Status and activities in the frame of APSU-PP in IMGW

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1. Job done

2. Examples

3. Summary

T1.3 Perturbations based on adapted Random Number Generator (RNG) – for the years 2011 – 2015, comparison (already operationally running) the "new" RNG with regular one as before.

T3.1 Perturbation of soil surface temperature and

T3.3 Combination of soil and upper air perturbation – further comparison of various perturbation methods vs. operational EPS vs. reference ("deterministic") forecasts and vs. measurements over the entire domain, for the years 2011-2015.
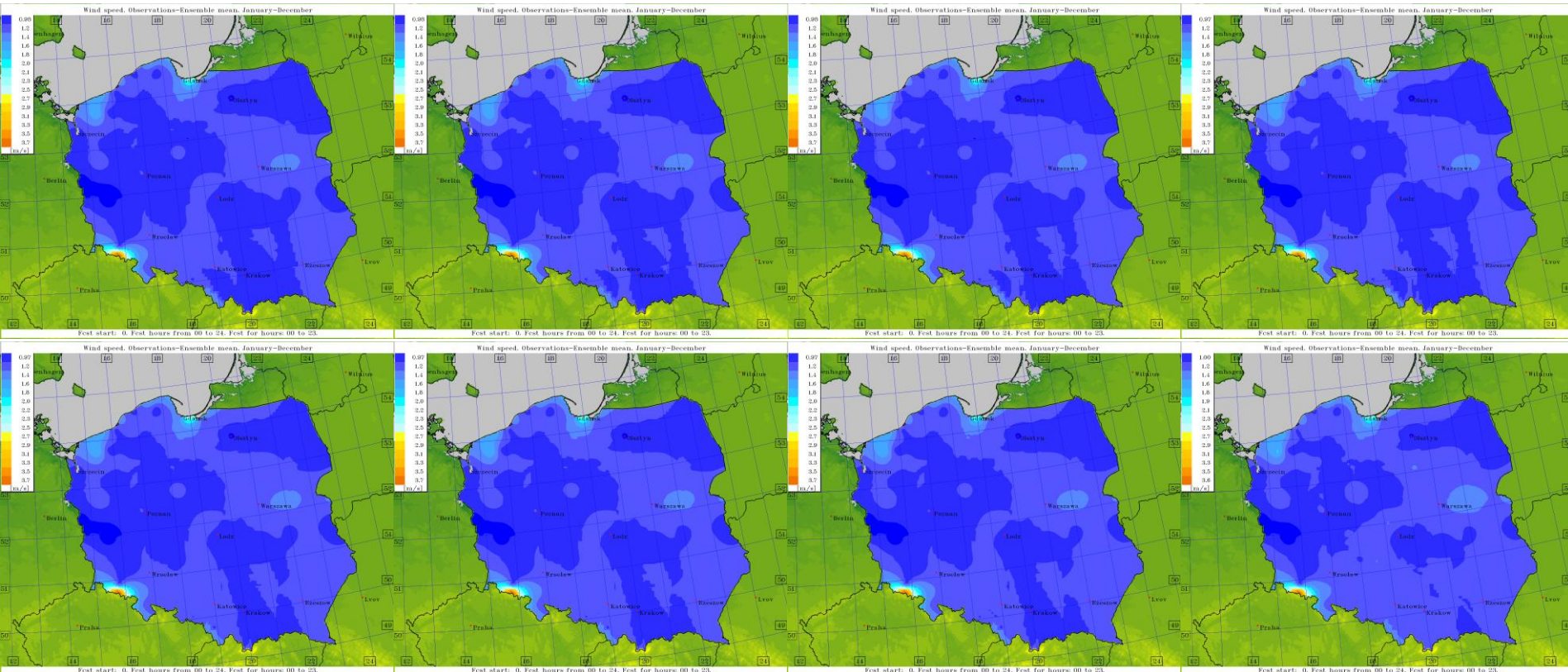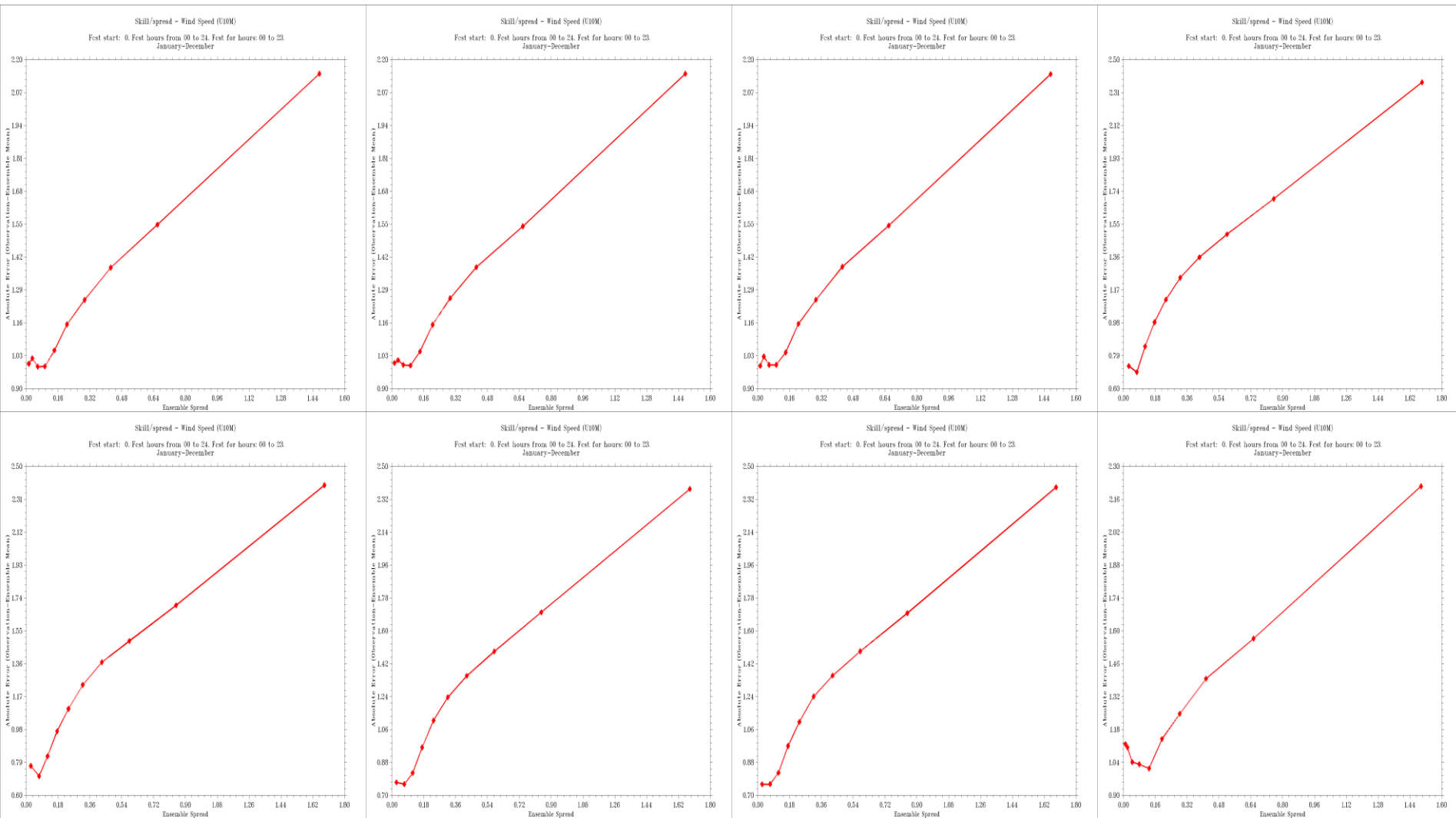
Spatial distribution of skill for wind speed. Top charts, perturbations left to right: all combined, *laf*, *laf-efco*, *laf-c_soil*. Bottom charts: *c_soil*, *ef-c_soil*, operational, *efco*. Avg. for 2011-2015

