Perturbation of soil conditions for the convection-permitting ensembles: results of the COTEKINO PP

COTEKINO Priority Project - Task 3. Soil/surface perturbations

Andrzej Mazur, Grzegorz Duniec, Witold Interewicz

Institute of Meteorology and Water Management
National Research Institute
Department of Numerical Weather Forecasts – COSMO

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INTRODUCTION

- *c_soil*[*)] - a soil-related, quasi-constant parameter, was chosen for an "ensemble base"… (COSMO GM 2013, CUS 2014)

- … since it is possible to prepare a representative ensemble modifying source code to (randomly) perturb values of *c_soil* from gridpoint to gridpoint over the domain (COSMO GM 2014)

- Perturbations (in certain circumstances...) have had initially almost insignificant influence, especially in locations with small land fraction (CUS 2015).

- Solution for an operational setup? Time-lagged-based boundary and initial conditions (BICs)…

- … combined with a relation between soil type and an amplitude of the perturbation.

[*)] *c_soil* - surface-area index of the evaporating fraction of gridpoints over land, related to *c_lnd* - surface-area index of gridpoints over land.
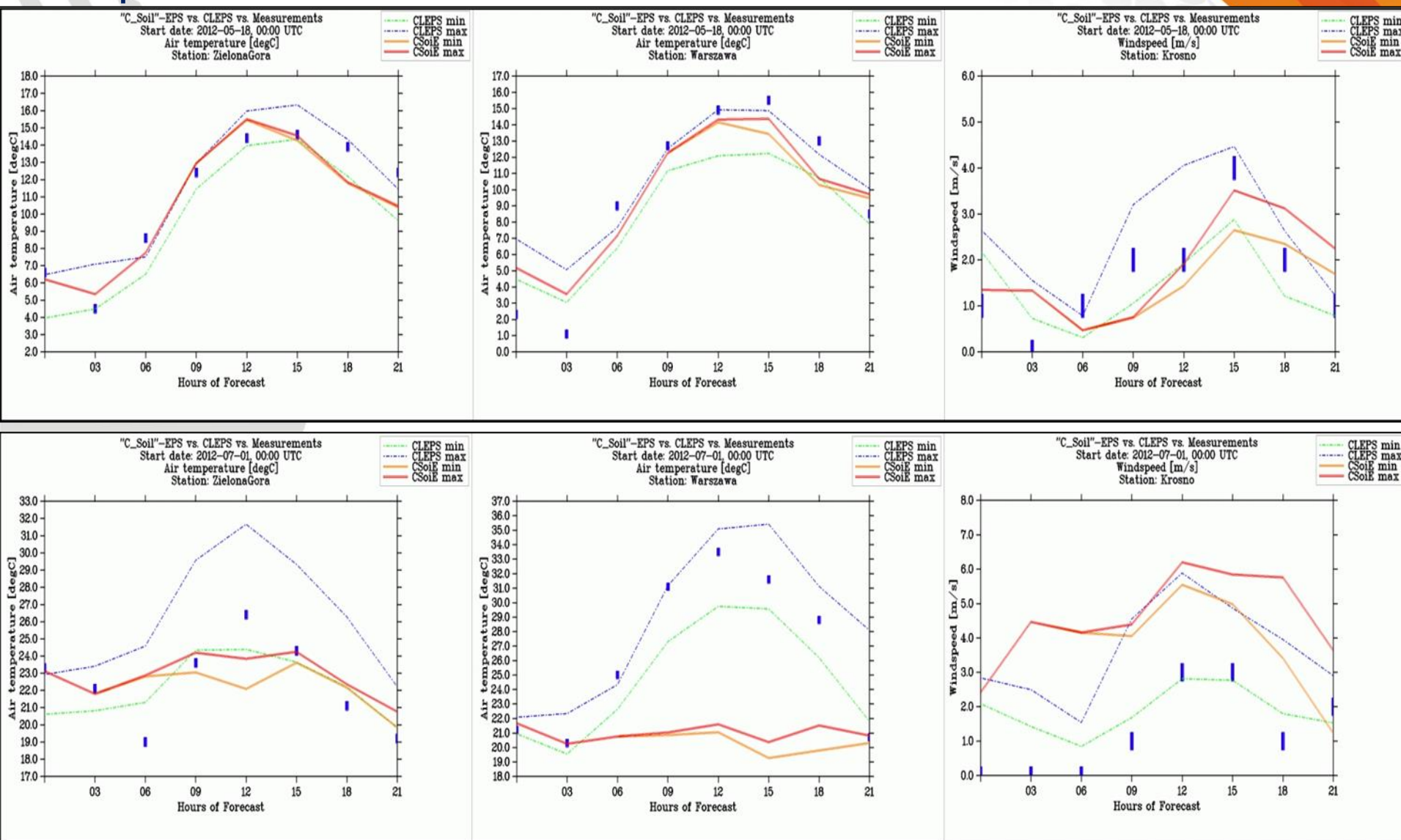
PREVIOUS RESULTS – SHORT REMINDER
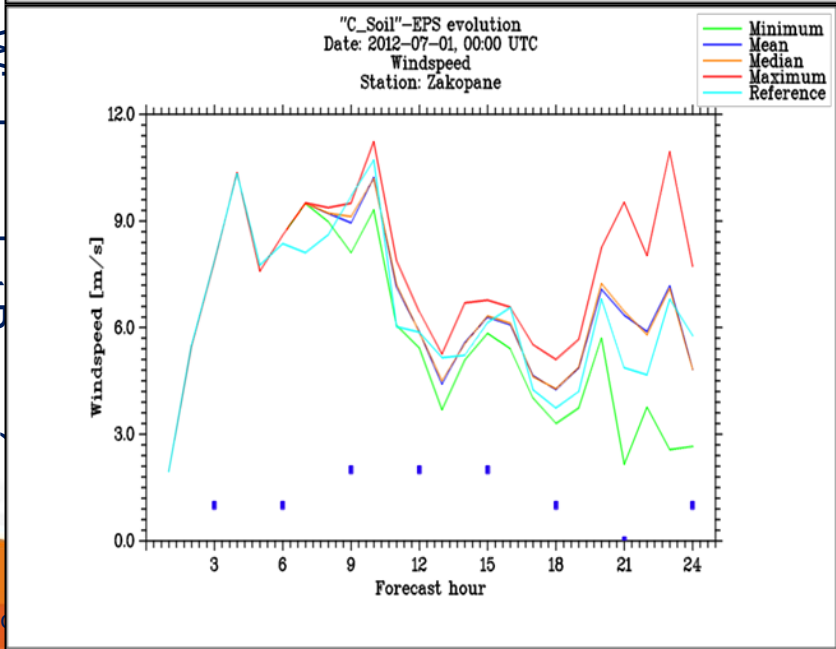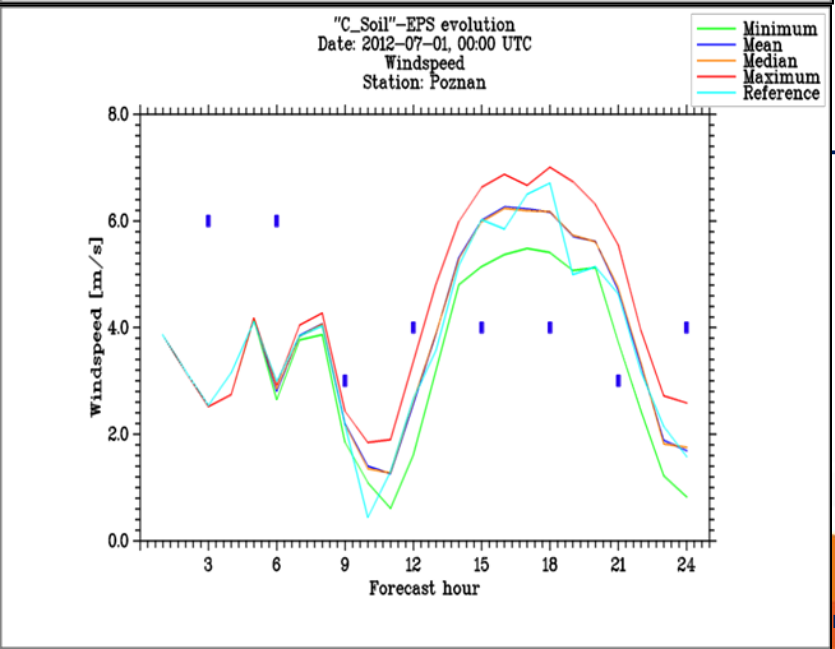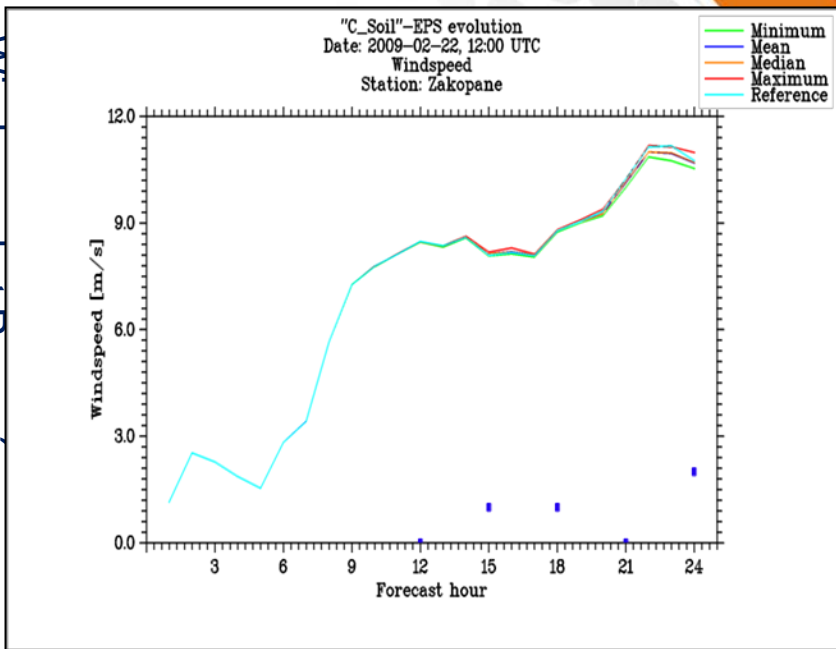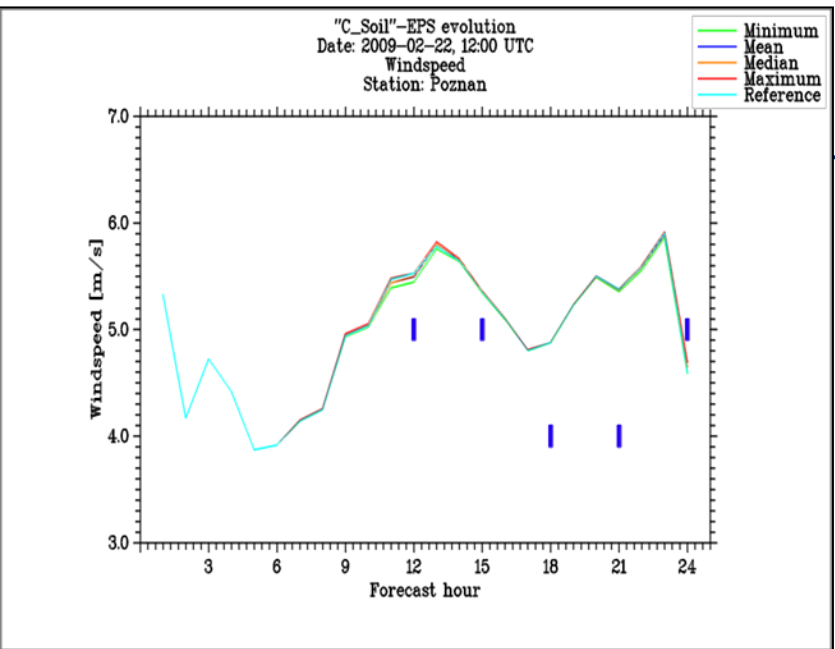
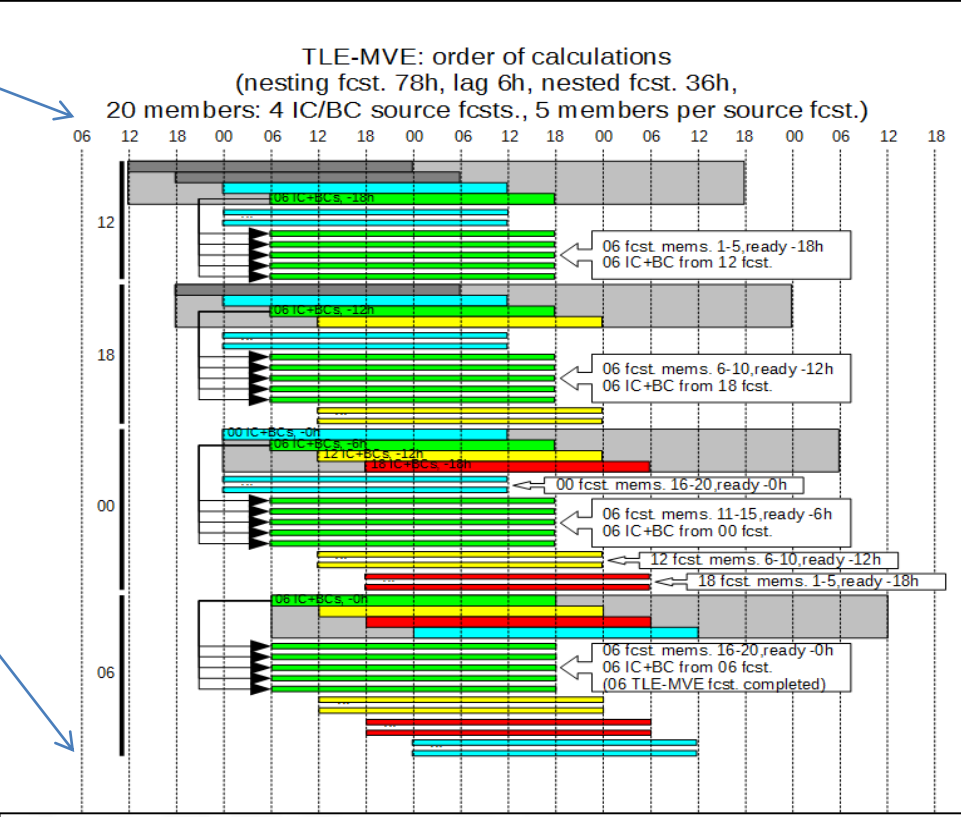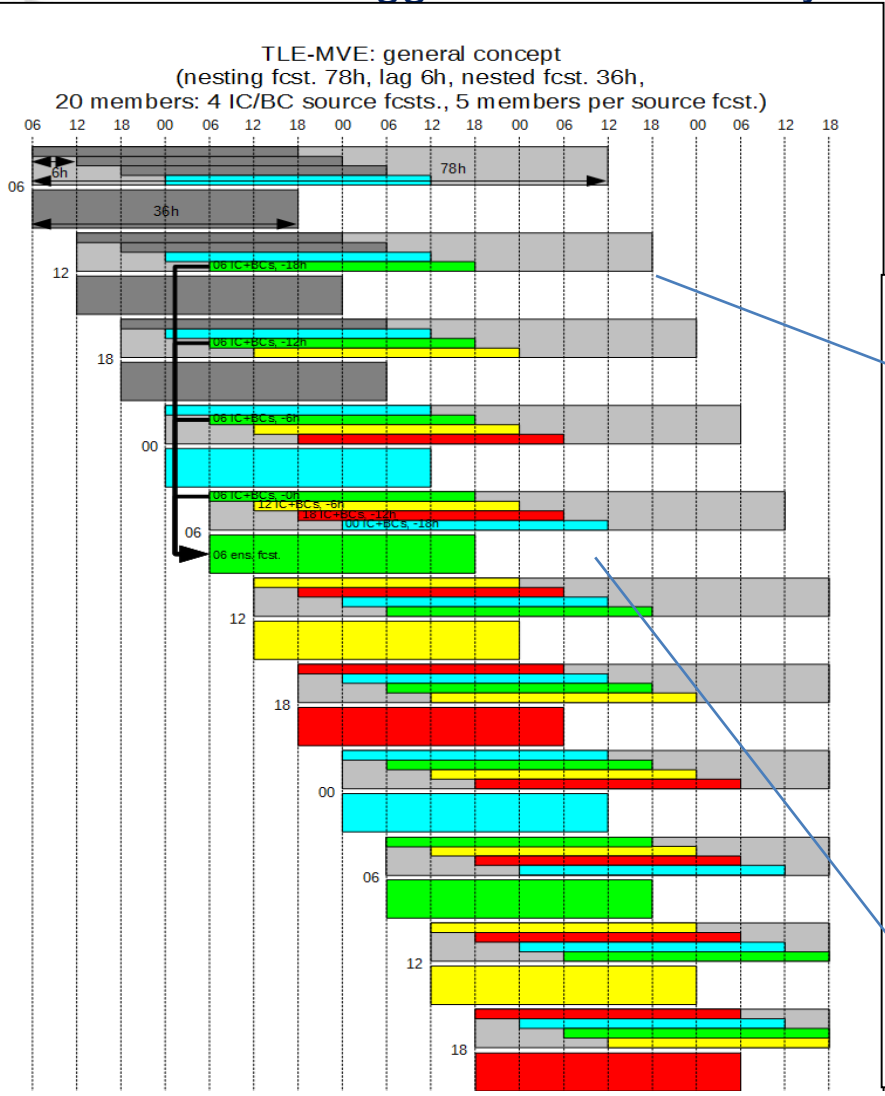# PREVIOUS RESULTS – SHORT REMINDER

