



Subtask 4.3: Application of PWS to NWP model verification in urban areas

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photo by: Gabriel Jaczewski

Subtask 4.3: Application of PWS to NWP model verification in urban areas

Personal Weather Station (PWS) Sensors



- Temperature
- Humidity
- Wind

Professional Institutional Networks



- Synoptic Stations
- Other Agency Data

RainGRS+ Product

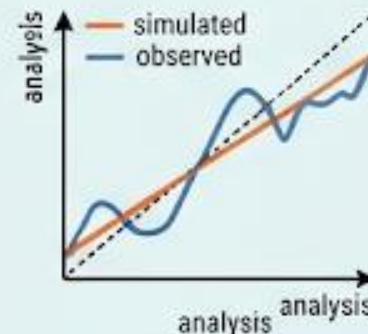


RainGRS+

- High-resolution Radar Data
- Precipitation Fields

ICON-LAM Simulation Verification

- Temperature
- Humidity
- Wind
- Precipitation Fields (heavy convection)



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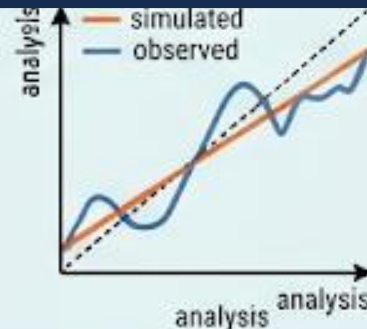


RainGRS+

- High-resolution Radar Data
- Precipitation Fields

ICON-LAM Simulation Verification

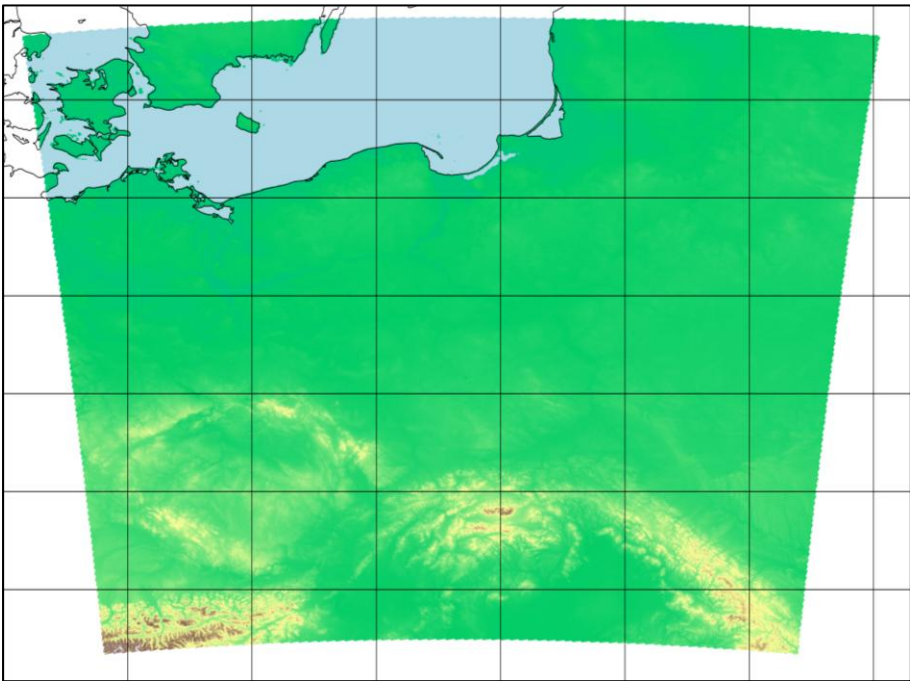
- Temperature
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ICON-LAM forecasting systems



horizontal resolution	
2.5 km (R2B10)	1.0 km
leadtime	
96 h	48 h
levels	
65	65
ICBC	
ICON global analysis 13.6 km	



- i2k5

1-moment microphysics
- i2k5im

2-moment microphysics
- i2k5g

2-moment microphysics + greyzone
- i2k5a

2-moment microphysics + continental aerosol
(cnn_type = 8)