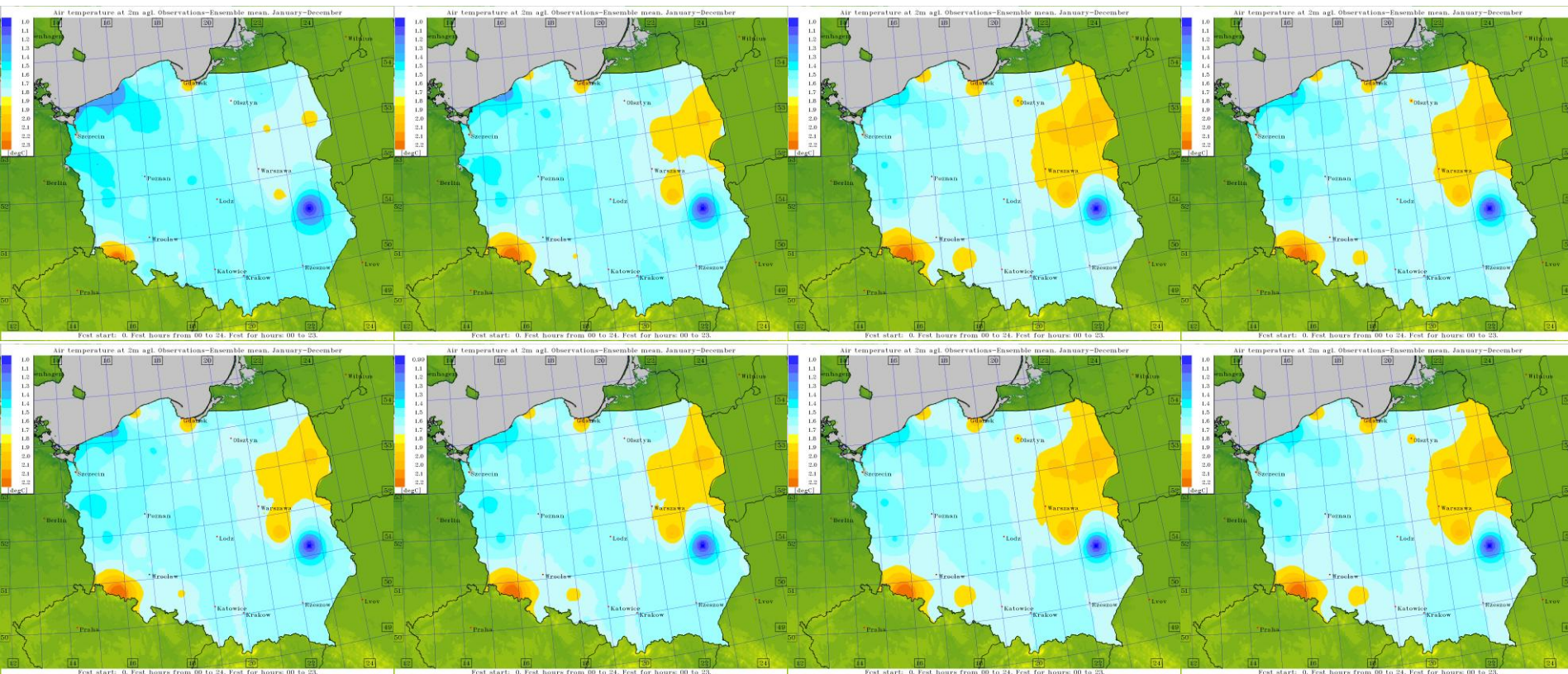| Pert. type	MAE	StD	Pert. type	MAE	StD	Pert. type	MAE	StD	Pert. type	MAE	StD
all	1.2521	1.6954	*laf*	1.2523	1.6957	*laf-efco*	1.2525	1.6959	*laf-c_soil*	1.2527	1.6970
c_soil	1.2566	1.7013	*ef-c_soil*	1.2584	1.7029	*oper*	1.2586	1.7031	*efco*	1.2877	1.7347

