



Latest activities in the PP PROPHECY at IMGW

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Contents

- 1. (Sub)tasks covered**
- 2. Skill/spread relations and other results**
- 3. Basic conclusions, to-dos**



(Sub)tasks covered

1. Subtask 1.1 – Development of the parameter perturbation.
2. Subtask 2.2 – Assessment of the influence of various methods of perturbation of initial field of soil temperature.
3. Subtask 3.5 – Modification of lagged-approach scheme (“weights with memory” – connection to PP MILEPOST Subtask 2.2)



Subtask 1.1 – Development of the parameter perturbation.

Aim: examine soil-, PBL- and cloud-related parameters

- Testing the perturbation of soil-related parameters, of parameters in the cloud and precipitation schemes
- Setup: the domain covers Poland with adjacent areas, resolution – 2.8 km, period – (initially) one year, warm and cold season.
- Evaluation of the impact of different perturbation types/perturbed parameters on the aviation-targeted forecasts



Subtask 1.1 – Development of the parameter perturbation.

Selection of new parameters to be introduced in the TLE-MVE ensemble.

Possible candidates: reflectivity, freezing height, CAPE, SDI, VMAX/gusts, lightning frequency.

Others wanted (by aviation): horizontal/vertical visibility, CAT

To be useful (for research) it should be verifiable (against measurements).

In progress...



Subtask 2.2 – Assessment of the influence of various methods of perturbation of initial field of soil temperature.

Focus on the examining of the impact of disturbing the soil temperature field down to a given depth.

Assumed significance – down to ~1m depth (soil level #5 – 0.54m; #6 – 1.62m)

Keeping the condition of "zero overall change" – total temperature change (after perturbation and normalisation) calculated over the entire domain should be equal to zero.

The amplitude of perturbation depends on soil type (the "looser" the soil, the greater the amplitude – from clay to sand...)

Two types of RNGs applied – operational (cf. PP SPRED and APSU) and "regular", supplied with the original COSMO code.