- i1k0im

2-moment microphysics
- i1k0ec

2-moment microphysics + TU / ECOCLIMAP-SG
(planned)

- maps of the distribution of forecast error magnitude (bias),
- **SAL (Structure, Amplitude, Location)**
 - the **S** values range from **-2 to 2** – negative values indicate that the forecast suggests too small rainfall areas or that the value from the centre of the rainfall area is significantly larger than in the surrounding area, or both events overlap (the opposite applies for positive values),
 - the **A** values range from **-2 to 2** – negative values mean that the forecasted rainfall amplitude was too small compared to observations, and positive values – too large
 - the **L** values range from **0 to 2** and indicate the fit of the centre of gravity of the forecast rainfall field to the centre of gravity of the actual rainfall field, considering the distribution of individual zones forming the rainfall field,
 - **an ideal forecast** corresponds to values **S=0, A=0, L=0.**

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selected dates

6.08

10.08

17.08

21.08

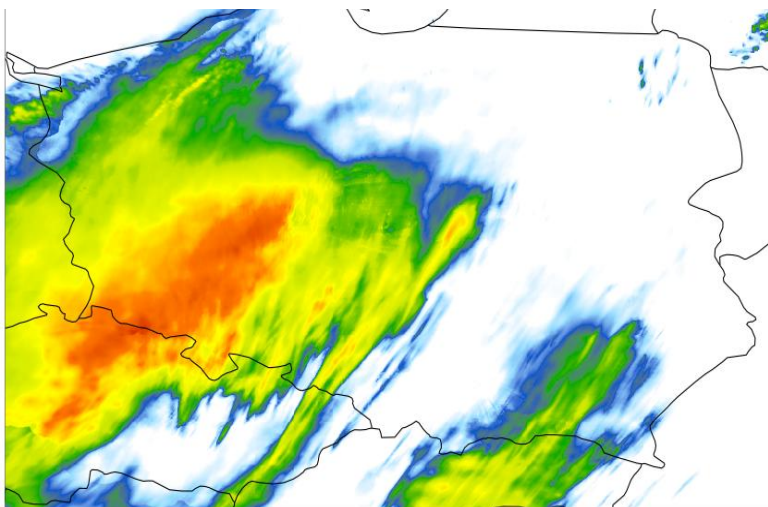
22.08

The 2026 summer deep convection cases – 21/22.08.2026, 18-24h

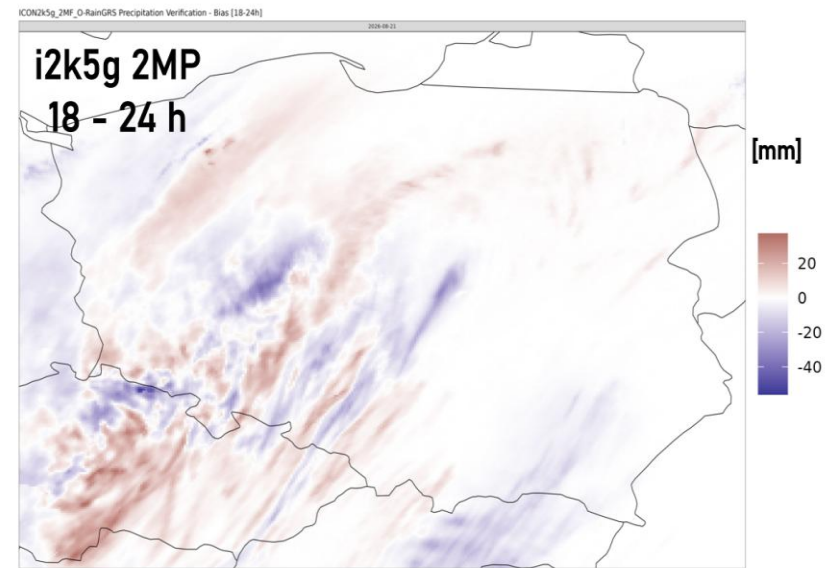
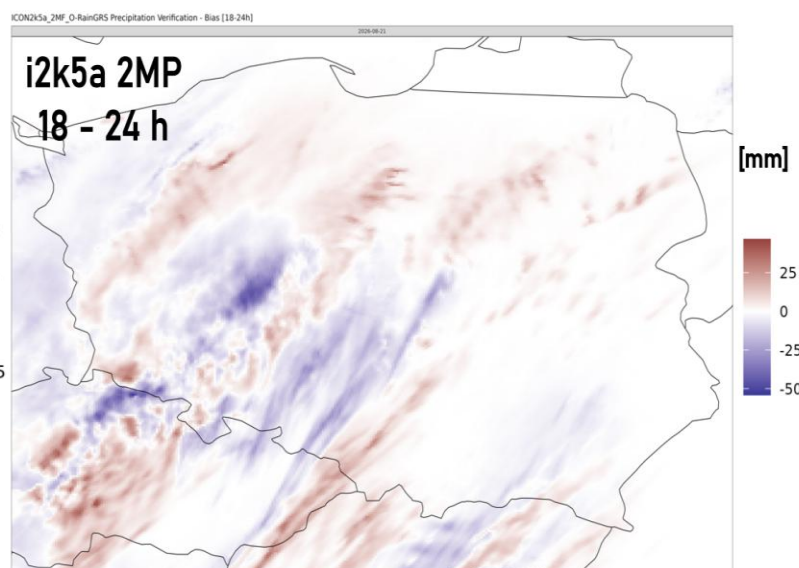
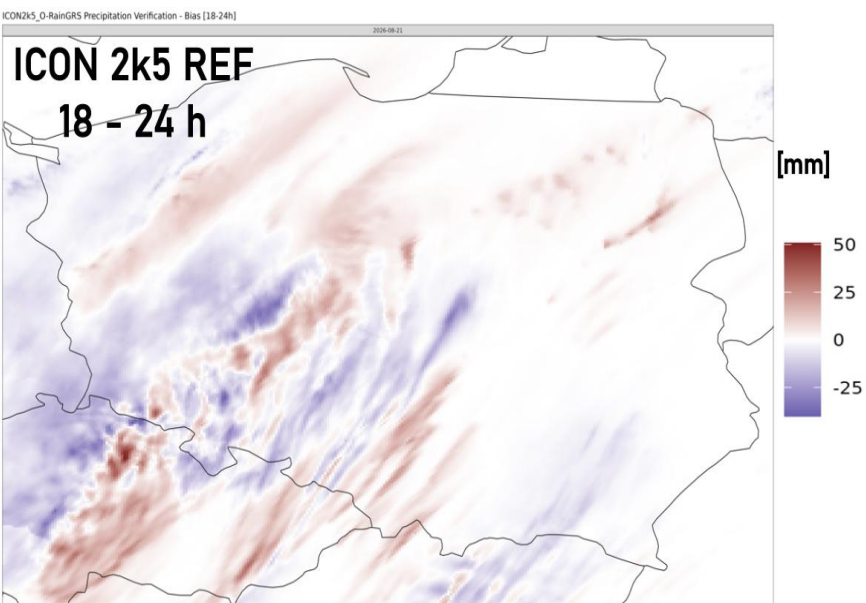
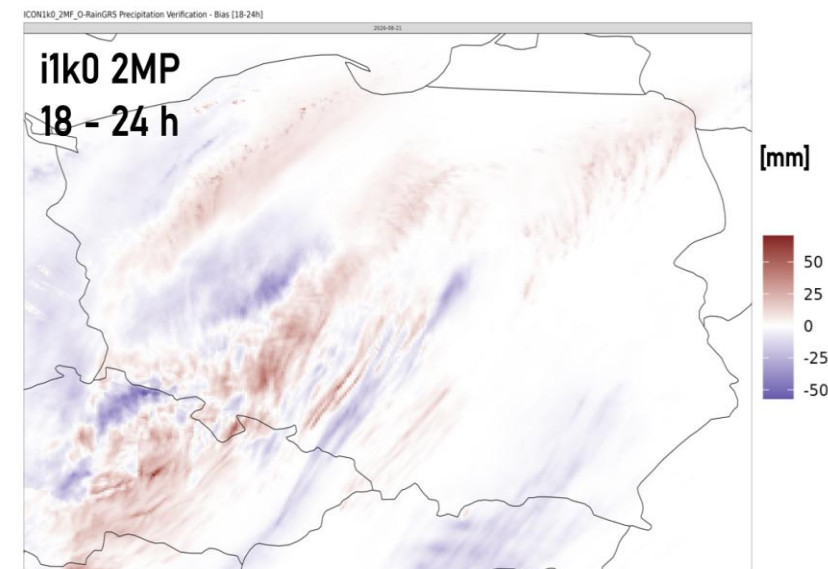
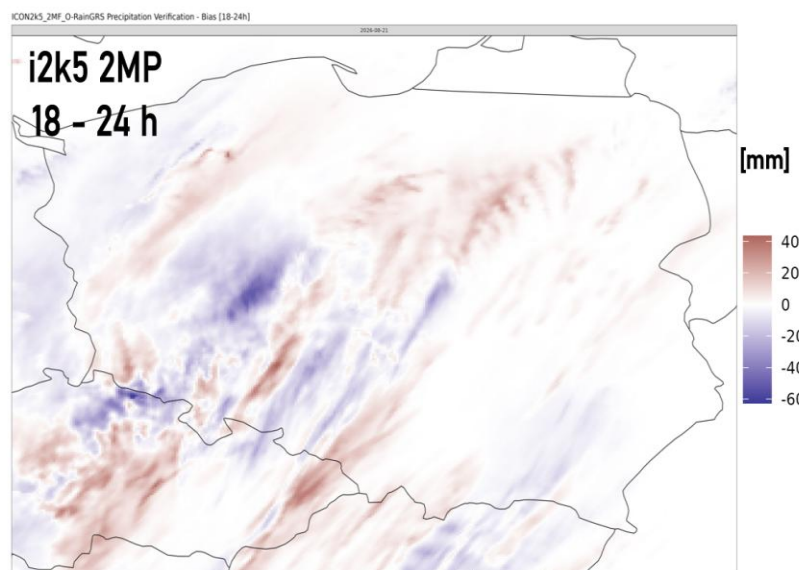