Spread/skill charts for wind speed. Top charts, left to right: all combined, *laf*, *laf-efco*, *laf-c_soil*. Bottom charts: *c_soil*, *ef-c_soil*, operational, *efco*. Avg. for 2011-2015
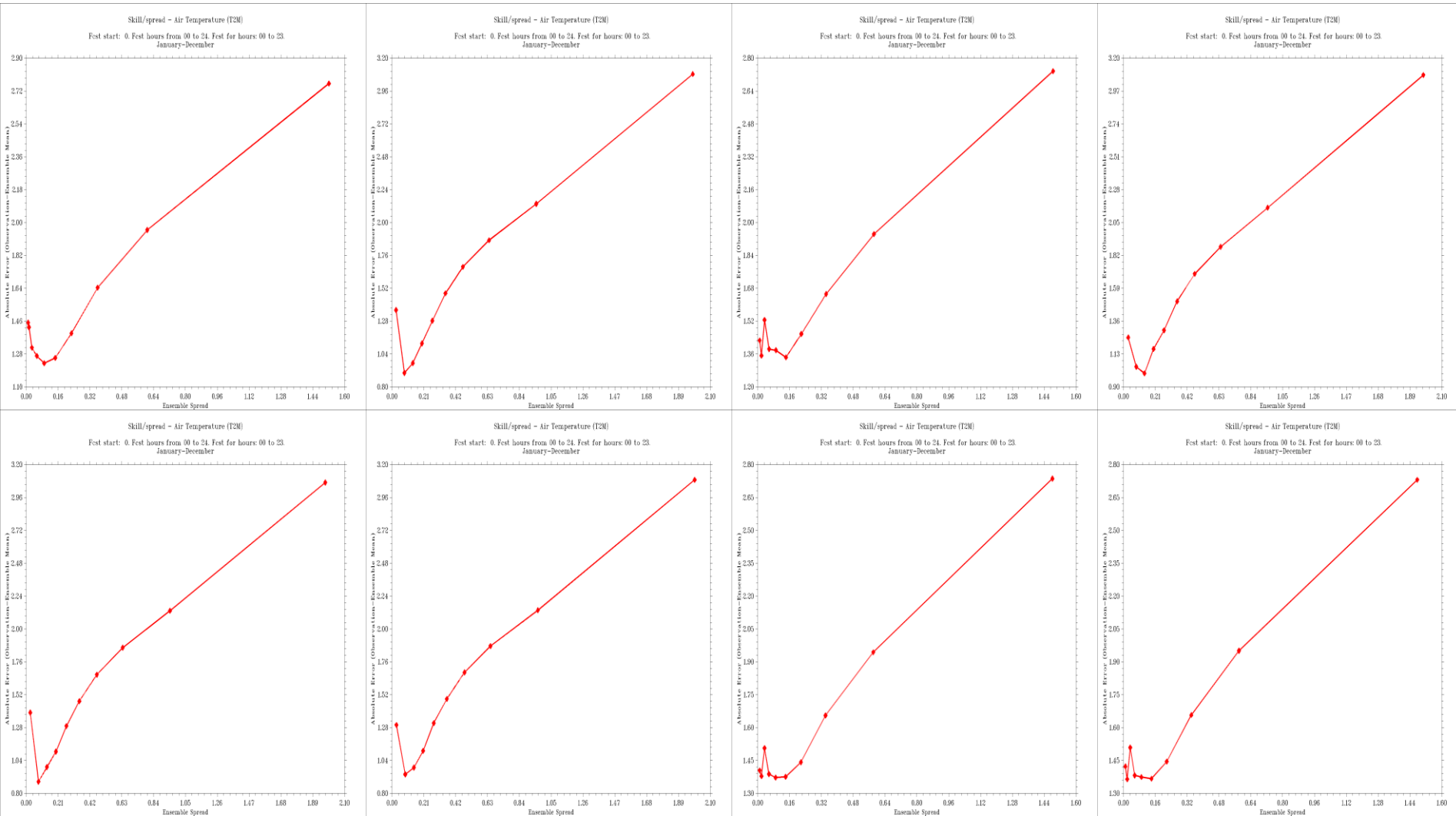
Spatial distribution of skill for air temp. Top charts, left to right: *efco*, operational, all combined, *laf-c_soil*. Bottom charts: *ef-c_soil*, *c_soil*, *laf*, *laf-efco*. Avg. for 2011-2015

Pert. type	MAE	StD	Pert. type	MAE	StD	Pert. type	MAE	StD	Pert. type	MAE	StD
efco	1.5710	2.0495	*oper*	1.5889	2.0824	*all*	1.6202	2.1241	*laf-c_soil*	1.6048	2.1064
ef-c_soil	1.5870	2.0792	*c_soil*	1.5924	2.0846	*laf*	1.6203	2.1240	*laf-efco*	1.6204	2.1244

