



EMS Annual Meeting Abstracts

Vol. 18, EMS2021-227, 2021

<https://doi.org/10.5194/ems2021-227>

EMS Annual Meeting 2021

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



An upcoming European network of microwave radiometers for operational temperature profiling and humidity observations

Rolf Rüfenacht¹, Simone Bircher-Ardot¹, Bernhard Pospichal², Domenico Cimini^{3,4}, Christine Knist⁵, Pauline Martinet⁶, Emiliano Orlandi⁷, Harald Czekala⁷, Ulrich Loehnert², Jacqueline Sugier⁸, Myles Turp⁸, and Alexander Haeefe¹

¹Federal Office of Meteorology and Climatology MeteoSwiss, Payerne, Switzerland (rolf.ruefenacht@meteoswiss.ch)

²University of Cologne, Institute for Geophysics and Meteorology, Cologne, Germany

³National Research Council of Italy, Institute of Methodologies for Environmental Analysis, Tito Scalo, Italy

⁴University of L'Aquila, Center of Excellence CETEMPS, L'Aquila, Italy

⁵Deutscher Wetterdienst (DWD), Lindenberg, Germany

⁶Meteo France / CNRS, Toulouse, France

⁷RPG Radiometer Physics GmbH, Meckenheim, Germany

⁸Met Office, Exeter, United Kingdom

From the perspective of numerical weather prediction and nowcasting, the atmospheric boundary layer (ABL) is one of the most undersampled regions of the atmosphere due to difficulties of spaceborne remote sensing at these altitudes. Ground-based microwave radiometers (MWR) have the potential to contribute to the closing of this gap. Indeed, commercial K- and V-band (20-60 GHz) radiometers provide observations of temperature profile, water vapour and liquid water and are most sensitive to the ABL due to their choice of spectral channels and observation geometry.

EUMETNET's E-PROFILE observation programme has thus evaluated the potential for a European network of ground-based microwave radiometers. The stakeholder needs were inferred from WMO and EUMETNET Statements of Guidance, OSCAR and a dedicated user survey. The maturity and effectivity of the technology was assessed through a literature review and experts judgements comprising recent large-scale campaigns, experiences with long-term usage and assimilation trials and outcomes of the recent COST action TOPROF. Last but not least, the availability of existing instrumentation from which a European network could be built up was investigated.

Based on this study, EUMETNET decided to establish an operational MWR network by 2023 with continuous near real-time provision of brightness temperatures, humidity and temperature information from a centralised retrieval as well as forecast indices for fore- and nowcasting. The products will come along with different monitoring quality control stages at timescales from near real-time to monthly. Special care will be dedicated to ensure reliable absolute calibration results by accounting for the recent developments and recommendations from TOPROF. In the setting up and operation of the network as well as in the implementation of retrievals and monitoring, important synergies with the ACTRIS programme and the scientific community gathered in the COST action PROBE are expected.

The presentation will briefly outline the reasoning for setting up the network but mainly focusses on the operational aspects and services that E-PROFILE MWR will provide. Moreover, the first steps taken towards an operational network will be discussed and the general roadmap outlined.