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RainGRS, 21.08.2026 18-24 UTC



Division for Numerical Weather Prediction, Institute of Meteorology and Water Management - National Research Institute

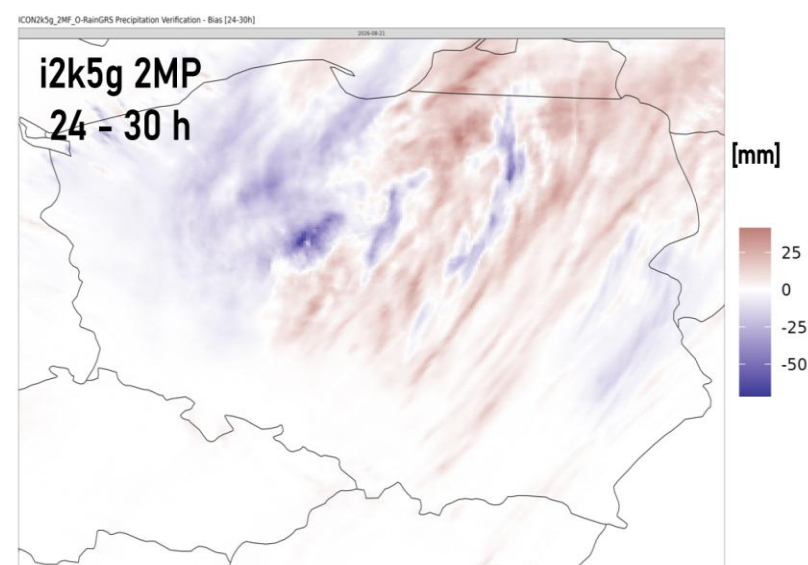
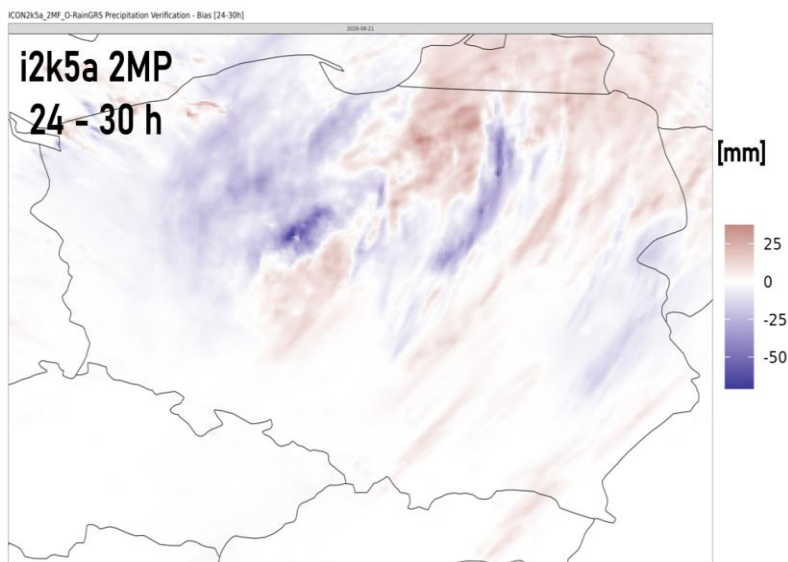