Spread/skill charts for air temp. Top charts, left to right: ef-c_soil, operational, efco, c_soil. Bottom charts: laf-c_soil, all combined, laf, laf-efco. Avg. for 2011-2015
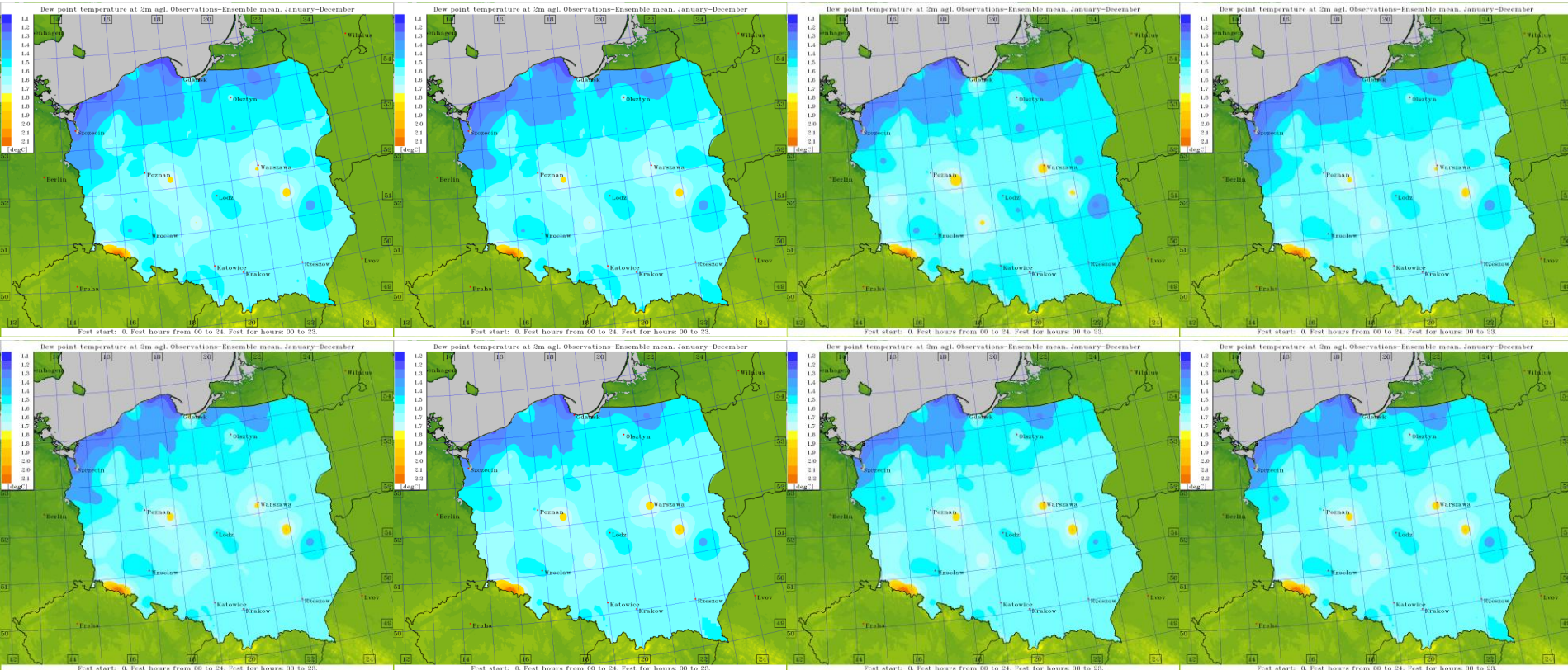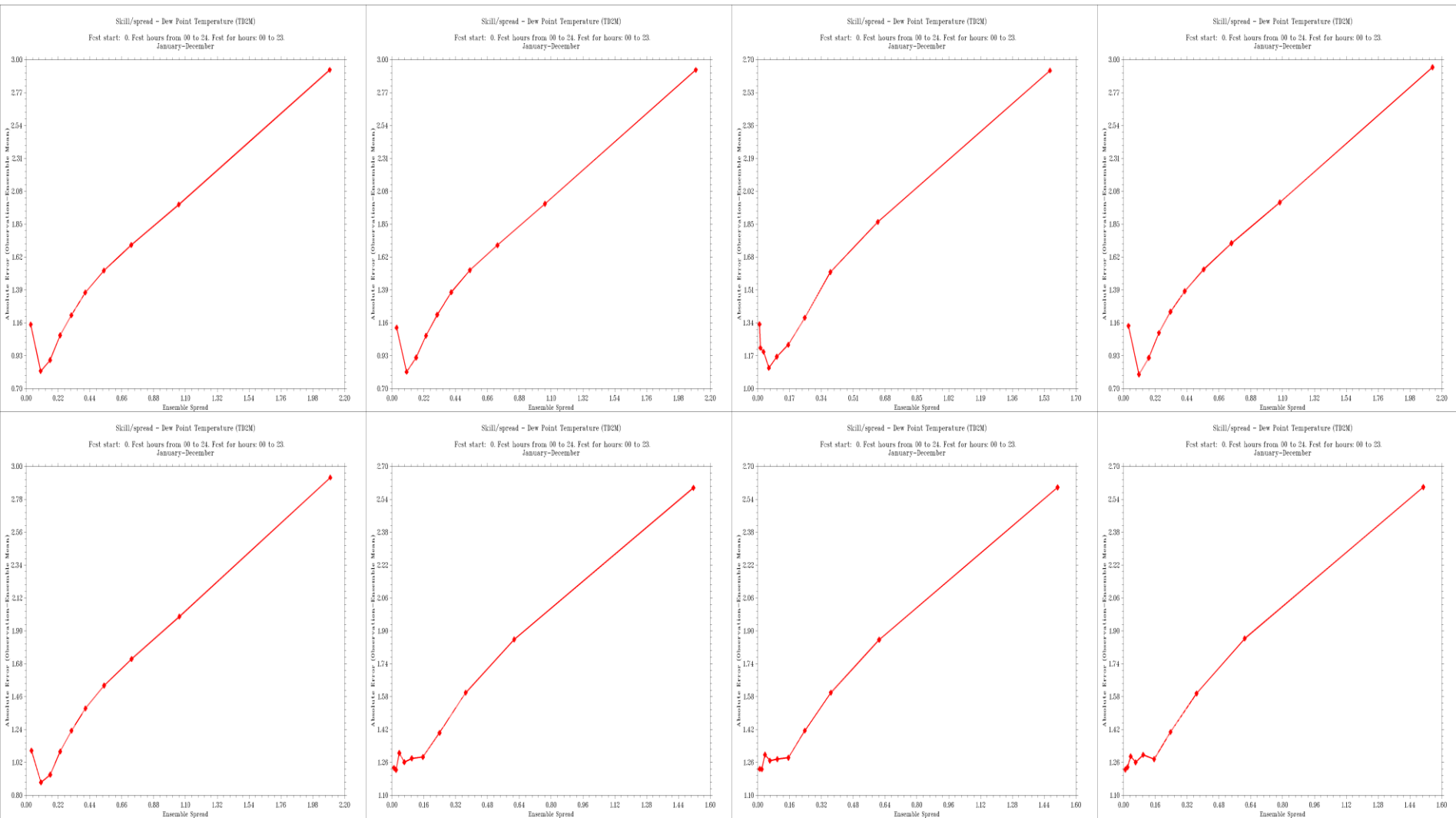
Spatial distribution of skill for dew point. Top charts, left to right: *ef-c_soil*, operational, *efco*, *c_soil*. Bottom charts: *laf-c_soil*, all combined, *laf*, *laf-efco*. Avg. for 2011-2015

Pert. type	MAE	StD	Pert. type	MAE	StD	Pert. type	MAE	StD	Pert. type	MAE	StD
ef-c_soil	1.4676	1.9719	*oper*	1.4677	1.9722	*efco*	1.4709	1.9683	*c_soil*	1.4765	1.9840
laf-c_soil	1.4799	1.9897	*all*	1.5049	2.0210	*laf*	1.5051	2.0210	*laf-efco*	1.5052	2.0213

Spread/skill charts for dew point. Top charts, left to right: *ef-c_soil,* operational, *efco, c_soil*. Bottom charts: *laf-c_soil*, all combined, *laf*, *laf-efco*. Avg. for 2011-2015
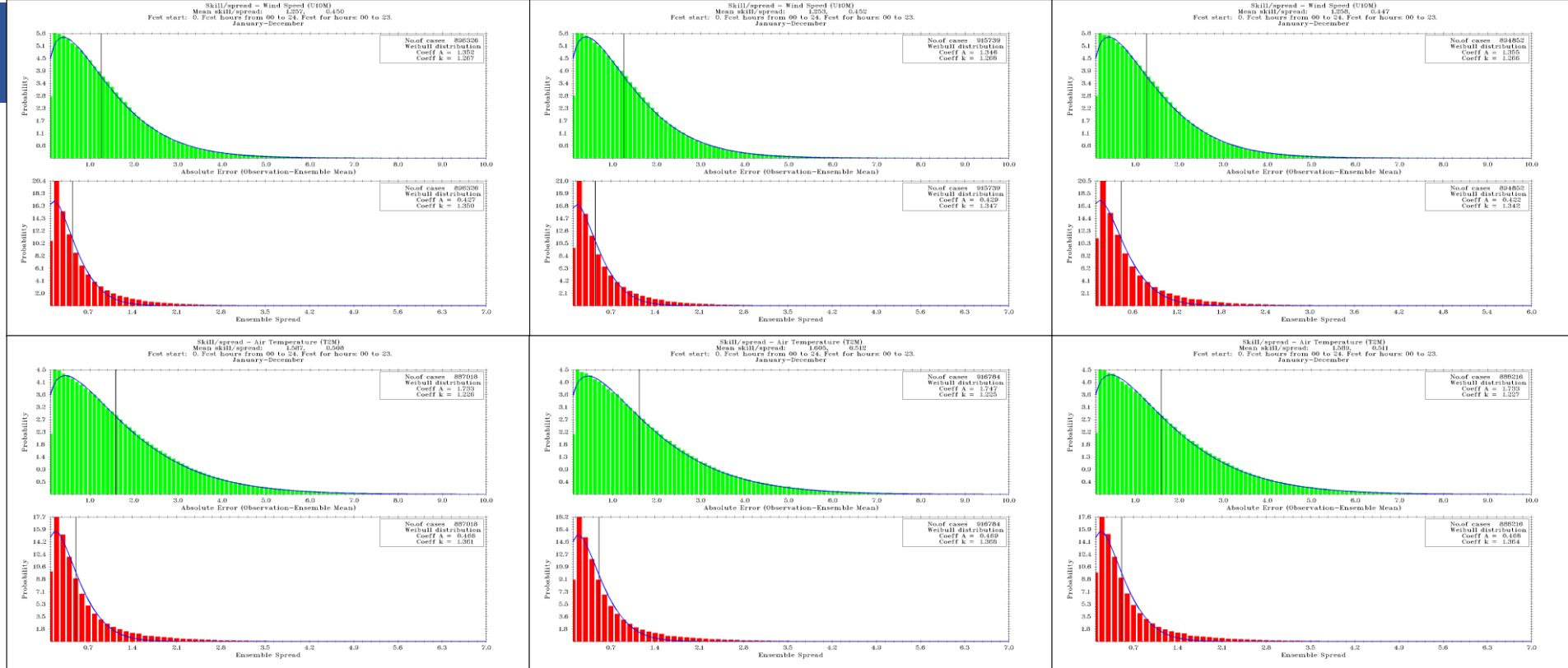
Weibull distributions of skill (green)/spread (red). Top – wind speed, bottom – air temp., Left to right: *ef-c_soil*, *laf-c_soil*, operational. Avg. for 2011-2015

