

# Enhancing Dry-Wet Classification in CML/SML Time Series by Integrating NWC-SAF PC Products and Commercial Microwave Links with Cloud Microphysical Satellite Data

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## Abstract:

Accurate rainfall estimation benefits from combining various measurement methods. Commercial Microwave Links (CMLs) provide path-averaged rainfall rates through the attenuation of emitted radiation, offering valuable data, especially in regions lacking dedicated rainfall sensors, such as many parts of Africa. However, processing CML data presents challenges, notably in differentiating between wet and dry periods. Factors such as Wet Antenna Attenuation (WAA) and baseline drift due to environmental changes make conventional methods unstable and can lead to inaccuracies in rainfall estimates.

To address these issues, we propose integrating CML data with satellite-based cloud microphysics products to enhance wet-dry classification. In this study, we combine a hybrid CNN-LSTM model trained on commercial CML data with cloud microphysics data from the Meteosat Second Generation (MSG) Spinning Enhanced Visible and InfraRed Imager (SEVIRI), specifically the Precipitation Cloud (PC) and Precipitation Cloud-Phase (PC-Ph) products, for rain event detection. This integration aims to improve the accuracy of wet-dry classification in CML time series, assessing performance across varying rainfall intensities, frequencies, and durations. Data from 3,748 CMLs in Germany and 2,889 CMLs in the Czech Republic during June 2021 are analyzed, with validation against the RADKLIM-YW radar product.

By leveraging this hybrid approach, we anticipate improvements in dry-wet classification performance and plan to extend the use of these products for rainfall type classification and correcting errors related to the dependence of the attenuation-rainfall relationship on the Drop Size Distribution (DSD).

Keywords: Commercial Microwave Links, Satellite Data Integration, Rain Event Detection, Wet-Dry Classification, Cloud Microphysics, MSG SEVIRI ,DSD , Rainfall Type

## Are you an Early Career Scientist ?

Yes

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