Comparison with COSMO LEPS

OPERATIONAL CONFIGURATION

An idea of Time-Lagged set of boundary/initial conditions (TL-BIC)[*]:

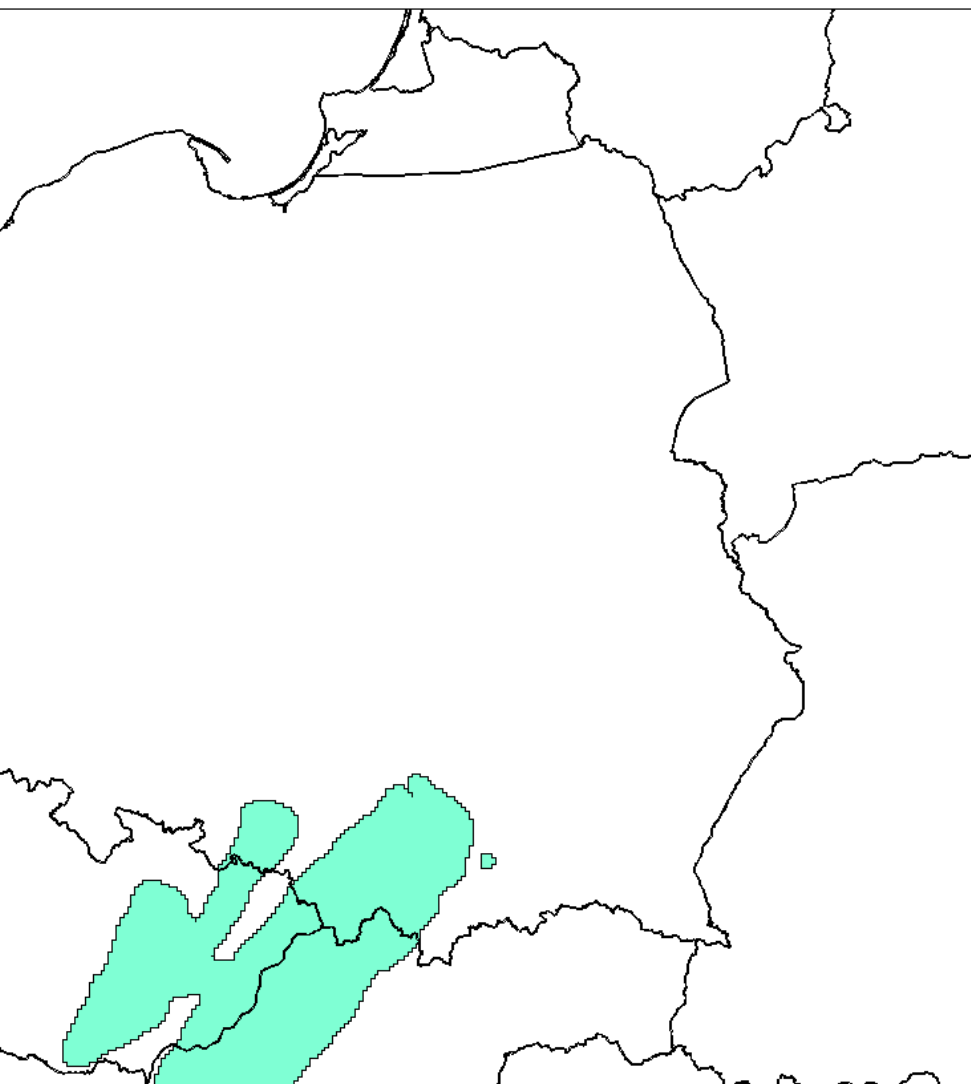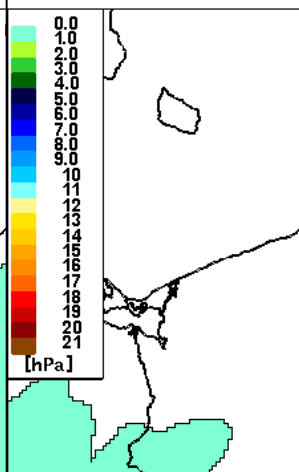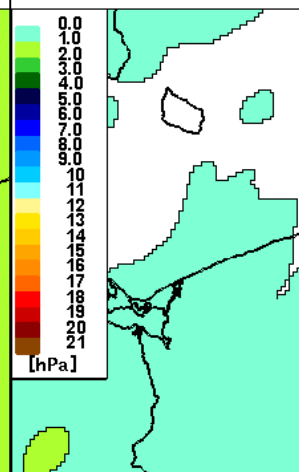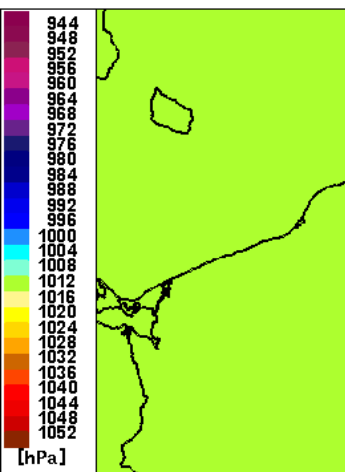TLE – Time-Lagged Ensemble; MVE – Model-Varied Ensemble

