

## **SEMINAIRE CNRM**

***vendredi 20 février 2026 à 10h***

### ***The ICON/COSMO polarimetric radar forward operator EMVORADO and its application for model evaluation***

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Webex link:

**[https://meteo.webex.com/meteo-fr/j.php?  
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Abstract:

Polarimetric radar measurements contain information about hydrometeor microphysical properties and processes. Reliable forward operators (FO), which link physical cloud and precipitation properties to radar quantities are key tools to exploit the polarimetric radar measurements in model evaluation, data assimilation or interpretation of microphysical process fingerprints.

EMVORADO is the native radar FO of the ICON model putting strong emphasis on model-operator-consistency. Direct coupling of EMVORADO into the ICON code together with the application of bulk scattering lookup tables allow for highly efficient simulations over the entire radar network including the possibility to consider measurement effects like beam bending, broadening, blockage, attenuation. It furthermore features a physics-inspired melting scheme that allows realistic simulations of the radar bright band for both ICON's one- and two-moment microphysics schemes.

While EMVORADO is applied operationally in the German Weather Service's assimilation of radar reflectivity and radial wind volumetric measurements, its polarimetric simulations have so far primarily been used in model evaluation studies particularly of the ICON-RUC setup with two-moment microphysics. From individual cases as well as statistical analysis, deficiencies of simulated polarimetric variables in the melting and the dendritic growth layers have been identified and could be

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attributed to the microphysics scheme and to assumptions in EMVORADO itself. This included, e.g., a tendency of the ICON two-moment scheme to predict too much, too large, and too long-surviving graupel in stratiform weather situations on the one hand and a smearing out of the bright band signatures due to a too-generalising implementation of wet growth in EMVORADO on the other hand.

In this talk, I will showcase some of the key features of EMVORADO, discuss accuracy, sensitivity, and uncertainties of the polarimetric forward operator resulting from inherent assumptions, and present some detailed results from the ICON-RUC evaluation.