

Model vs. Observation: Finding reasons for improper ICON model predictions during the Swabian MOSES 2021 field campaign

MSc topic in the working groups *Atmospheric Risks and Large-scale Dynamics and Predictability*

Despite considerable progress in recent years, the prediction of severe convective storms (SCS) by state-of-the-art numerical weather prediction (NWP) models is still a big challenge and a major research topic at research and weather prediction centers. In order to observe SCS with a diverse set of observation systems (i.a. KITcube) in south-western Germany, IMK and many other research institutions conducted an interdisciplinary field campaign in summer 2021 called *Swabian MOSES* (www.swabianmoses.de; *English version available by clicking on EN at the upper right corner*).

During the investigation period May-July 2021 of *Swabian MOSES*, seven intensive observation periods (IOPs) were conducted, leading to a unique dataset of observations of several SCS across the investigation area in Baden-Württemberg. For some days during IOPs, the NWP model ICON-D2 predicted a great potential for convection and simulated the occurrence of SCS, but what followed was a convectively completely inactive atmosphere or a large horizontal offset compared to reality.

The proposed thesis will try to unravel discrepancies between model predictions and observations during the *Swabian MOSES 2021* field campaign focusing on the meso- and large-scale ambient conditions. On the one hand, the dataset of the observation systems operated during the campaign will serve as a comprehensive basis for the investigations. On the other hand, high-resolution ensemble predictions of ICON-D2 will be available for comparisons between the observations and the simulated “solutions” of the different members of ICON-D2. Ensemble sensitivity analyses applied to the predictions of ICON-D2 may help to unveil the physical reasons for the offset between forecasts and observations on the scales considered.

If you are interested in this topic, please feel free to contact us. We are happy to provide you with more information on the topic. The thesis can be conducted and written in German or English according to your preference.

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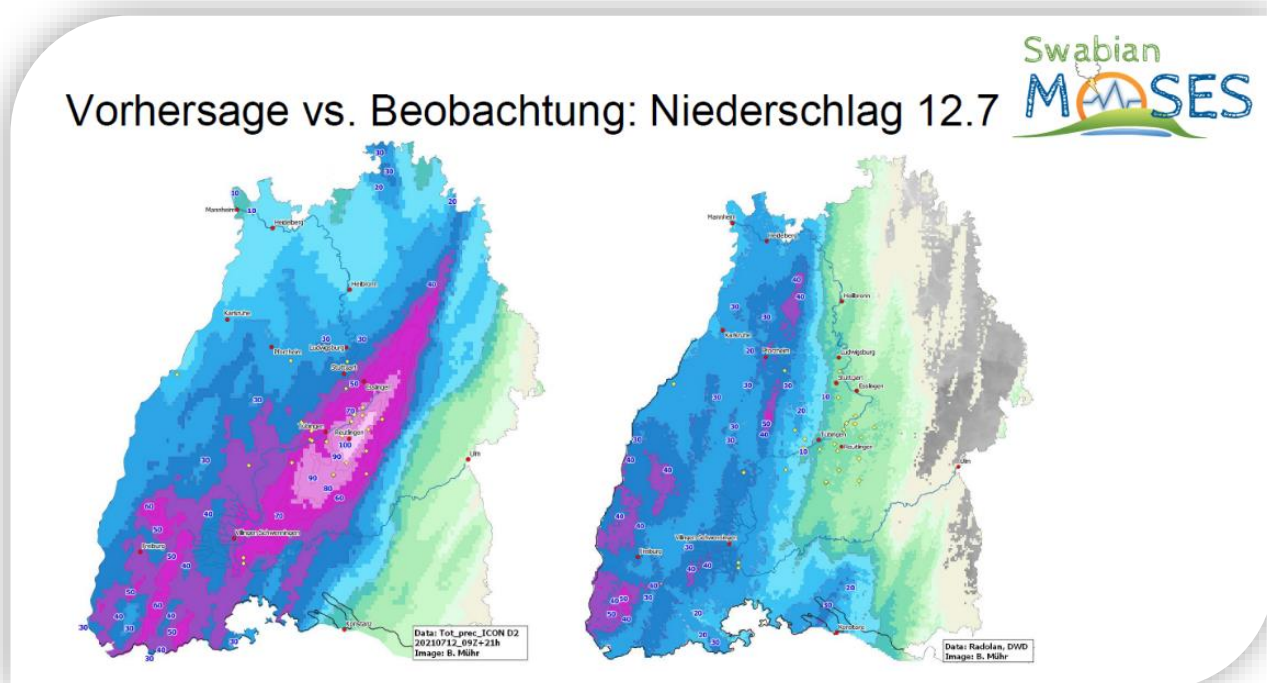


Figure 1: Comparison of the 24-hourly precipitation amount in Baden-Württemberg on 12/13 July 2021 (06-06 UTC). Left: Prediction of the deterministic run of ICON-D2 (initialized on 12 July 09 UTC); right: observation based on RADOLAN (combined and adjusted measurements of ombrometers and precipitation radar). © Bernhard Mühr