

EGU24-20005, updated on 03 Nov 2024
<https://doi.org/10.5194/egusphere-egu24-20005>
EGU General Assembly 2024
© Author(s) 2024. This work is distributed under
the Creative Commons Attribution 4.0 License.



Cloudnet – an ACTRIS data repository for cloud remote sensing observations

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

Finnish Meteorological Institute, Atmospheric Composition, Helsinki, Finland (simo.tukiainen@fmi.fi)

Clouds strongly regulate the Earth's water cycle and the planetary radiation balance. Clouds are one of the largest contributors to the overall uncertainty in climate feedbacks, propagating into global temperature projections (Arias et al., 2021). Cloudnet data repository provides long-term datasets of cloud property profiles with a high temporal and vertical resolution, derived from synergetic ground-based measurements and numerical weather prediction model data.

These datasets can be used, for example, to validate satellite-based products and to improve the accuracy of climate and weather forecast models. Cloudnet is part of the Aerosol, Clouds and Trace Gases Research Infrastructure (ACTRIS) which is now in the implementation phase and plans to be fully operational in 2025 (Häme et al., 2018).

Cloudnet receives data regularly from around 20 stationary observational facilities. Each facility is equipped with instruments that meet the requirements of the ACTRIS Centre for Cloud Remote Sensing (CCRES). These instruments include Doppler cloud radars, Doppler lidars, ceilometers, microwave radiometers, disdrometers, and weather stations. We also host and process data from mobile and campaign platforms.

Cloudnet processes raw instrument data into cloud property products such as target classification of the scatterers, liquid and ice water content, and drizzle drop size distribution (Illingworth et al., 2007) using the open-source Python package CloudnetPy (Tukiainen et al., 2020). Processed data products are provided in near-real time, typically within one hour from the measurement. In the future, Cloudnet will also provide wind and boundary layer height products derived from Doppler lidar data.

All the raw and processed data are freely available according to the FAIR principles (Wilkinson et al., 2016) via cloudnet.fmi.fi. Furthermore, our software are freely and openly available from <https://github.com/actris-cloudnet/>.

ACKNOWLEDGEMENTS

We thank the Academy of Finland Flagship (grant no. 337552), the European Union's Horizon 2020 research and innovation programme (grant no. 654109), and ACTRIS (project no. 739530, grant no. 871115) for funding this project.

REFERENCES

Arias et.al. (2021) Technical Summary. Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. (Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA)

Häme et.al. (2018). ACTRIS stakeholder handbook 2018. (Painotalo Trinket Oy).

Illingworth et.al. (2007). Cloudnet: Continuous Evaluation of Cloud Profiles in Seven Operational Models Using Ground-Based Observations. Bulletin of the American Meteorological Society, 6, 88.

Tukiainen, S., O'Connor, E., and Korpinen, A. (2020). CloudnetPy: A Python package for processing cloud remote sensing data. Journal of Open Source Software, 5(53), 2123.

Wilkinson et.al. (2016). The FAIR Guiding Principles for scientific data management and stewardship. Scientific Data, 3(1), 160018.