



C2I Priority Project

Status of the transition from COSMO to ICON at Arpa Piemonte



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Phase 1: Preparation & Installation

- ✓ ICON-NWP (v. 2.3) and ICON-TOOLS (v. 2.3.3) have been successfully installed and compiled on ECMWF
- ✓ The current deterministic ICON-model setups have been defined (COMET)

Phase 2: Basic Forecasting System

- ✓ Deterministic ICON-LAM forecast without data assimilation has been performed using the setups from Phase 1.
- ✓ Considering limited capacities of the HPC systems at our institutions, only deterministic forecast is foreseen within this project.

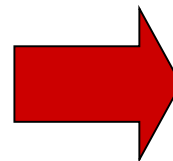
Phase 2: deterministic run

ICBC from ICON at 13 km resolution
(analyses and forecasts)



Domain over Europe at 5 km resolution

Case study: the **VAIA storm** that struck northern Italy between 26 and 31 October 2018



Domain over Italy at 2.5 km resolution

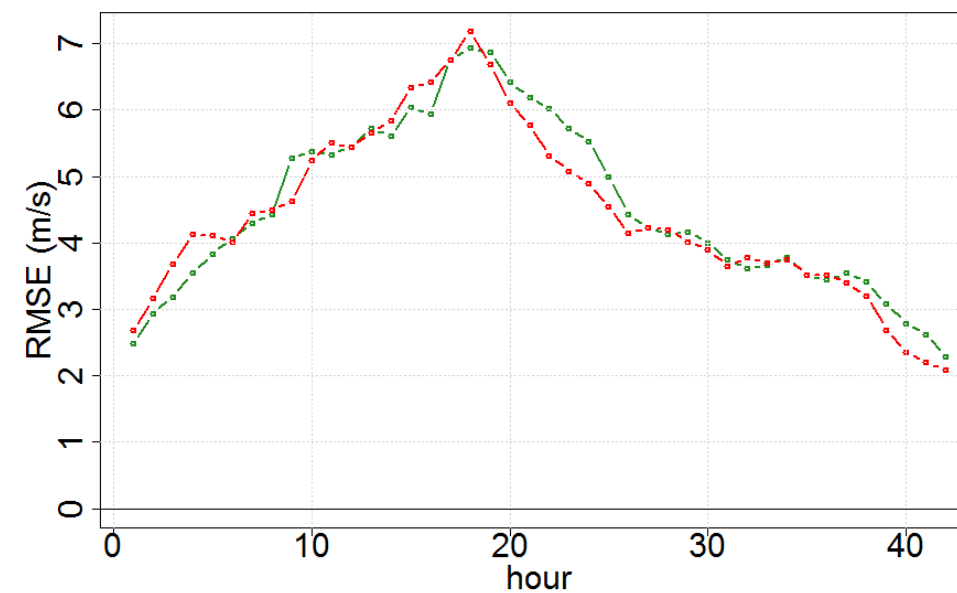
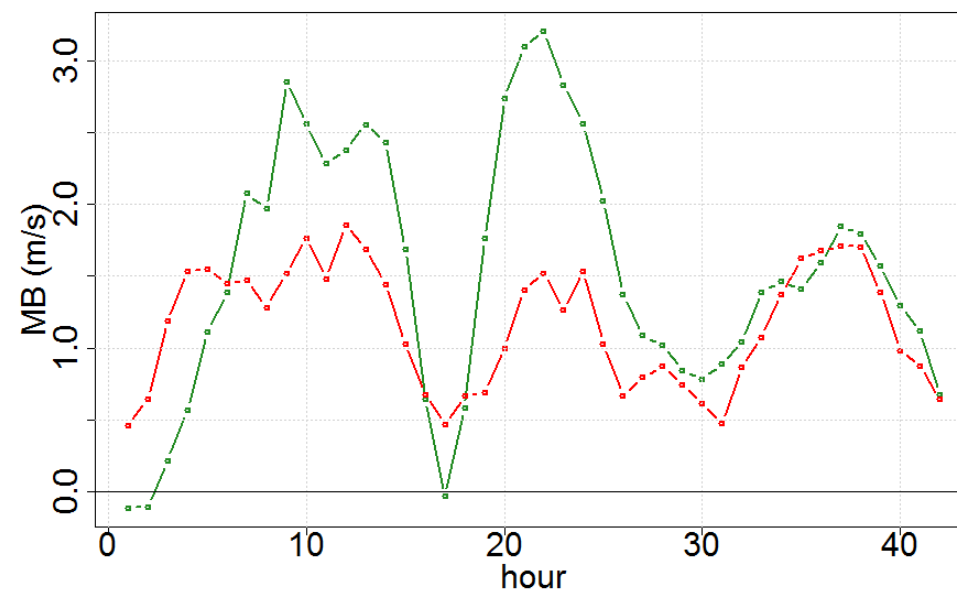
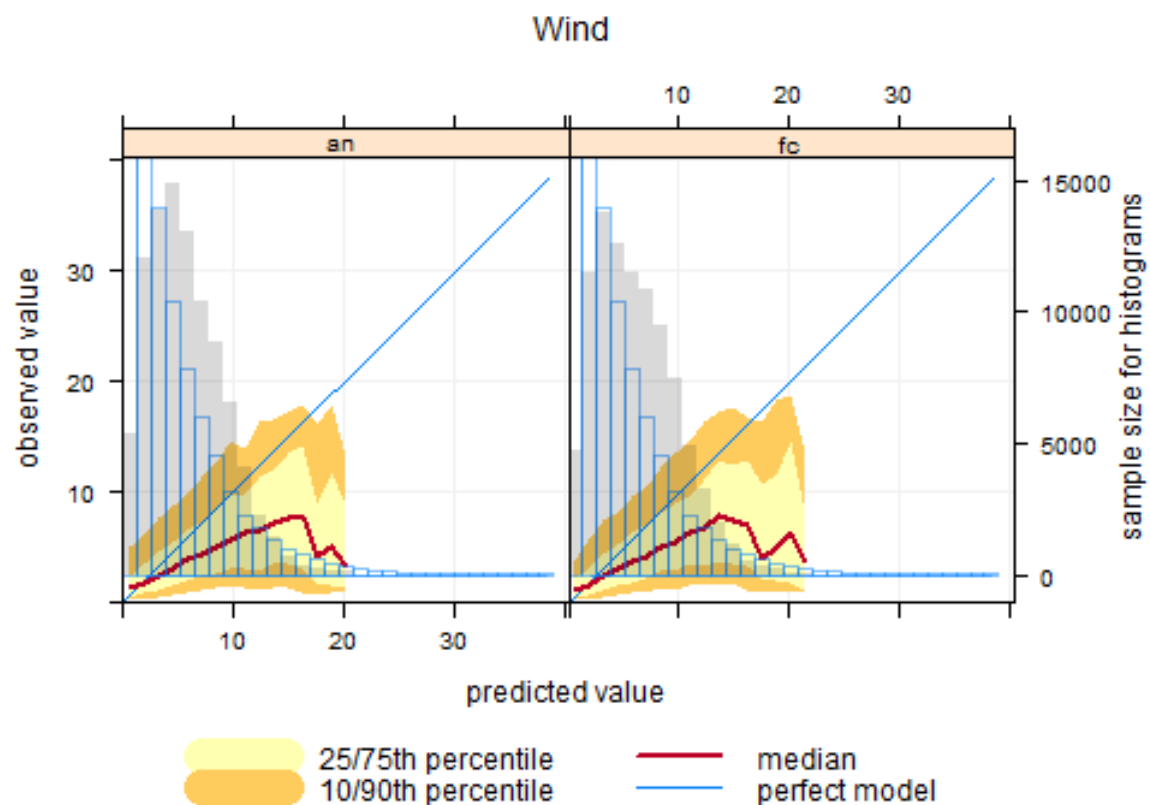