Best ↓

Results

↓ Worst

Oper. RNG

Oper. RNG

Standard RNG

Standard RNG

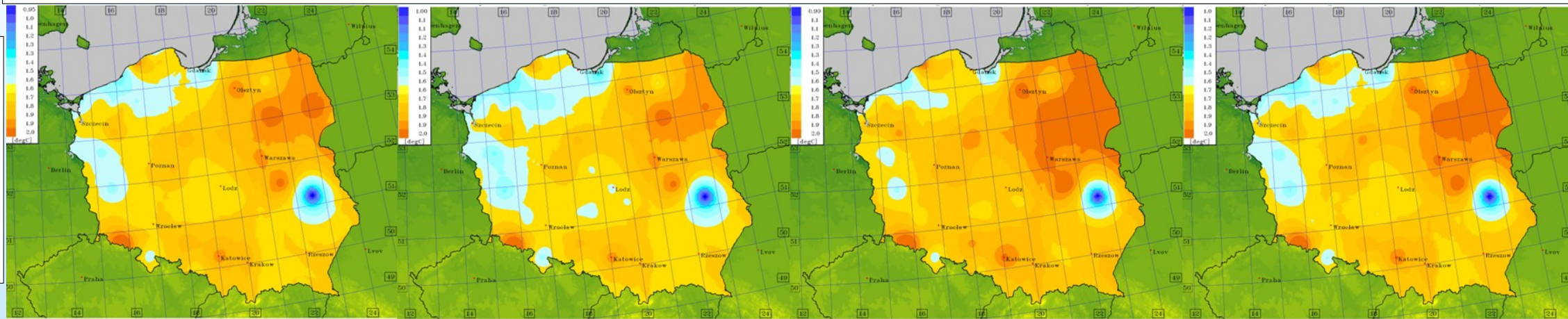
Sfc pert. only

Down to 5th level

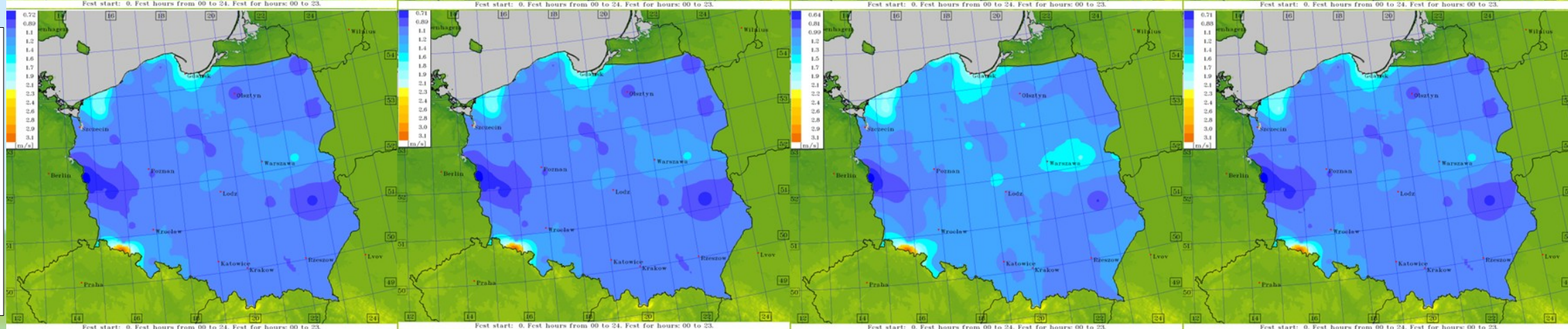
Sfc pert. only

Down to 5th level

T2M



T2M



2020



Best? ↓

Results

↓ Worst?

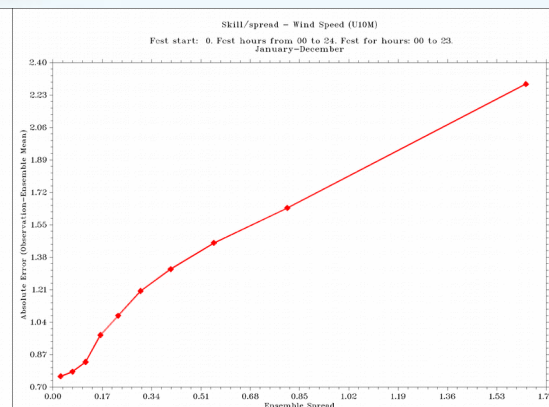
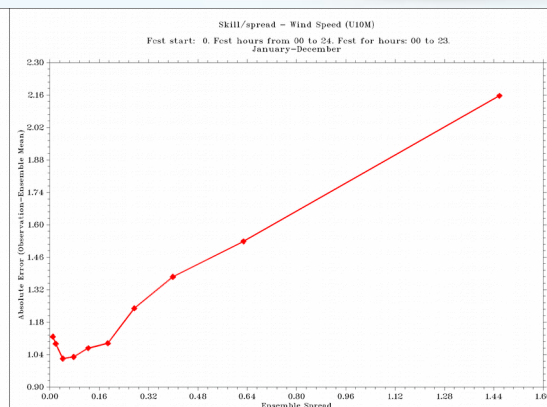
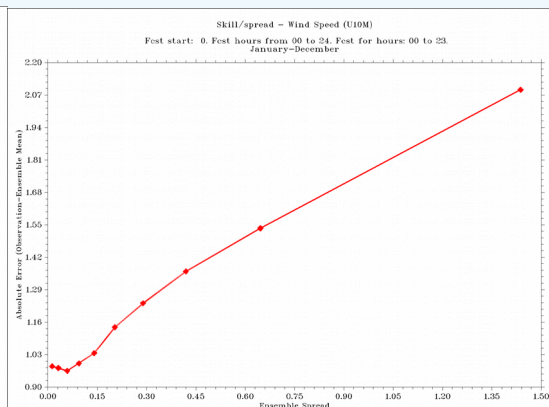
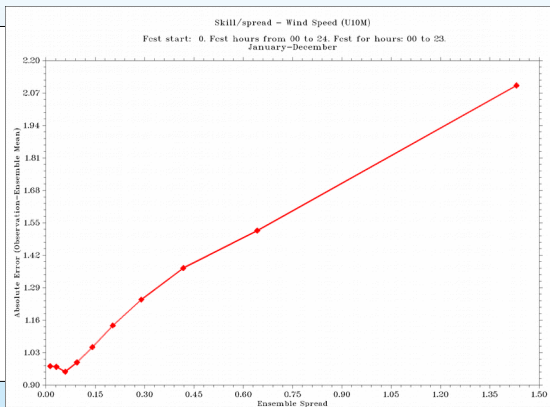
Oper. RNG
Sfc pert. only