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*)An outcome from the discussion(s) at GM2014 and CUS 2015

CURRENT RESULTS
PMSL (ensemble mean, max-min, spread for 00 hour of forecast):

Start of forecast: 2015-08-28 18:00

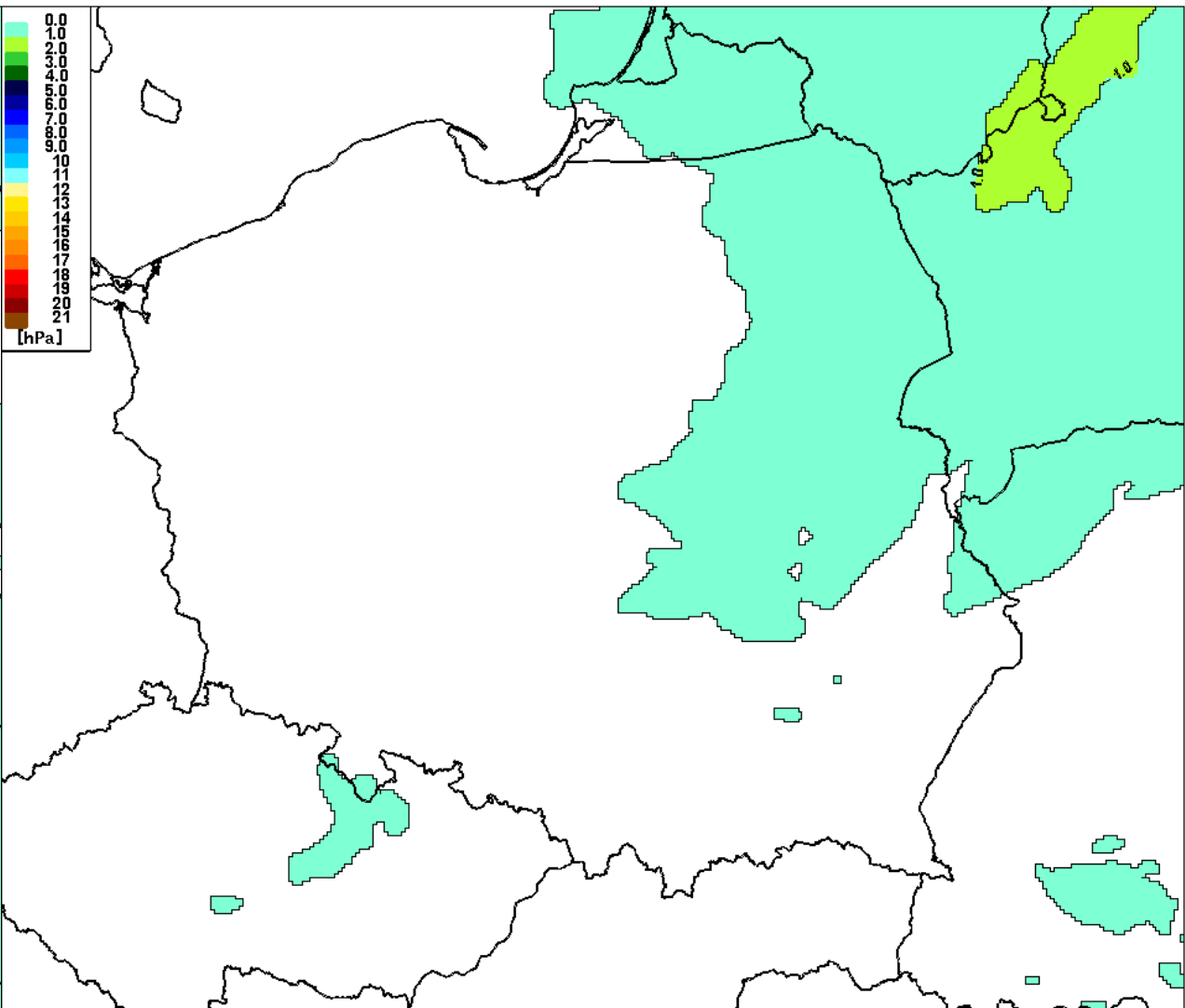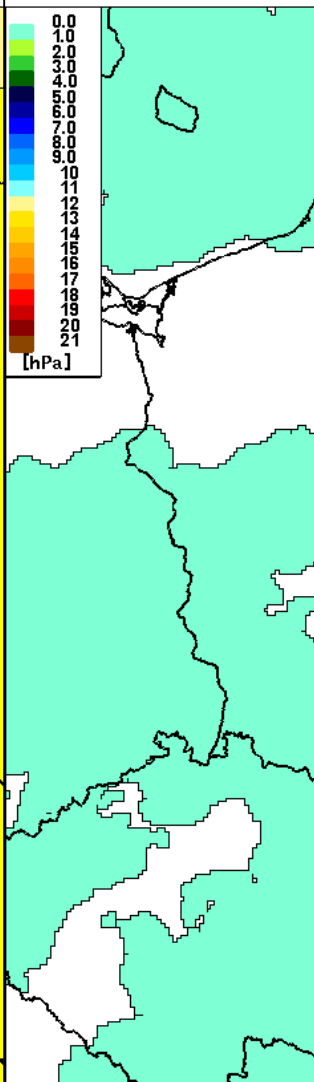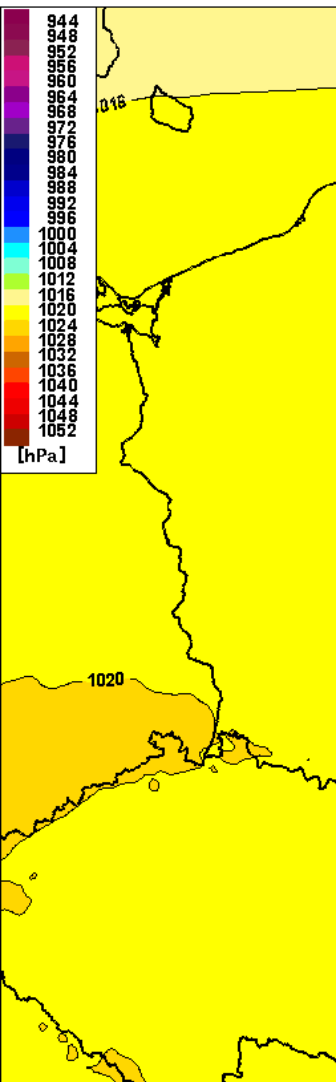Mean sea-leve | Mean sea-level p | Mean sea-level pressure – ensemble spread at 00 hour of forecast