Phase 2: deterministic run

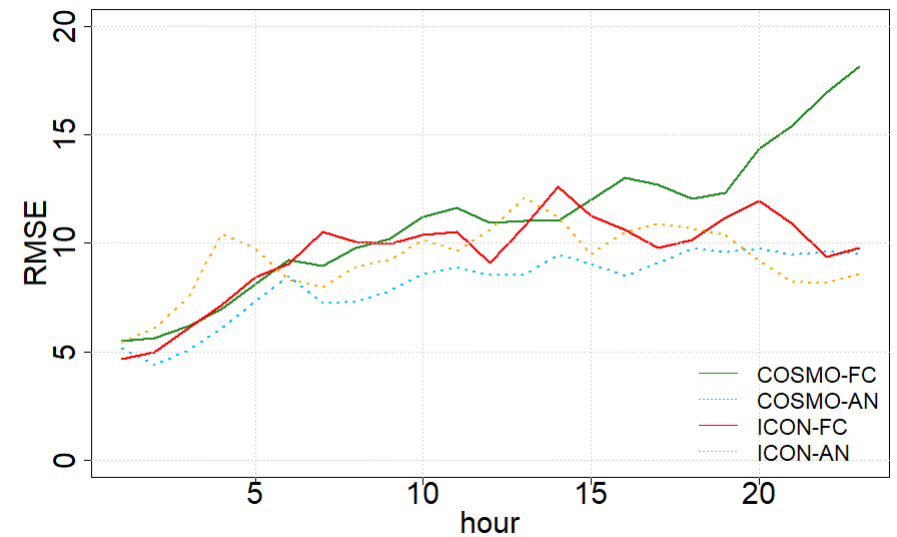
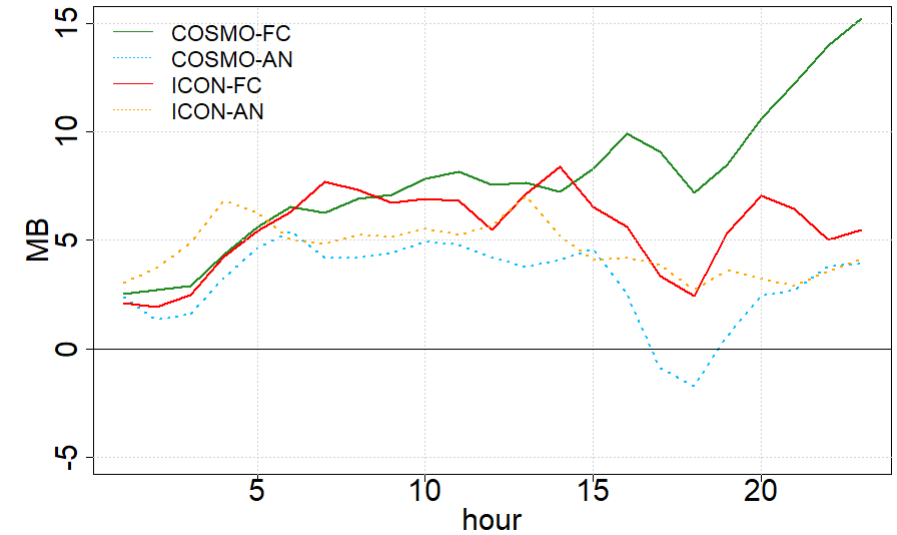
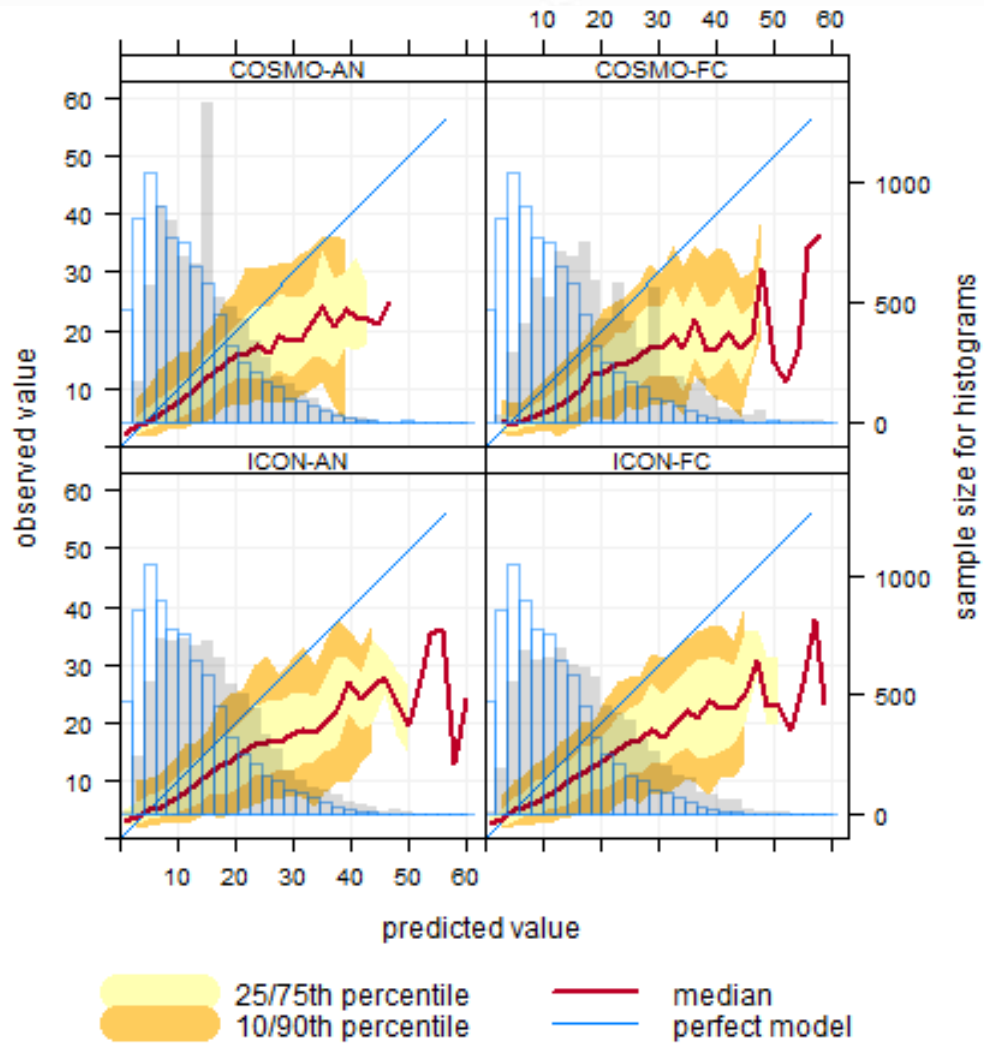
- ✓ **Run AN:** ICON re-analysis at 2.5 km resolution since 20181026 00 UTC to 20181031 00 UTC with BCs every 6h
- ✓ **Run FC:** ICON forecast at 2.5 km resolution since 20181029 00UTC up to +48h with BCs every 3h at ~ 2 km over Italian domain