Oper. RNG
Down to 5th level

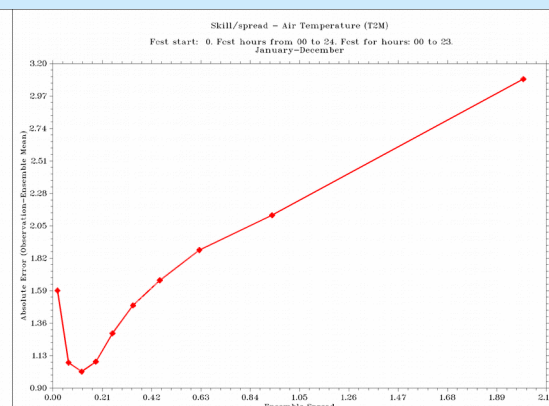
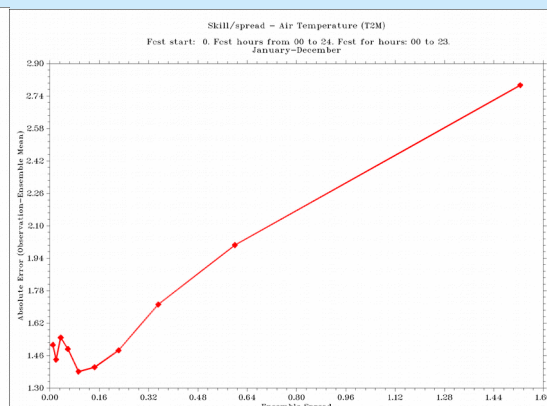
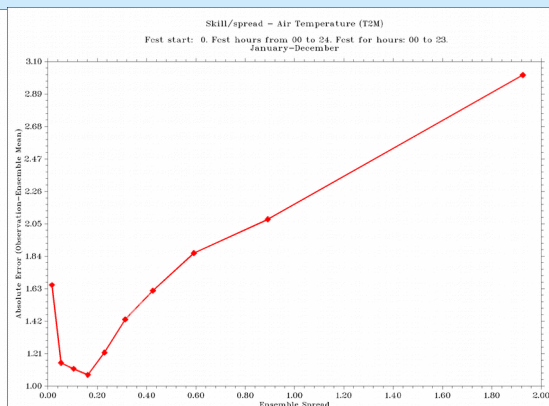
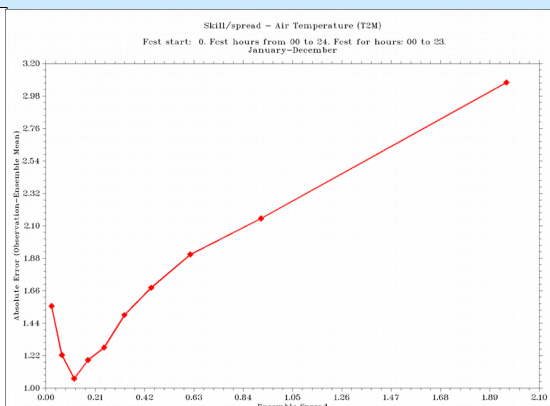
Standard RNG
Sfc pert. only

Standard RNG
Down to 5th level

U10M



T2M



2020





Subtask 3.5 – Modification of lagged-approach scheme (“weights with memory” – connection to PP MILEPOST Subtask 2.2)

Current operational setup – every member is used with equal importance, and every group has the same number of members. This data is subsequently passed to ANN-based post-processing.

Using the same set-up (i.e. period, domain and resolution) – test whether a change in the weight assigned to a specific member in the EPS can (positively) affect the performance of the forecast.