U10M				T2M				TD2M			
Skill		*Spread*		*Skill*		*Spread*		*Skill*		*Spread*	
A	k	A	k	A	k	A	k	A	k	A	k
1.3519	1.2667	0.4246	1.3447	1.7381	1.2265	0.4707	1.3692	1.5505	1.2346	0.5374	1.3937

Skill/spread values – closer to Fisher-Tippett's distribution with shape coeff. *k* > 1
(rather than exponential distribution, *k* <<1).
Scale coeff. *A* is bigger (3x to 10x) for skill (wide) than for spread (sharp).
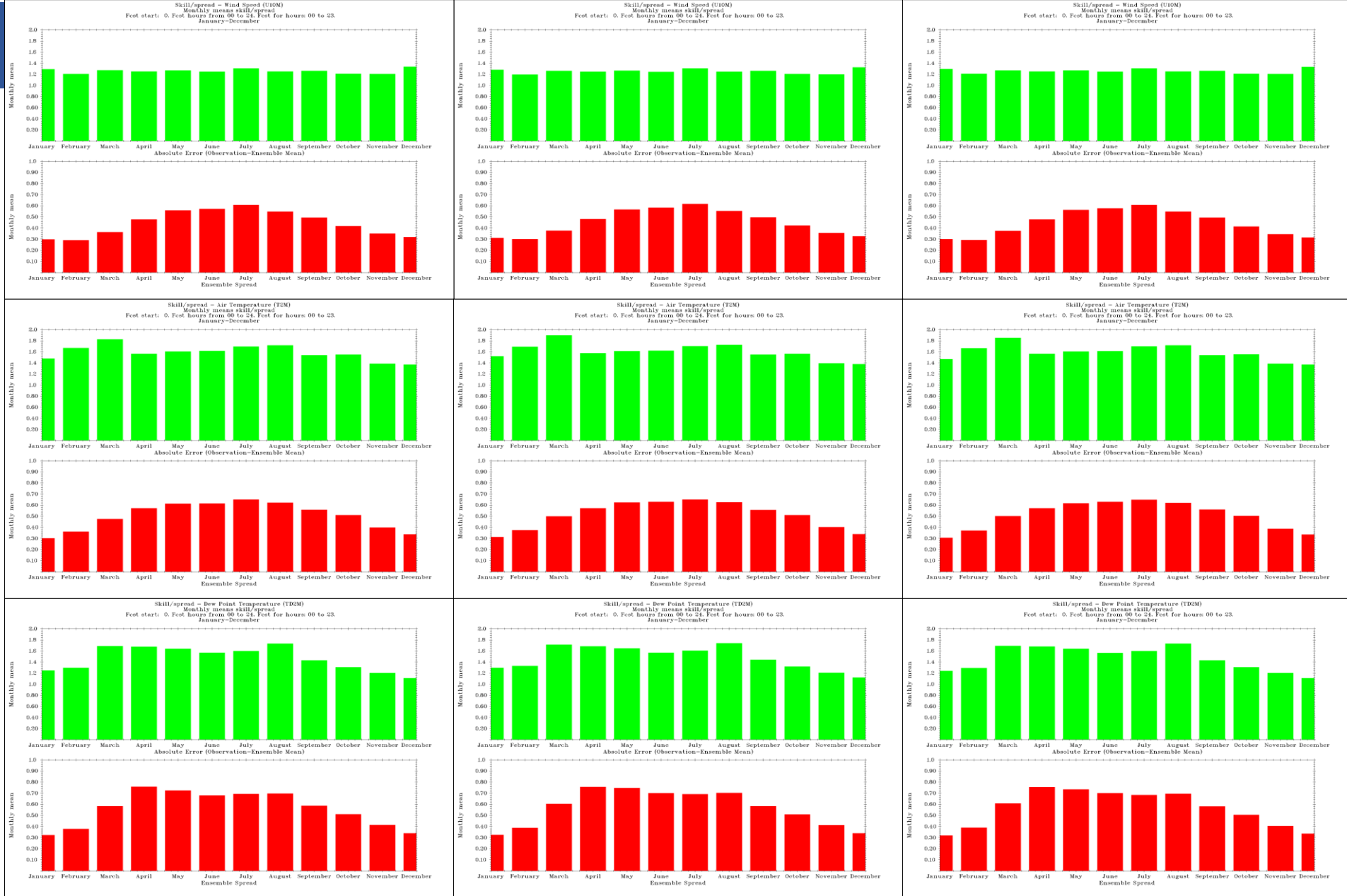
Monthly mean values of skill (green)/spread (red). Top – wind speed, middle – air temp., bottom – dew point. Left to right: *ef-c_soil*, *laf-c_soil*, operational. Avg. for 2011-2015

T4.1 Calibration (simple mean vs. MLR vs. ANN post-processing)

T4.2

• Specific products from ensemble outputs – further computations and continuation (for operation perturbation method and actual current forecasts) of assessment of effectiveness of ANN method;

• skill/spread computation for 2011-2015 in terms of flashrate/thunderstorms as non-standard product from EPS;

• Assessment of feasibility of space-lag (or cross-) correlation method for both "basic" elements, like T2M, U10M, TD2m etc. and HIW (visibility range, flashrate...)