The verification of the simulations has been performed on the period 29-30 October 2018 using the conditional quantile and the Taylor diagram for wind and the fuzzy technique for precipitation.

Phase 2: Verification: wind

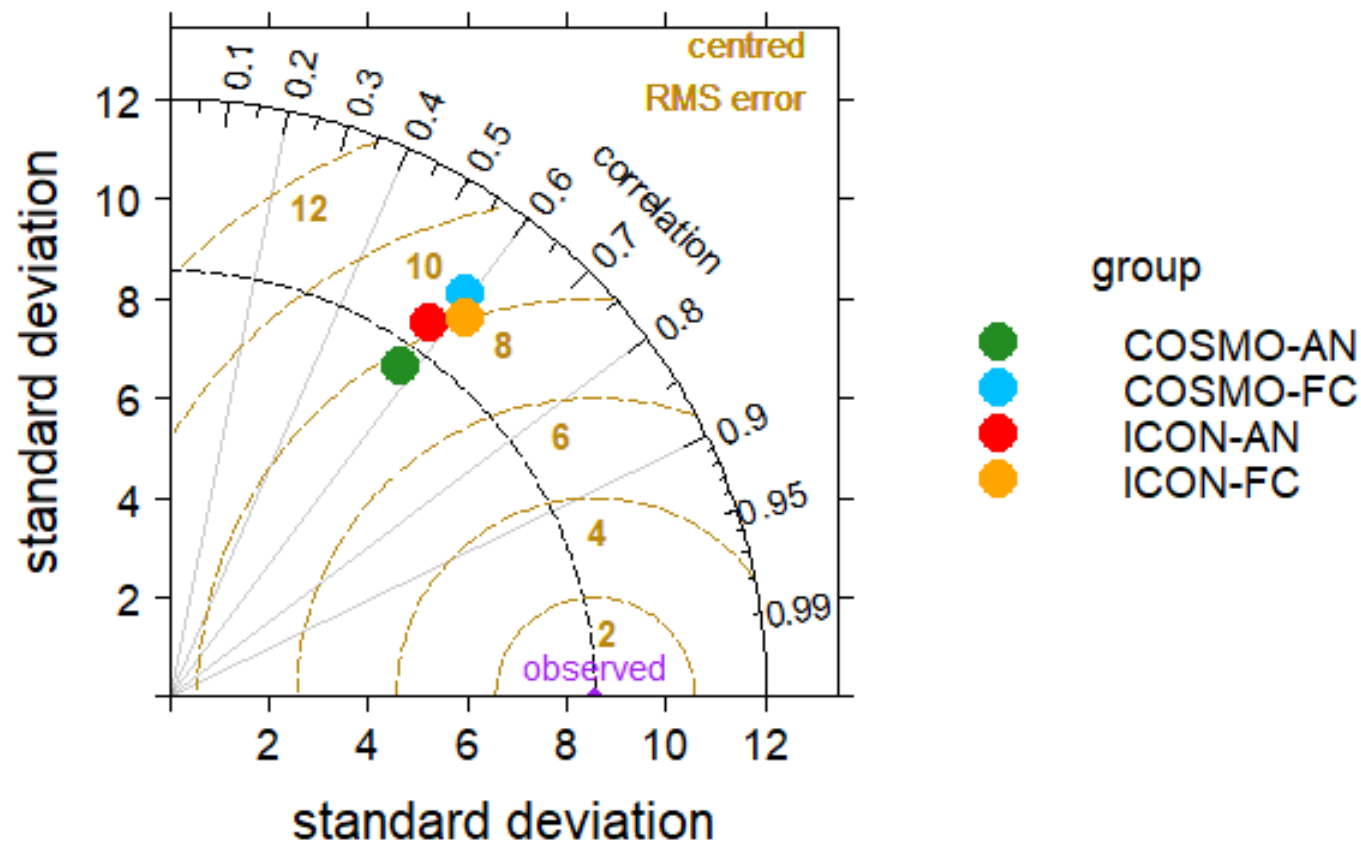


Phase 2: Verification: wind gust



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Taylor diagram for wind gust



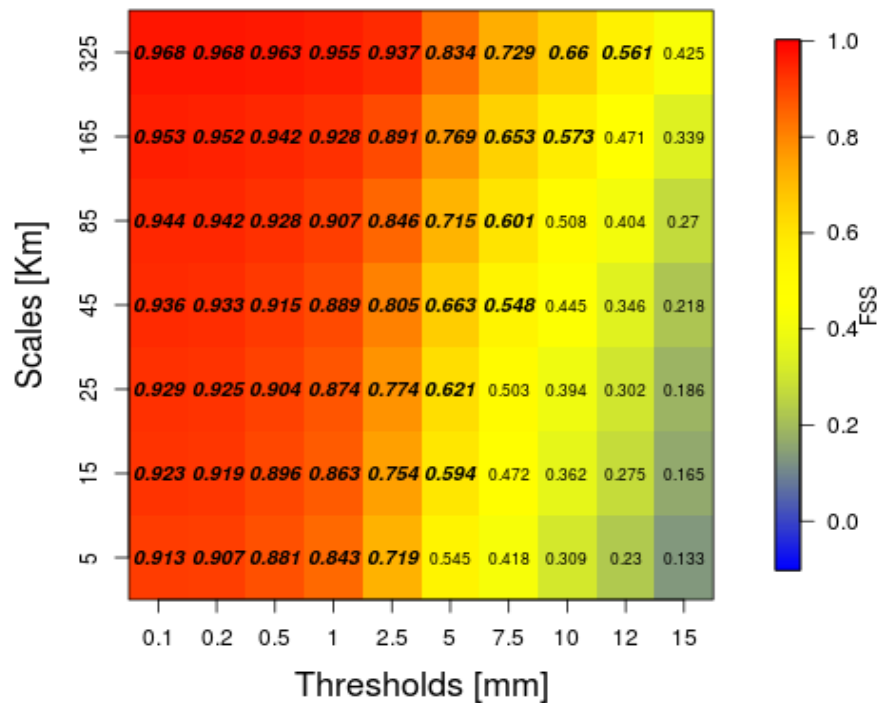
Concerning the wind gust, analysis better than forecast both for ICON and COSMO but general overestimation

