# Status of PP AWARE tasks 1.2 RHM

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COSMO PP AWARE online meeting 14.05.2020

# Task 1.2. Approaches to introduce observation uncertainty

### FTE 0.05 Deliverables:

Report on existing methods to introduce observation uncertainty and an overview of novel verification scores accounting for observation uncertainty (e.g., CRPS adapted for observation ensemble).

Started by delayed.

Was supposed to begin in Oct 2019 and end in Apr 2020 An extension is required until November 2020 without additional FTE

# **Observation uncertainty**

- Instrumental errors
- Random errors
- Reporting errors
- Representativeness errors
- Analysis errors
- Other errors...

# Thus, observation uncertainty can change verification results

## Methods to account for obs uncertainty (from B.Brown, 7<sup>th</sup> Verification Workshop)

- Indirect estimation of obs uncertainties through verification approaches (spatial methods, e.g., neighborhood method with neighborhood observations)
- Incorporation of uncertainty information into verification metrics (e.g., rmse decomposition into components due to "true" frc errors and obs errors)
- Treat observations as probabilistic / ensembles
- Assimilation approaches

# Ensembles is a way to incorporate obs uncertainty

- Run ensemble forecasts from perturbed initial conditions
- To create ensemble of observations. One of the most well-known is VERA: Vienna Enhanced Resolution Analysis ensemble (Gorgas, T. and Dorninger, M. (2012). Concepts for a pattern-oriented analysis ensemble based on observational uncertainties. Quarterly Journal of the Royal Meteorological Society, 138(664):769–784.). To compare ens forecast with ens analysis. Special metrics, e.g. CRPS, ROC, SAL, adapted to obs ensemble (*M. Dorninger, S. Radanovics, D. Boucouvala, and others*)

VERA obs ensemble: the generation of perturbations is the core task in the ensemble procedure. The observation error information is primarily derived from residuals (i.e. correction increments for individual observations) provided by a data QC scheme for surface station data.

### 5. Creating an Analysis Ensemble

Schematic randomisation procedure performed for each station and parameter



#### Steps towards ensemble analyses

- Correct station observation values by removing biases dereived from deviations proposed by quality control
- Analyse bias-corrected observations = reference analysis
- Generate normal distribution fitted to distribution of quality control outputs
- Create a number of sets of (gaussian) randomized observation values
- Use perturbated data to create ensemble analyses







### Subtask 1.2. cont. How to deal with rare events in case of lacking long observation time series?

 Model simulation (Russian experiment on wind reanalysis using high-res COSMO-Ru in the Okhotsk Sea:

Ривин Г.С., Никитин М.А., Розинкина И.А., Кислов А.В., Варенцов М.И., Платонов В.С., Чумаков М.М. Использование региональной системы прогноза погоды COSMO-Ru для изучения гидрометеорологических условий на охотоморском шельфе: детализированные поля метеорологических элементов за 1985-2015 гг // Вести газовой науки. 2017. №4 (32))

- Sometimes, questioning old local inhabitants helps, but it is very uncertain
- Other approaches?

# Plan

- To finish the overview of existing methods to introduce observation uncertainty and novel verification scores accounting for observation uncertainty
- To test different scores adapted for observation uncertainties (CRPS in particular) using the MesoVICT data focusing on extreme precipitation