CURRENT RESULTS
PMSL (ensemble mean, max-min, spread for 24 hour of forecast):

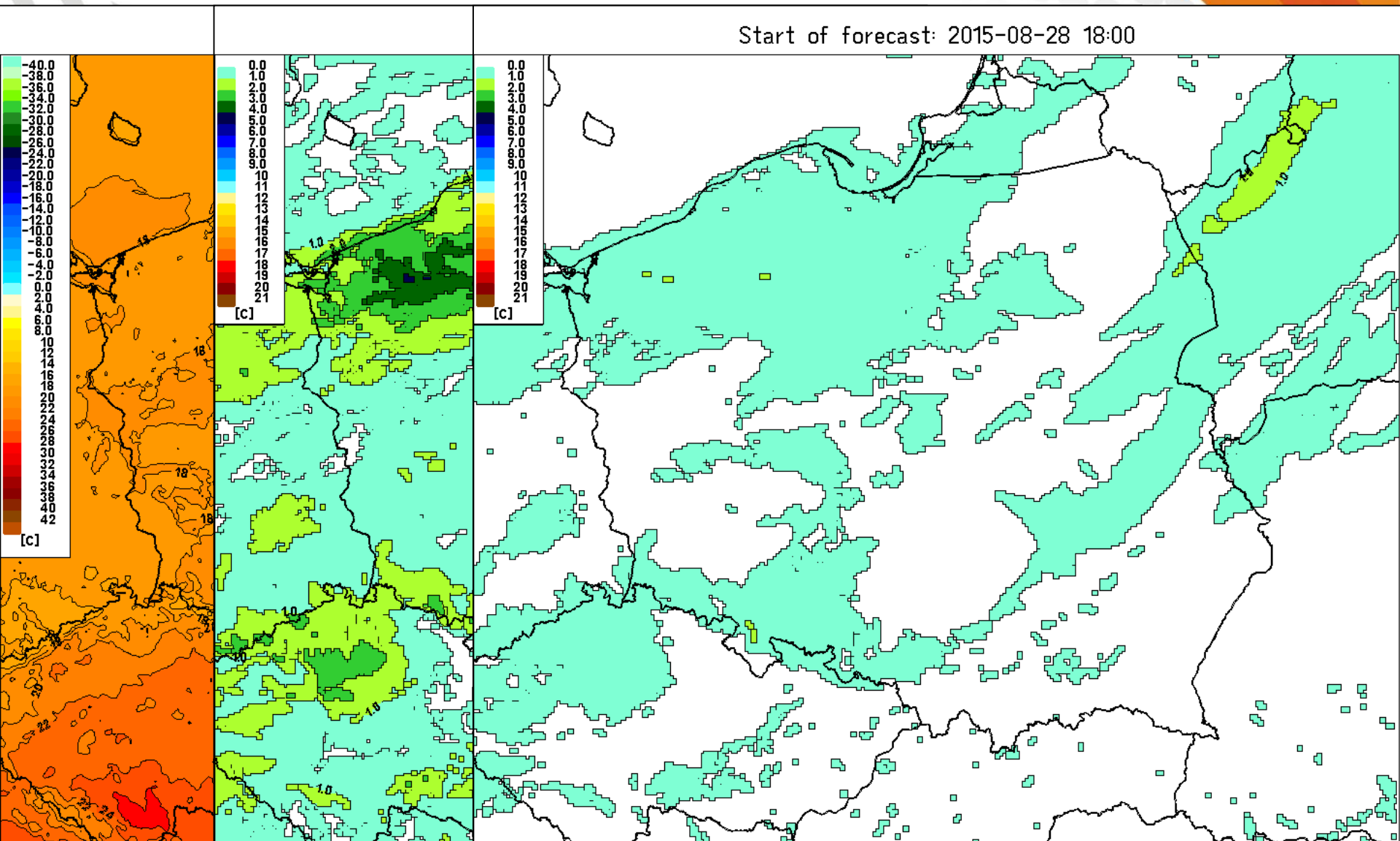Start of forecast: 2015-08-28 18:00

Mean sea-lev Mean sea-level pre Mean sea-level pressure – ensemble spread at 24 hour of forecast