MB and RMSE demonstrates a better behavior of ICON compared to COSMO, while the Taylor diagram shows similar performance of the models

Phase 2: Verification: rain

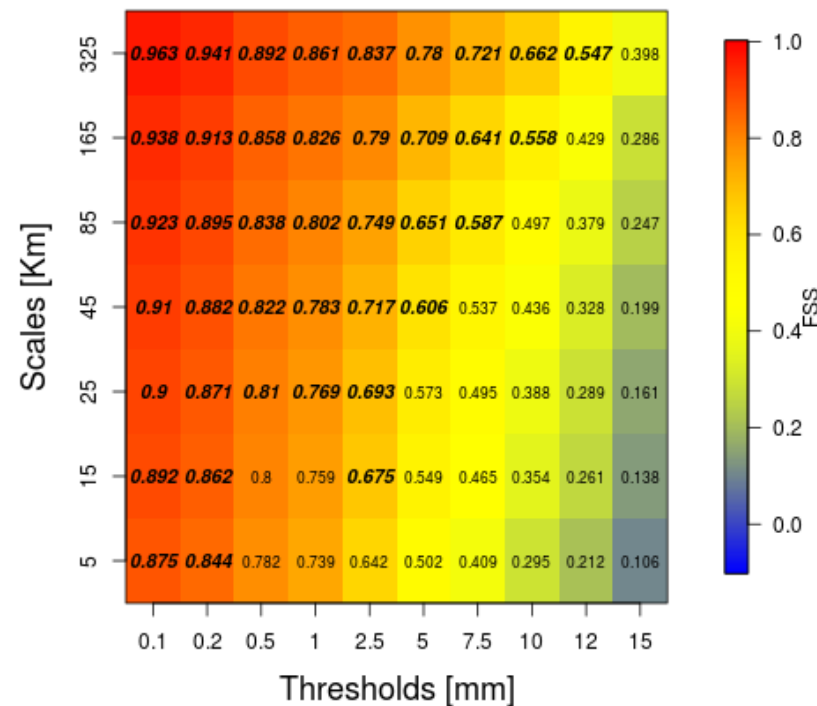
FUZZY VERIFICATION by the COSMO software VAST

