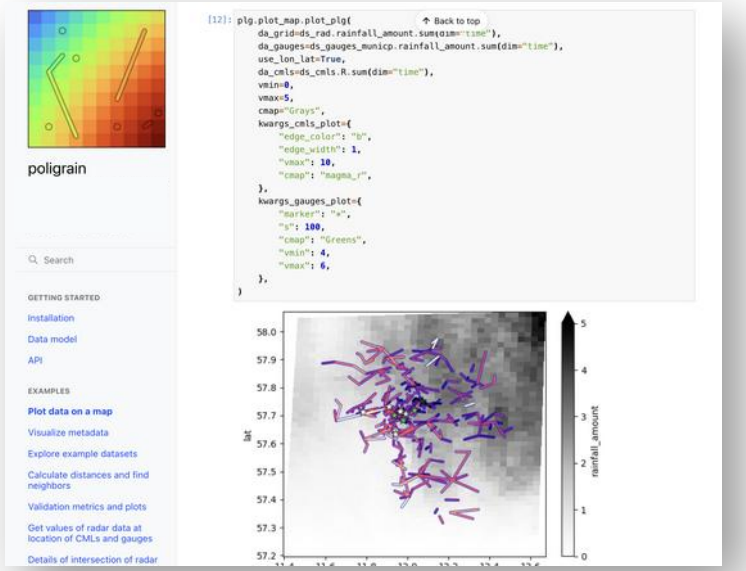
- Supported the publication of two open datasets with CML, gauge and radar data
  - OpenMRG (city of Gothenburg, Sweden) Anderss et al. (2022) https://doi.org/10.5194/essd-14-5411 22
  - OpenRainER (Emilia-Romagna, Italy) Covi and Roversi (2024) https://doi.org/10.5281/z do.10593848





Working group “Software & Methods”

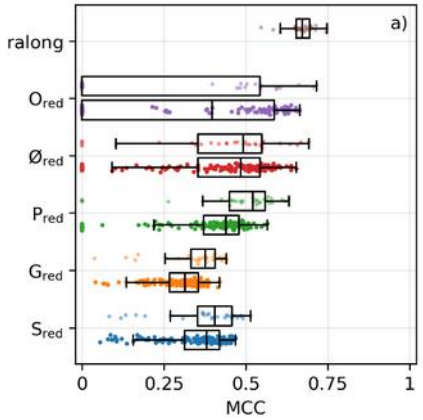
- Review of existing implementations
- Joint development of:
  - *poligrain*
    - Simplify common tasks for working with point, line and gridded rainfall sensor data
    - https://github.com/OpenSenseAction/poligrain
  - *pycomlink*
    - Processing methods for CML rainfall estimation
    - https://github.com/pycomlink/pycomlink
  - *pypwsqc*
    - Quality control methods for PWS data
    - https://github.com/OpenSenseAction/pypwsqc



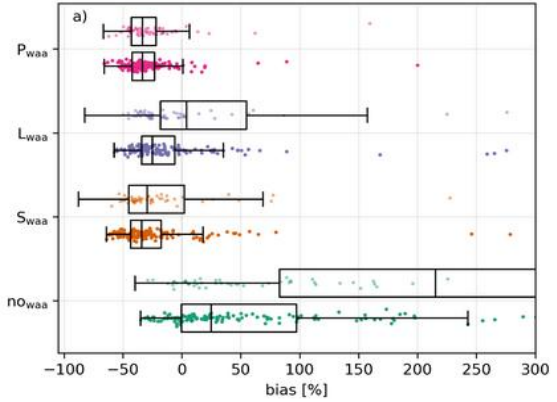
Working group “Software & Methods”

- Intercomparison of CML processing methods
  - Comparison of rain event detection and wet antenna estimation methods
  - Using OpenMRG and OpenRainER dataset
  - Graf et al. (in preparation)

Performance of different rain event detection methods

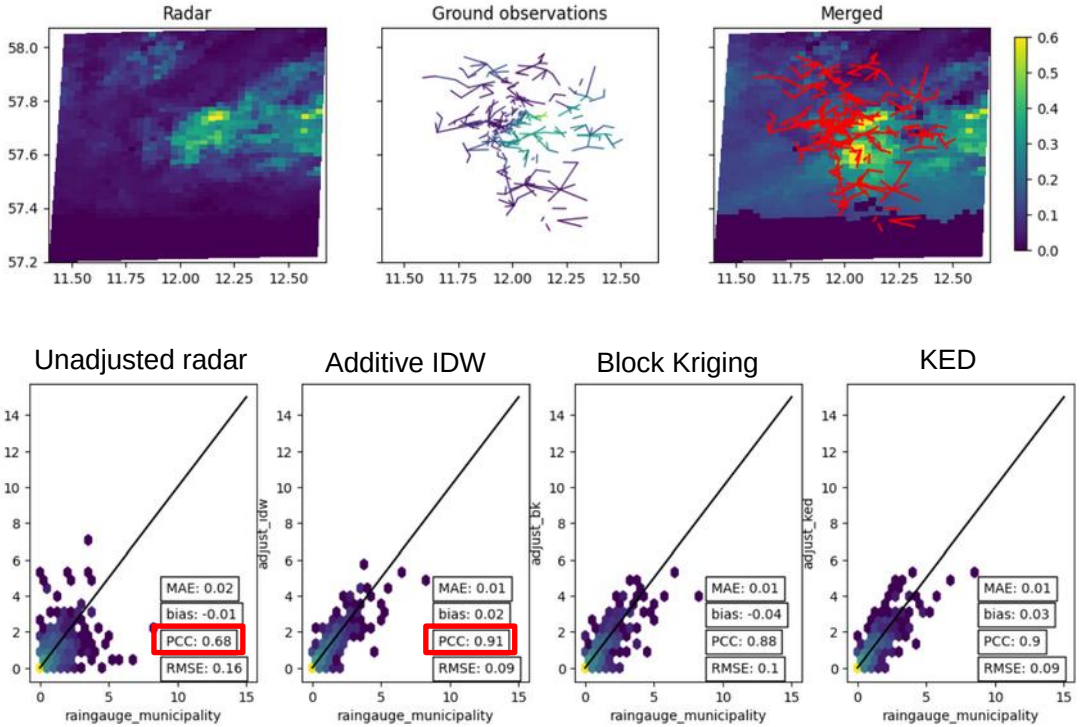


Bias depending on wet antenna correction methods



Working group “Merging and application”

- Method intercomparison for radar-CML merging
  - Using two large open datasets
  - Fully reproducible
  - Comparing different methods:
    - Additive-IDW
    - Multiplicative-IDW
    - Block Kriging
    - KED



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Outlook

- Refine software packages
  - Integrate more station QC methods
  - Integrate SML processing methods
  - Grow the community of contributors

- Finalize intercomparison studies for merging and PWS QC

- Solve CML data accessibility issue via the
  “Global Microwave Link Data Collection Initiative” (GMDI)

OpenSense

ITU

WMO

International Conference on Opportunistic Sensing of Precipitation - OpenSense

Final Conference of European COST Action CA20136 OpenSense

Offenbach, Germany

June 25-26, 2025

https://indico.scc.kit.edu/e/opensense_conference_2025

OpenSense

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

DWD

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

Funded by the European Union

https://opensenseaction.eu/