CURRENT RESULTS

T2M (ensemble mean, max-min, spread for 24 hour of forecast):

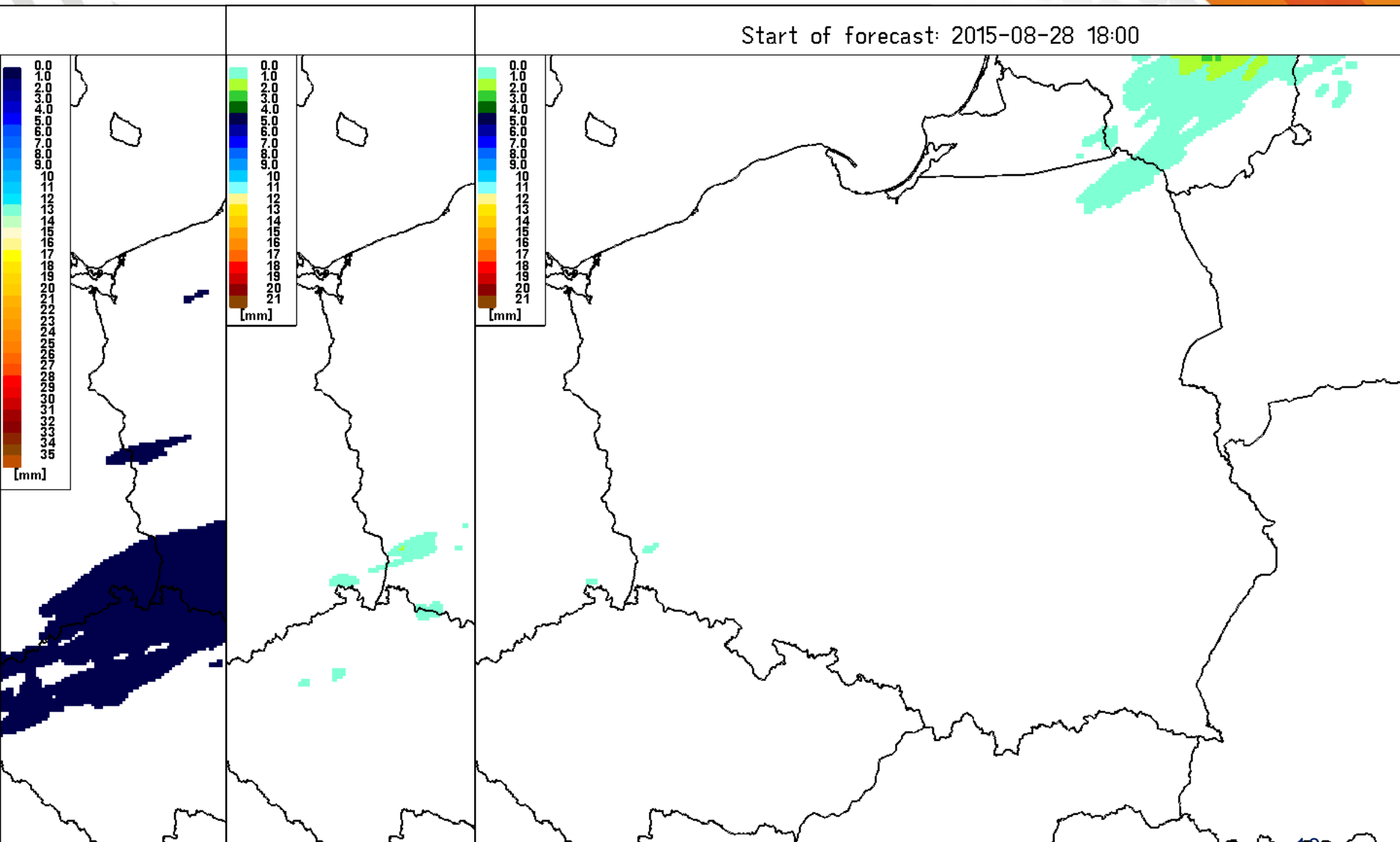Start of forecast: 2015-08-28 18:00

Air tempe   Air temperature at 2   Air temperature at 2m – ensemble spread at 24 hour of forecast

CURRENT RESULTS
TOT_PREC (ensemble mean, max-min, spread for 24 hour of forecast):
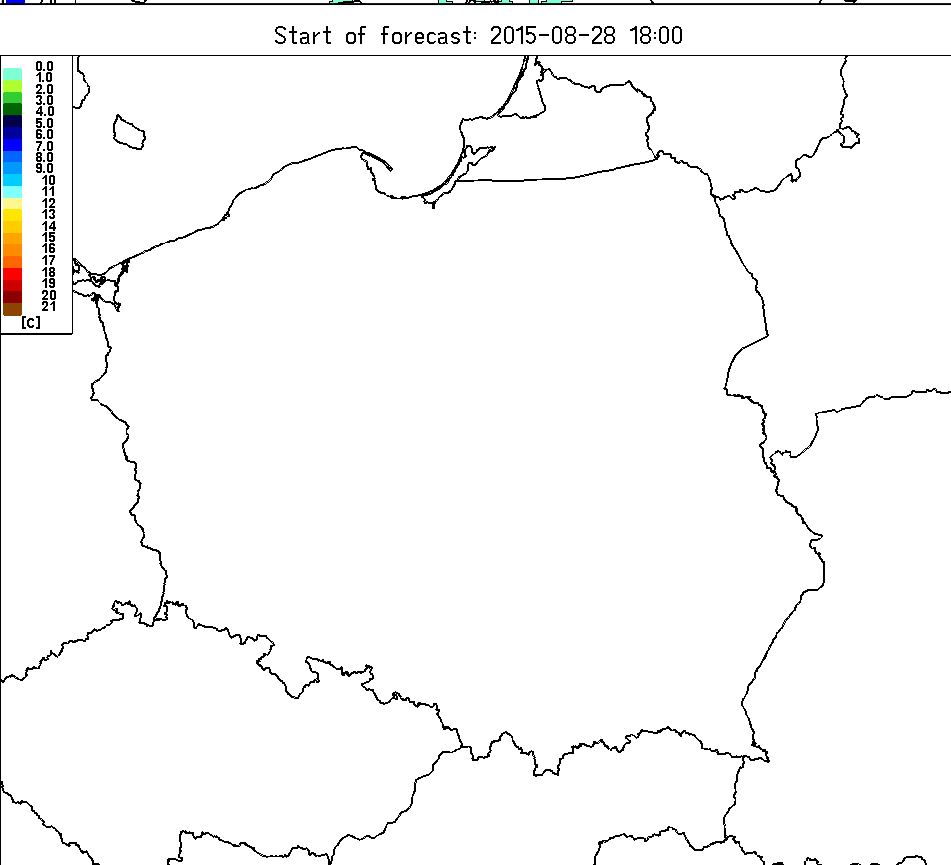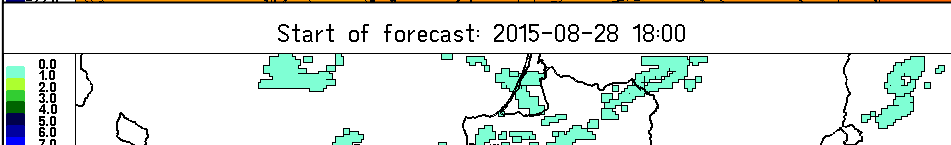