T4.1 Calibration (simple mean vs. MLR vs. ANN post-processing)

|	#preds	*U10M*			*T2M*			*TD2M*		
		ME	*MAE*	*SD*	*ME*	*MAE*	*SD*	*ME*	*MAE*	*SD*
SM	20	-0.2740	1.7197	2.4009	-0.2148	2.2060	3.4159	-0.1021	2.0905	2.9148
MLR; 1 year	20	0.1979	1.5285	2.2626	-0.1781	2.0795	3.2027	-0.3465	2.0960	2.8986
	21	0.1980	1.5257	2.2605	-0.1789	2.0581	3.1663	-0.3481	2.0924	2.8958
	22	0.2015	1.5248	2.2602	-0.1618	2.0634	3.1688	-0.3478	2.0924	2.8959
	24	0.1960	1.5330	2.2481	-0.1615	2.0565	3.1586	-0.3496	2.0911	2.8891
	25	0.7887	1.6092	2.4244	-0.0476	2.0516	3.1462	-0.1959	2.0534	2.8539
MLR; 2 years	20	0.0390	1.5432	2.2527	-0.3411	2.0866	3.2109	-0.2922	2.0788	2.8869
	21	0.0389	1.5399	2.2504	-0.3470	2.0633	3.1759	-0.2920	2.0750	2.8839
	22	0.0443	1.5378	2.2496	-0.3347	2.0651	3.1770	-0.2915	2.0751	2.8840
	24	0.0433	1.5467	2.2352	-0.3349	2.0610	3.1674	-0.2933	2.0740	2.8780
	25	-0.0379	1.5528	2.2286	-0.1483	2.0430	3.1378	-0.2061	2.0572	2.8491
ANN	20	0.0847	1.5833	2.1933	-0.0319	1.6391	2.2287	-0.0551	1.8376	2.6156
	21	-0.1389	1.5652	2.1816	0.0378	1.6262	2.1986	0.0176	1.8375	2.6087
	22	-0.0845	1.5297	2.1744	-0.0301	1.5936	2.1883	0.0201	1.7880	2.5685
	24	0.0981	1.4874	2.1461	-0.0075	1.5671	2.1167	0.0944	1.7461	2.4458
	25	-0.0395	1.4882	2.1249	0.0408	1.5594	2.0851	-0.0139	1.6966	2.3420

T4.2

•   Specific products from ensemble outputs – further computations and continuation (for operation perturbation method and actual current forecasts) of assessment of effectiveness of ANN method;

•   skill/spread   computation   for   2011-2015   in   terms   of flashrate/thunderstorms as non-standard product from EPS;

•   **Assessment of feasibility of space-lag (or cross-) correlation method for both "basic" elements, like T2M, U10M, TD2m etc. and HIW (visibility range, flashrate...)**

Space lag (cross-) correlation – reminder

1. Calculate coordinates of "centres of mass" (asterisks) for both distribution patterns (obs. vs. fcst)
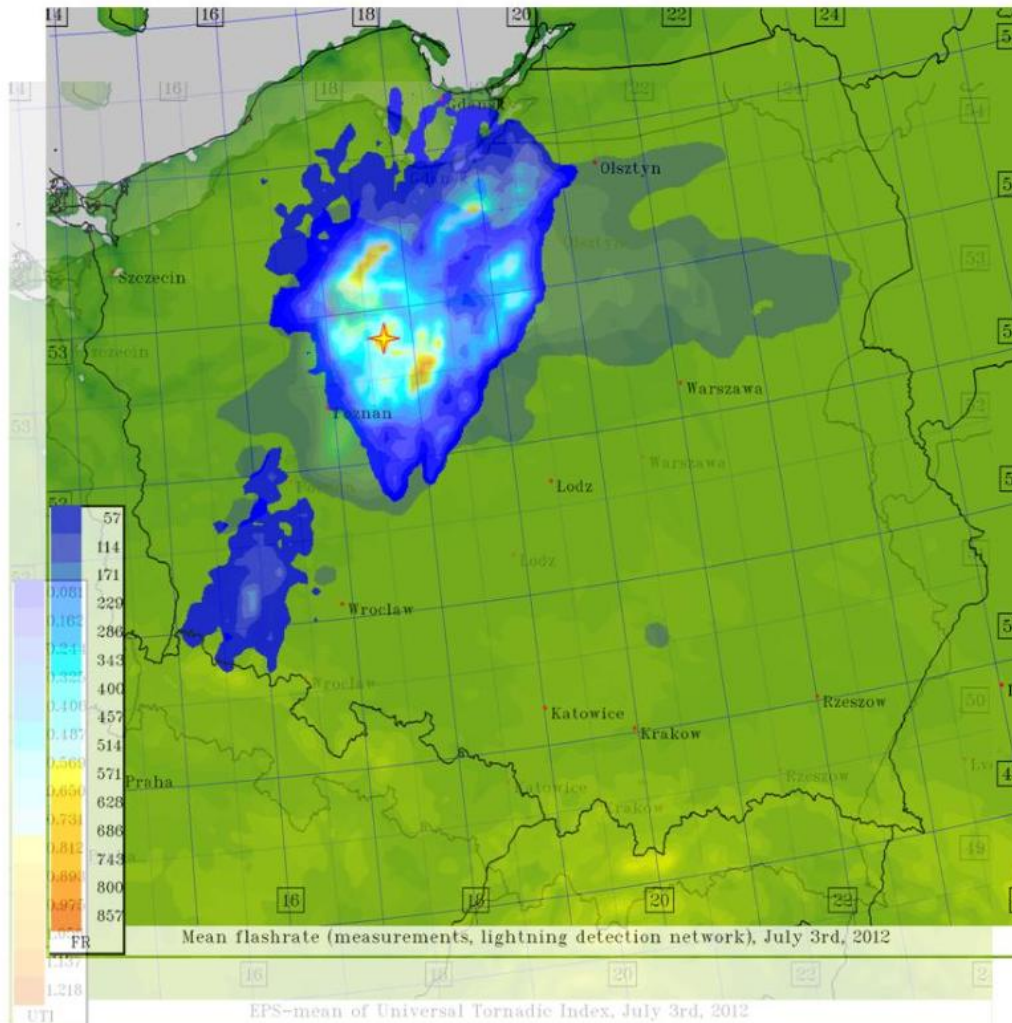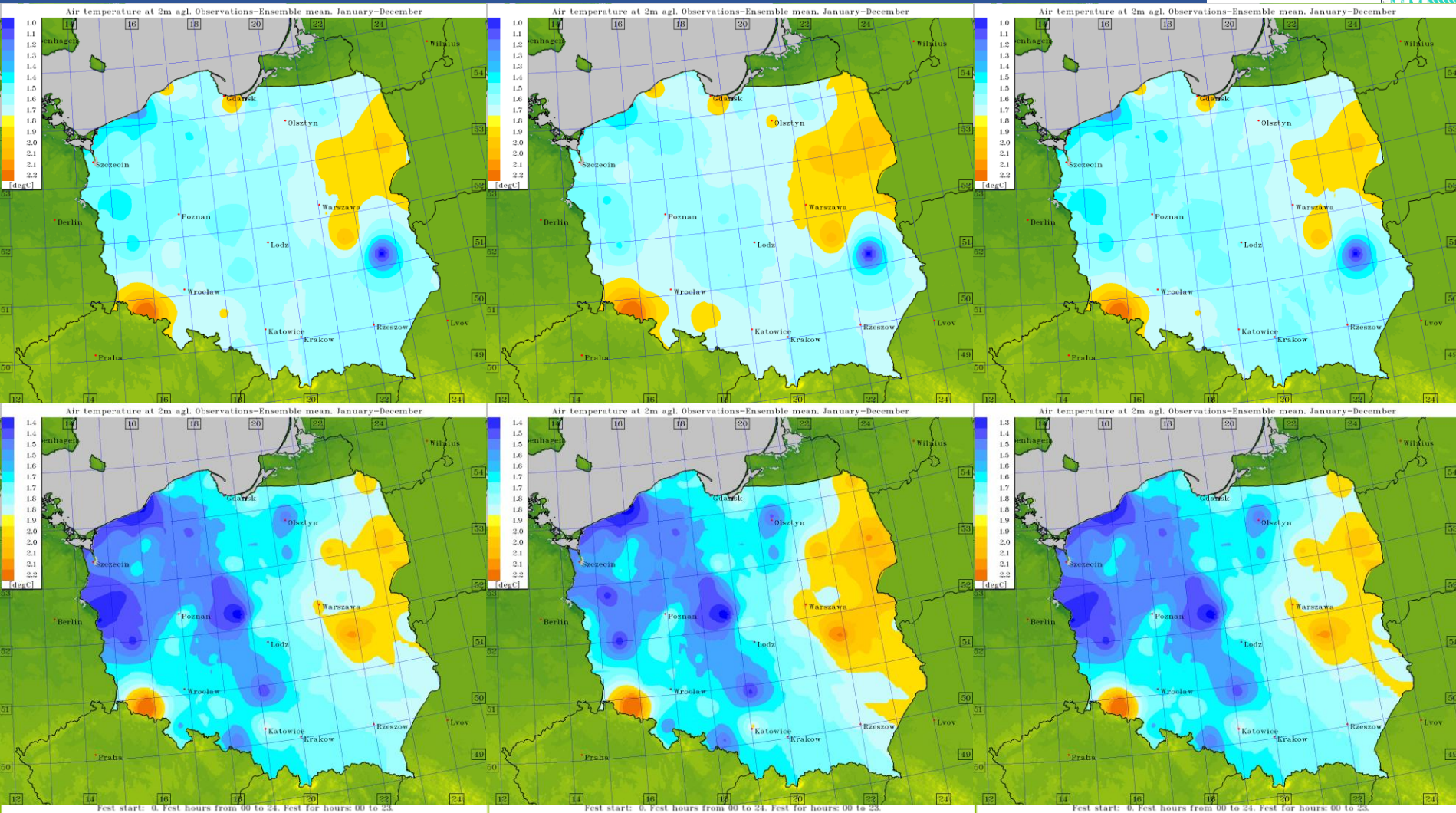