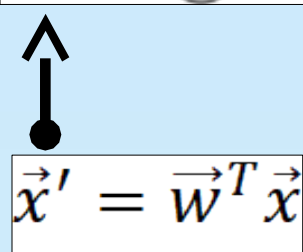
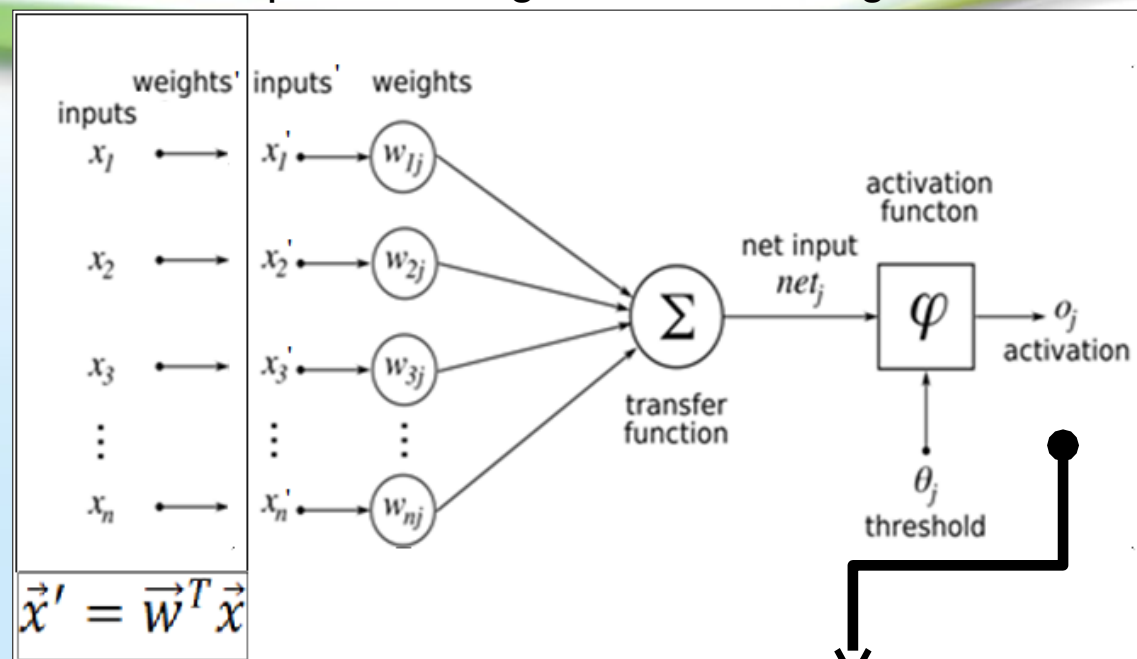
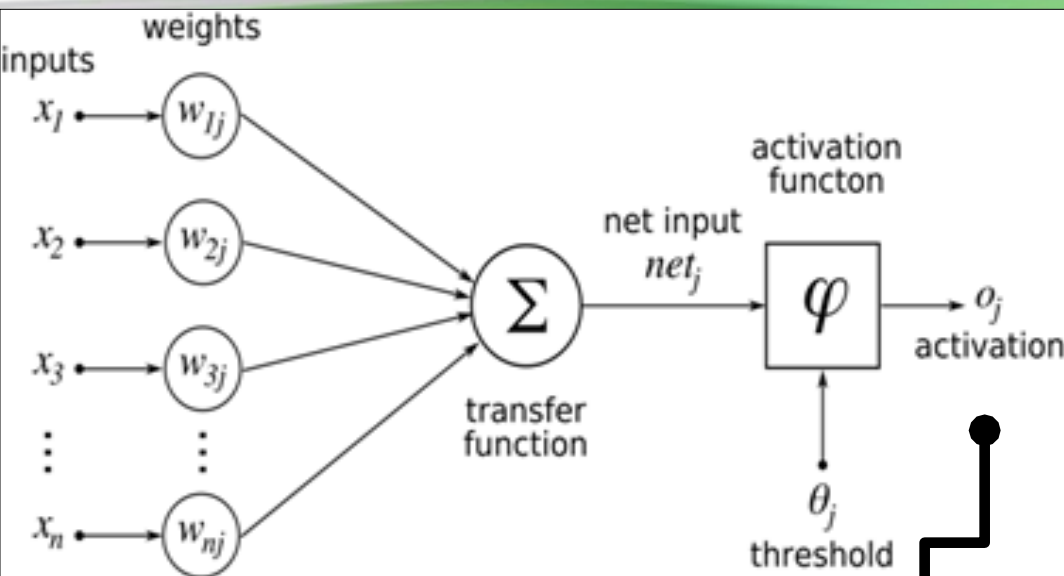
A “weight with memory” – the older runs would have smaller weights - or, the older runs would supply a smaller amount of members.