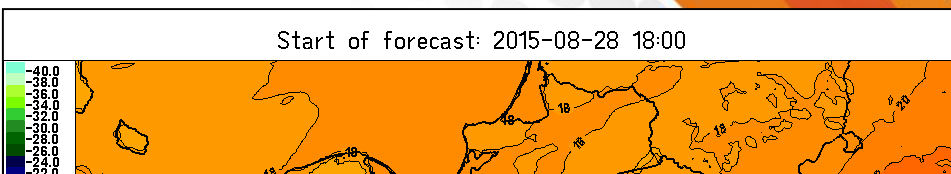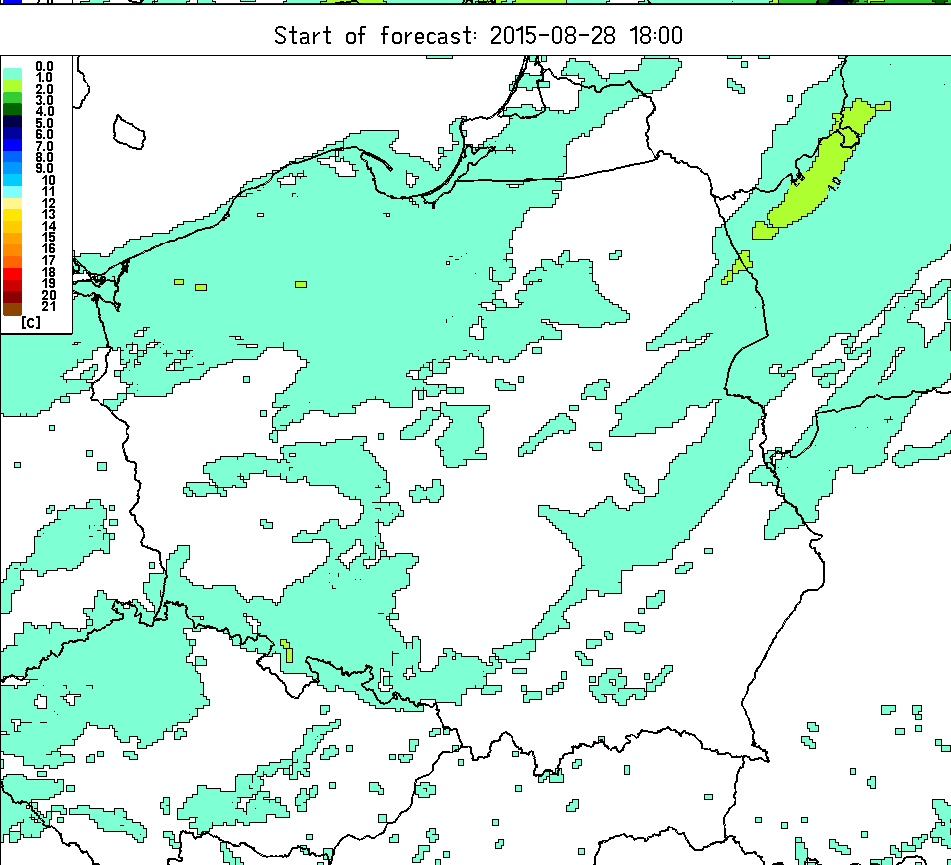Start of forecast: 2015-08-28 18:00
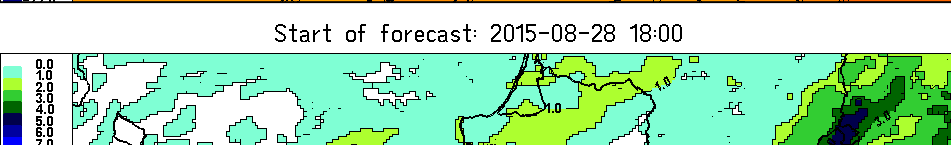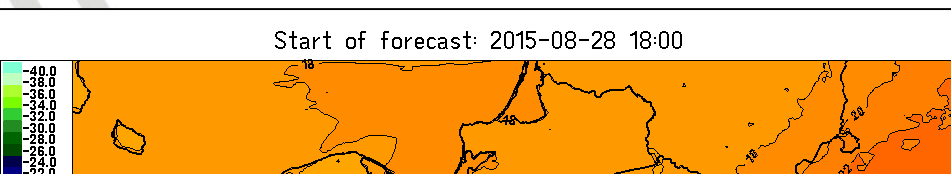
Precip   Precipitation –   Precipitation – ensemble spread at 24 hour of forecast

