Title: **Generation and Verification of ML Weather Model Ensembles**

Speakers: Dr. Nina Horat (KIT) and Simon Adamov (MeteoSwiss)

Abstract:

Simon Adamov presents a novel approach to perturb pre-trained ML weather emulators by directly adding noise to latent space weight tensors. The Burglind storm is used to demonstrate this approach in both graph neural networks and Fourier neural operators. Initial results suggest that the introduction of such perturbations allows the previously deterministic emulator to produce a probabilistic ensemble weather forecast. These forecasts are evaluated and compared to IFS ENS, with careful analysis of the error growth and propagation of the perturbations.

Dr. Nina Horat presents additional methods for generating probabilistic forecasts from deterministic AI weather models. These methods are based either on the generation of ensemble forecasts by perturbing the initial conditions, or on statistical post-hoc uncertainty quantification methods from post-processing. In a second part of the talk, Nina will present selected examples of how AI weather models and ML post-processing models have been evaluated in recent years, going beyond standard metrics. Special emphasis will be put on the physical consistency of forecasts and the verification of extreme events.