Fractions skill score ICON - FSS - 20181029 - 3 Tsteps



ICON forecast 20181029

Fractions skill score COSMO-OT - FSS - 20181029 - 3 Tsteps



COSMO forecast 20181029

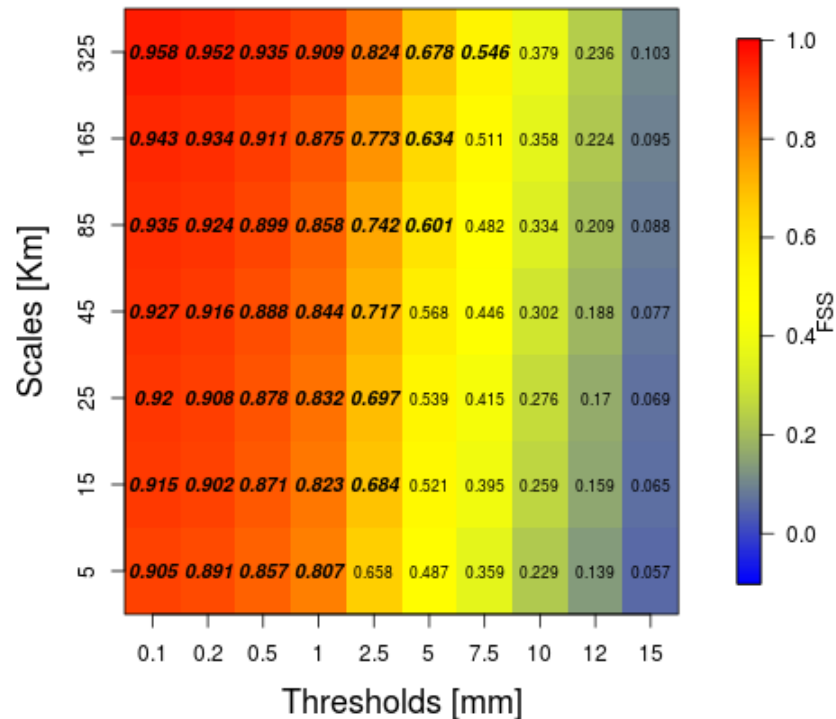
In bold FSS_{useful} indicates at what scale and at what intensity the forecast is useful

ICON behaves better than COSMO for lower thresholds

Phase 2: Verification: rain

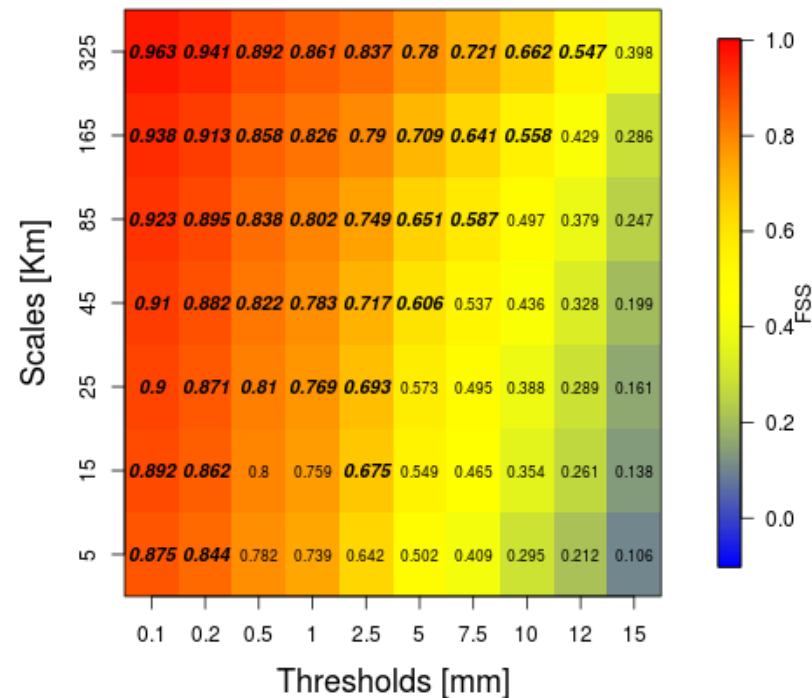
FUZZY VERIFICATION by the COSMO software VAST

Fractions skill score ICON - FSS - 20181029 - 3 Tsteps



ICON analysis 20181029

Fractions skill score COSMO-OT - FSS - 20181029 - 3 Tsteps



COSMO analysis 20181029

In bold FSS_{useful} indicates at what scale and for what intensity the forecast is useful


ICON behaves significantly better than COSMO for lower thresholds but worse for higher thresholds



Phase 2: Conclusions

In general ICON seems to behave better than COSMO, but further investigations are needed in order to be able to draw some conclusions

- 1) Model performance for t2m, rh2m
- 2) New test cases



Phase 2: Future plans

- ✓ Run in nested domains
- ✓ Run with ICBC from IFS
- ✓ Planned test case: 10-11/12/2017 => verification and comparison with COSMO