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CURRENT RESULTS

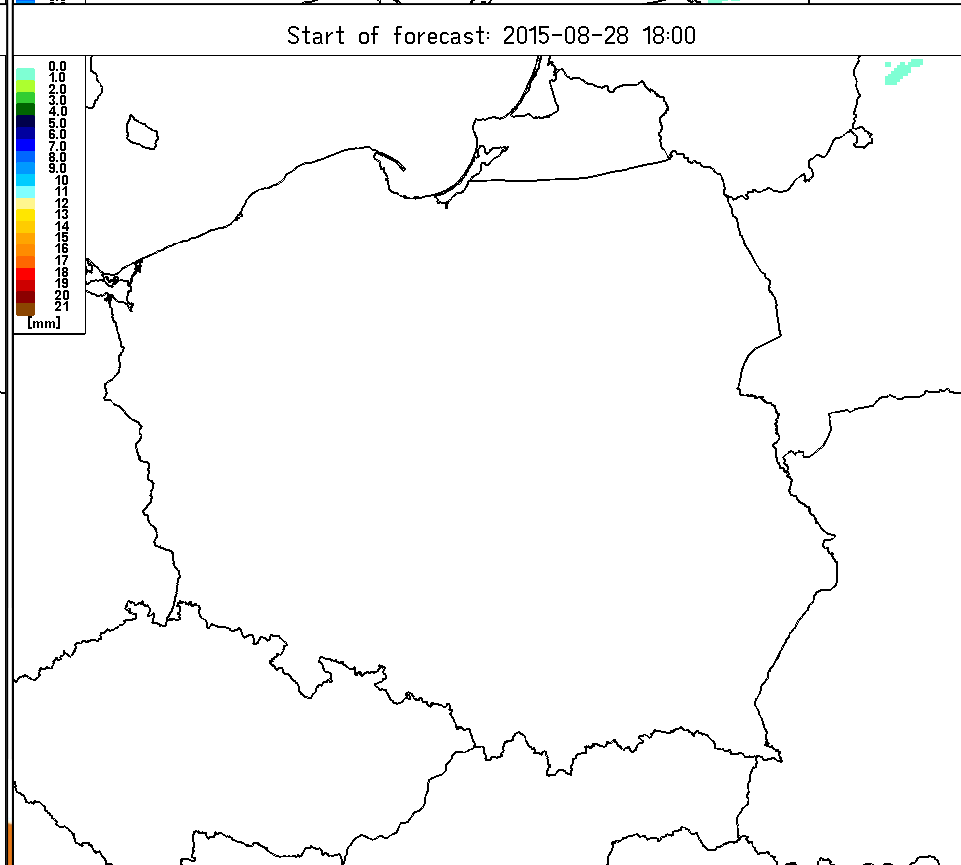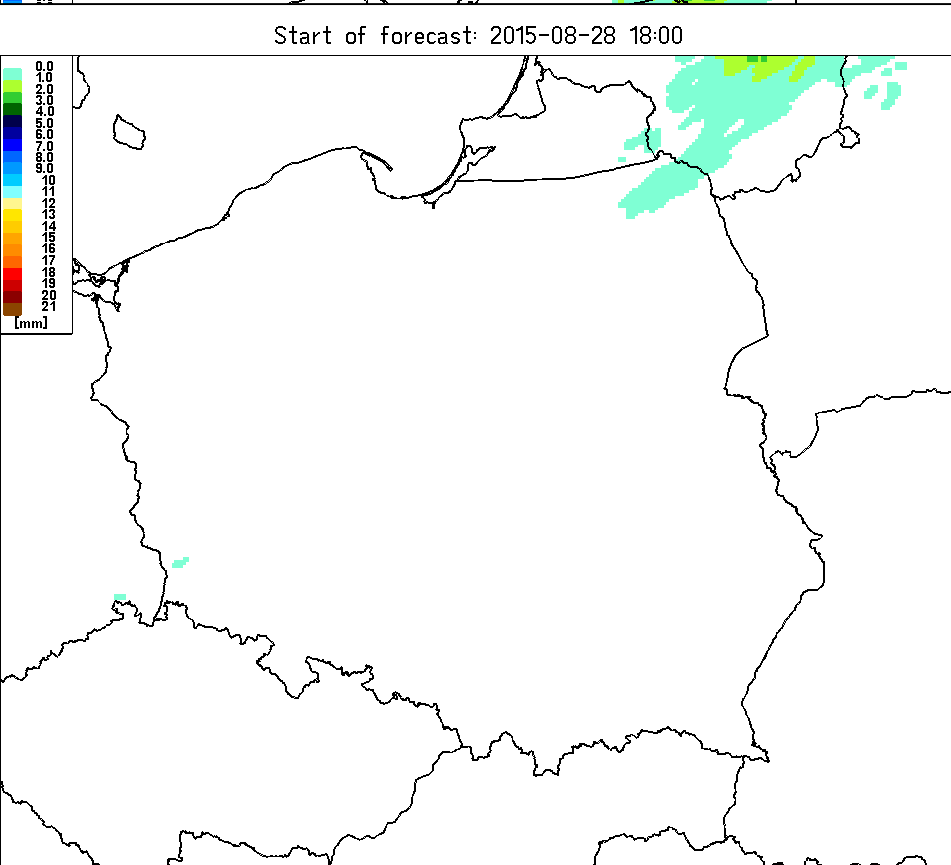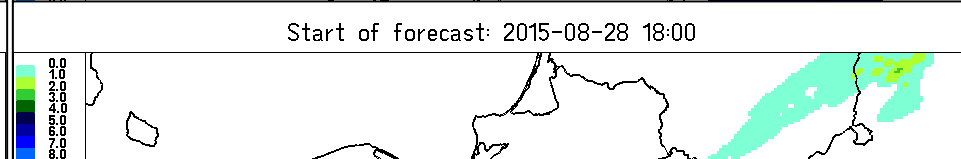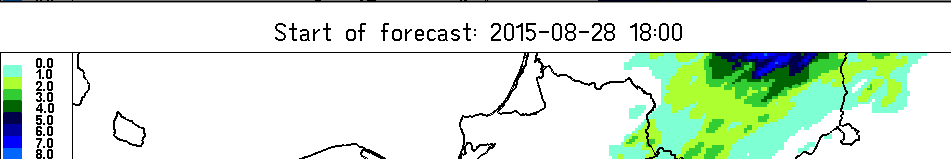## T2M – Time-Lagged (left) vs. one deterministic (right) set of BICs:

Air temperature at 2m – ensemble spread at 24 hour of forecast

CURRENT RESULTS
TOT-PREC – Time-Lagged (left) vs. one deterministic (right) set of BICs:

CURRENT RESULTS
TLE (left) vs. deterministic run (right):

CONCLUSIONS

- EPS was based on perturbation of *c_soil* value over the entire domain (from point to point), resolution 2.8km, 285x255 grid points

- A relation between soil type and an amplitude of the perturbation was assumed

- Initially, BICs for members were taken from deterministic run 7km over Europe (spread was not impressive, especially in first few hours of forecast)

- Eventually (currently in an operational mode) BICs are acquired from previous deterministic runs (TL-based BICs)

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OUTCOMES AND TO-DOs

Outcomes

• (Quasi-)operational EPS up and running…

• … with post-processing setup…

• … and with the ability to quickly and easily upgrade

To-dos (in the frame of the follow-up Priority Project)

• Perturbation of surface temperature (initial conditions) in a similar way – operational implementation

• Perturbation of soil porosity and/or tortuosity

• Summing up results, conclusions, setting most promising way to get a good ensemble

Thank you for attention ☺

Andrzej Mazur, Grzegorz Duniec, Witold Interewicz
Instytut Meteorologii i Gospodarki Wodnej
Państwowy Instytut Badawczy
Institute of Meteorology and Water Management
National Research Institute
01-673 Warszawa, ul.: Podleśna 61
tel. +48 22 56-94-134
andrzej.mazur@imgw.pl
grzegorz.duniec@imgw.pl
witold.interewicz@imgw.pl
www.imgw.pl
www.pogodynka.pl

POGODYNKA.PL
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