Modification of lagged-approach scheme – basic idea(s)

Operational setup

Setup with changeable initial weights



"Raw" values of skill

Corrected values of skill

NO!

Better than „raw” ones? (threshold)

YES!

Final output





Results

Average skill values

U10M

T2M

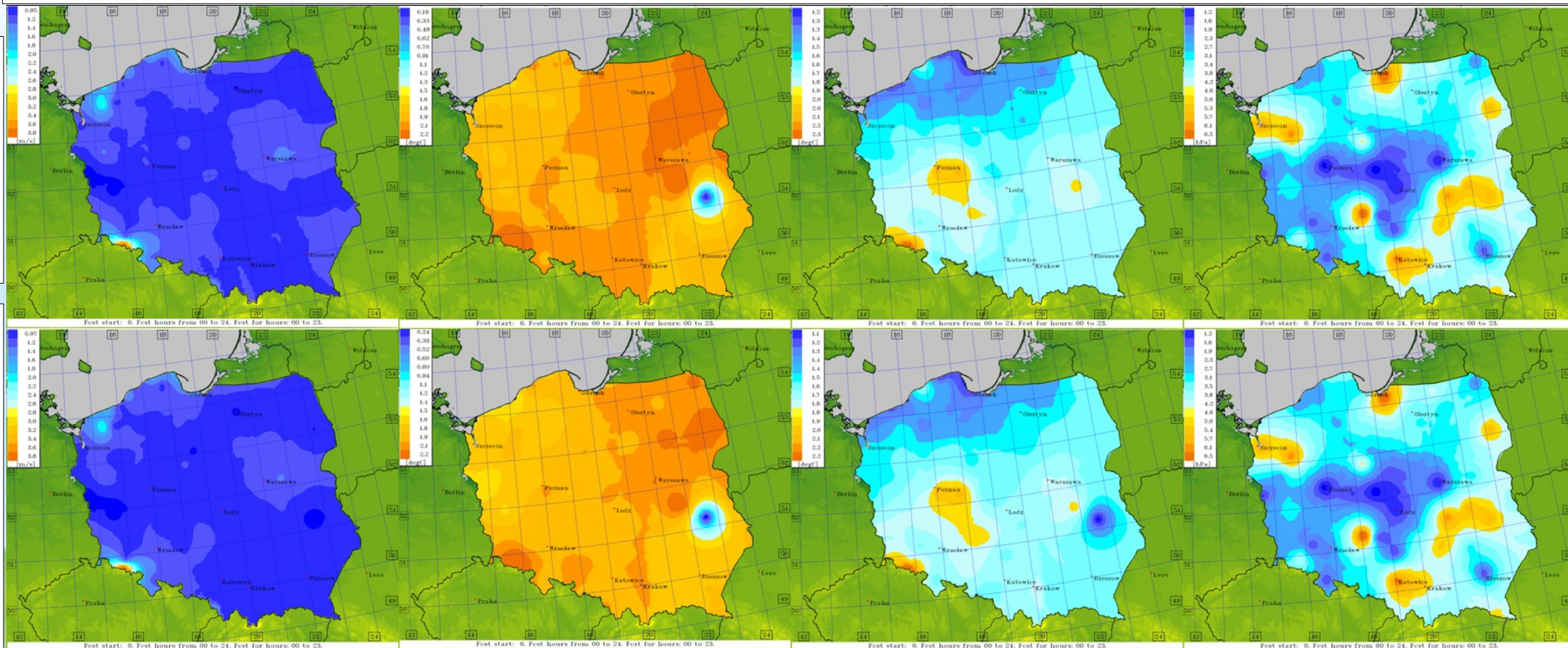
TD2M

PS

Raw ANN

Modified input ANN

Summer 2020





Basic conclusions, to-dos

- Combination of improved RNG and "deep" perturbation of soil temperature generates the best values of skill
- Altered inputs (with changeable weights) for ANN may improve skill of EPS compared to "raw" EPS output.

All the researches are "in progress"...

"Still to-do" list:

- Detailed research on relation between amplitude of perturbation and soil type
- Research on perturbation of other soil-related parameters
- Selection of parameters to be included in EPS

$$(1.00)^{365} = 1.00$$

$$(1.01)^{365} = 37.7$$

Doing nothing at all

Vs.

Small consistent effort