Mean flashrate (measurements, lightning detection network), July 3rd, 2012
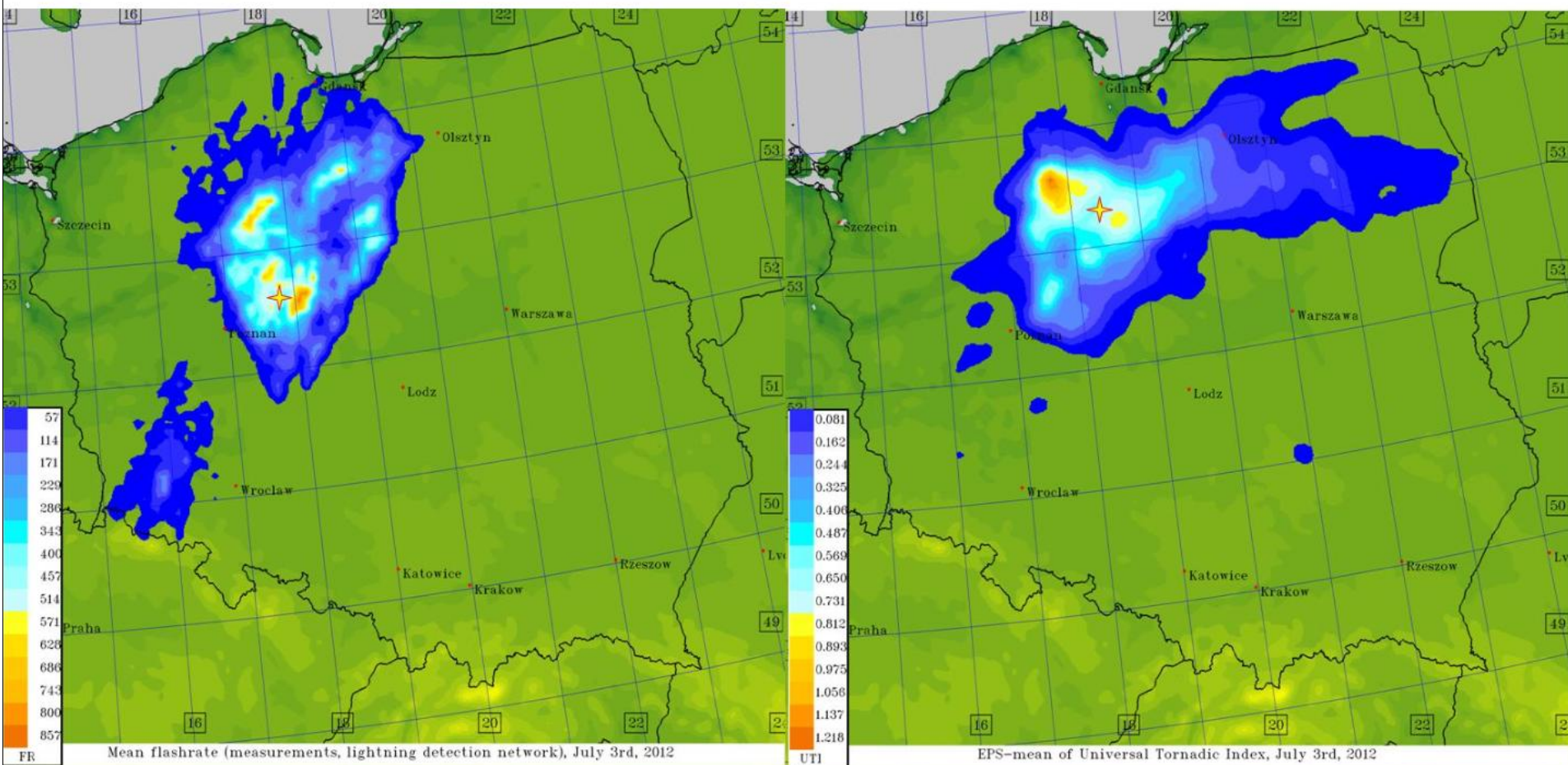
EPS−mean of Universal Tornadic Index, July 3rd, 2012

Space lag (cross-) correlation – reminder

2. Compute vector of displacement of fcst to obs. as a difference of the two above
3. Displace linearly every value of fcst by the vector of displacement

Mean flashrate (measurements, lightning detection network), July 3rd, 2012

EPS-mean of Universal Tornadic Index, July 3rd, 2012

Mean skill	DMO	1.8250	1.9011	1.8631
	VOD	1.6427	1.6899	1.6419

Spatial distribution of skill for air temperature – DMO (upper) and using VOD procedure (lower), mean values for 2011-2015. From left to right: *ef-c_soil*, all combined, operational.
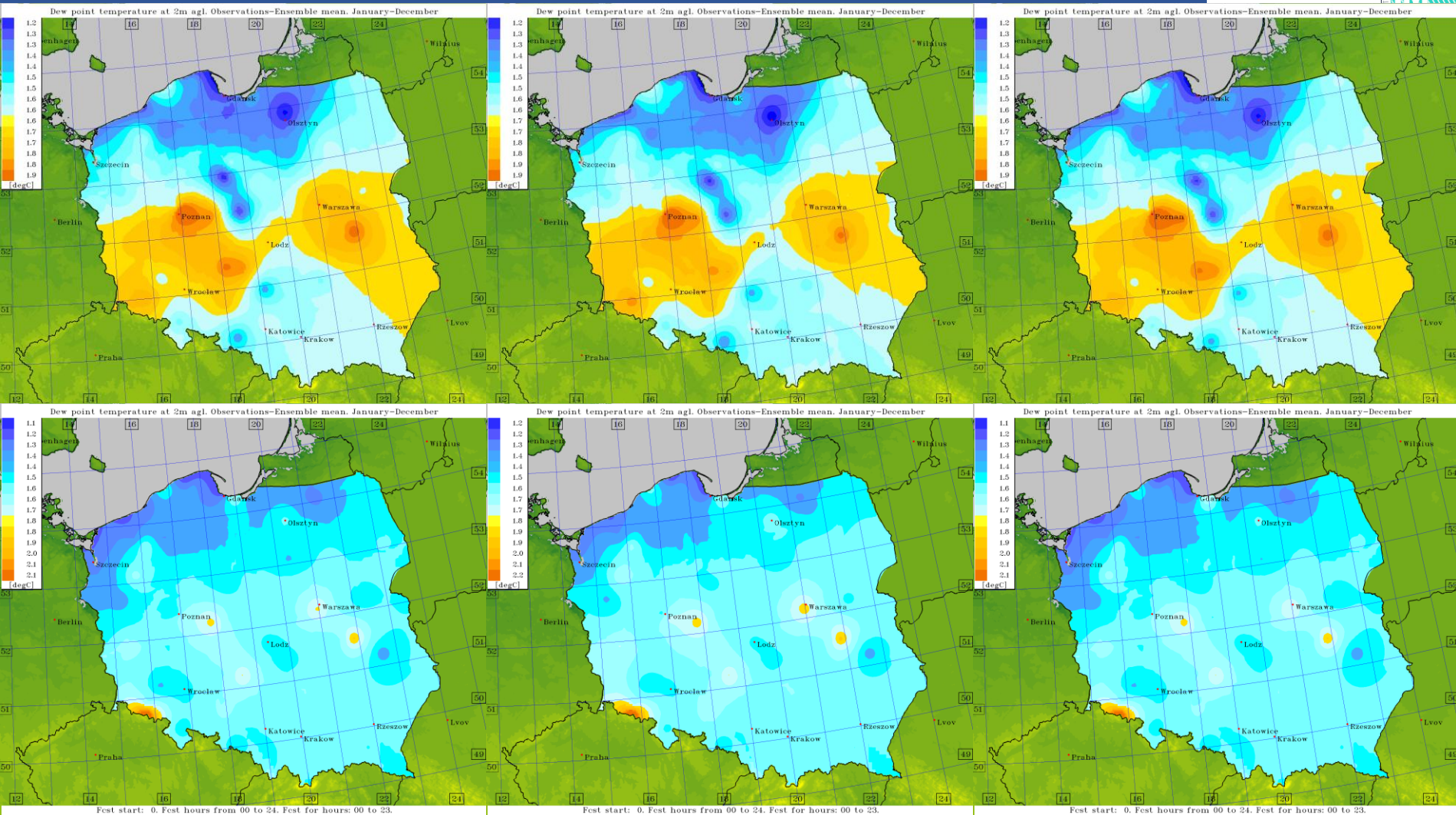
Mean skill				
	DMO	1.7631	1.8823	1.7982
	VOD	1.5263	1.5634	1.5237

Spatial distribution of skill for dew point – DMO (upper) and using VOD procedure (lower), mean values for 2011-2015. From left to right: *ef-c_soil*, all combined, operational.

Summary

T1.3 Perturbations based on adapted Random Number Generator (RNG) – comparison the "new" RNG with regular one.

T3.1 Perturbation of soil surface temperature and …

T3.3 Combination of soil and upper air perturbation – comparison of various perturbation methods vs. operational EPS vs. reference forecasts and vs. measurements over the entire domain.

All of the above for the entire period of 2011–2015 – calculations DONE!

JCR publication based on T3.3 – accepted ☺ (**Acta Geophysica;** **https://doi.org/10.1007/s11600-020-00467-4**)

T4.1/2 Calibration and …

• Specific products from ensemble outputs – further computations and continuation (for operation perturbation method and actual current forecasts) of assessment of effectiveness of ANN method – ongoing;

• Skill/spread computation in terms of flashrate/thunderstorms and visibility range as non-standard products from EPS – computed for 2011–2015;

• Assessment of feasibility of space-lag (or cross-) correlation method for both "basic" elements, like T2M, U10M, TD2m etc. and HIW (visibility range, flashrate...) – computed for 2011–2015

And thereby hangs a tale...

William Shakespeare, "As You Like It"