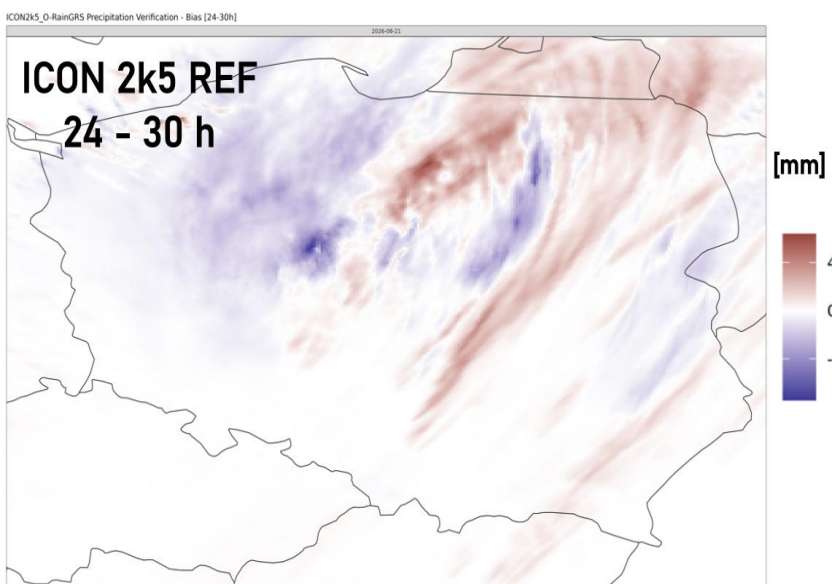
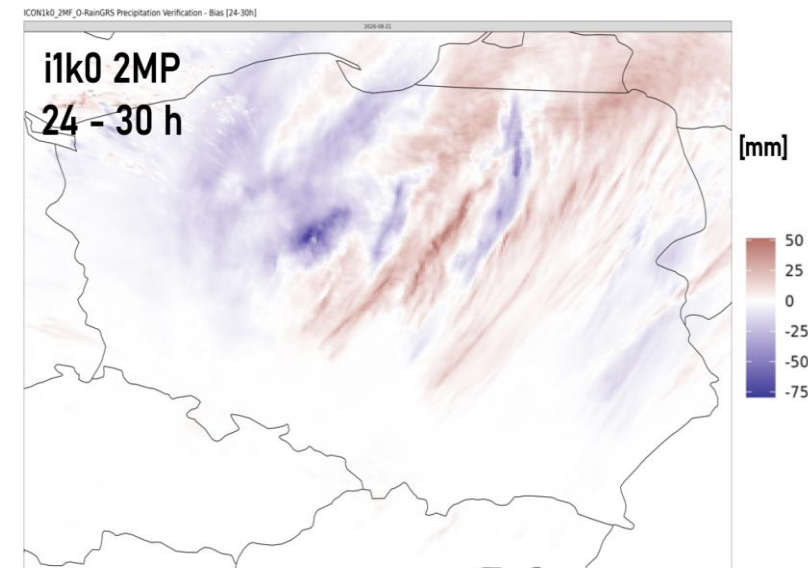
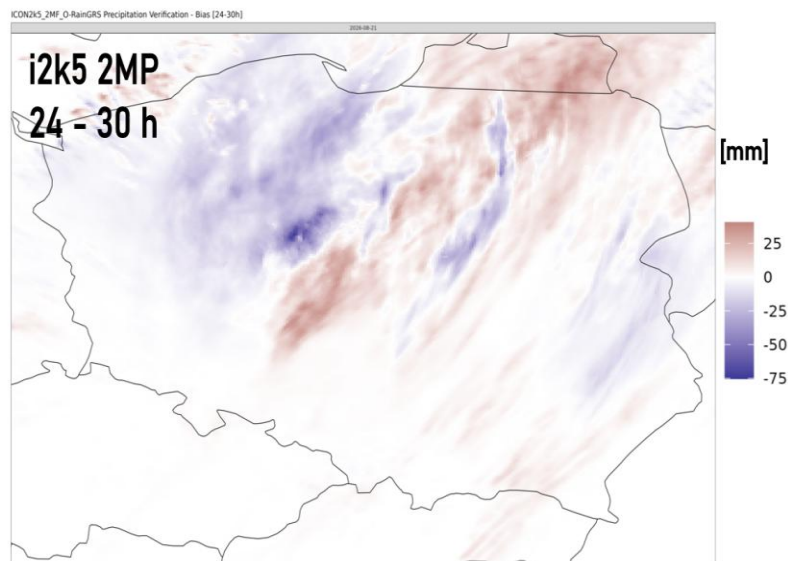
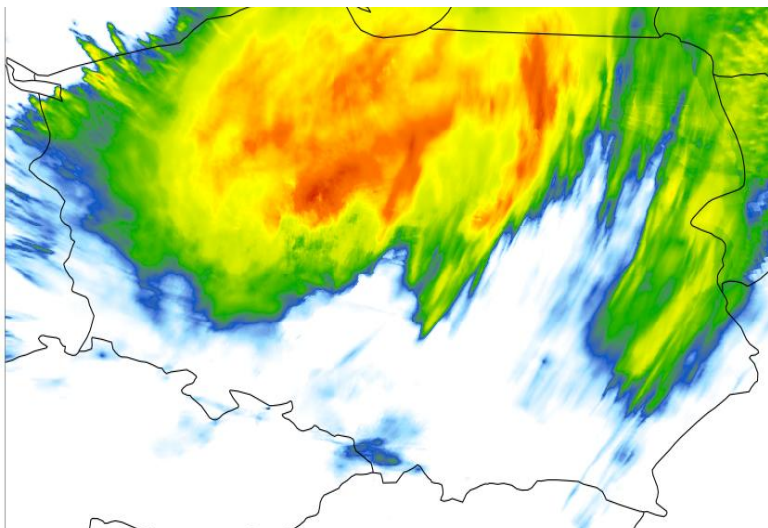


The 2026 summer deep convection cases – 21/22.08.2026, 24-30h



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RainGRS, 21.08.2026 24-30 UTC



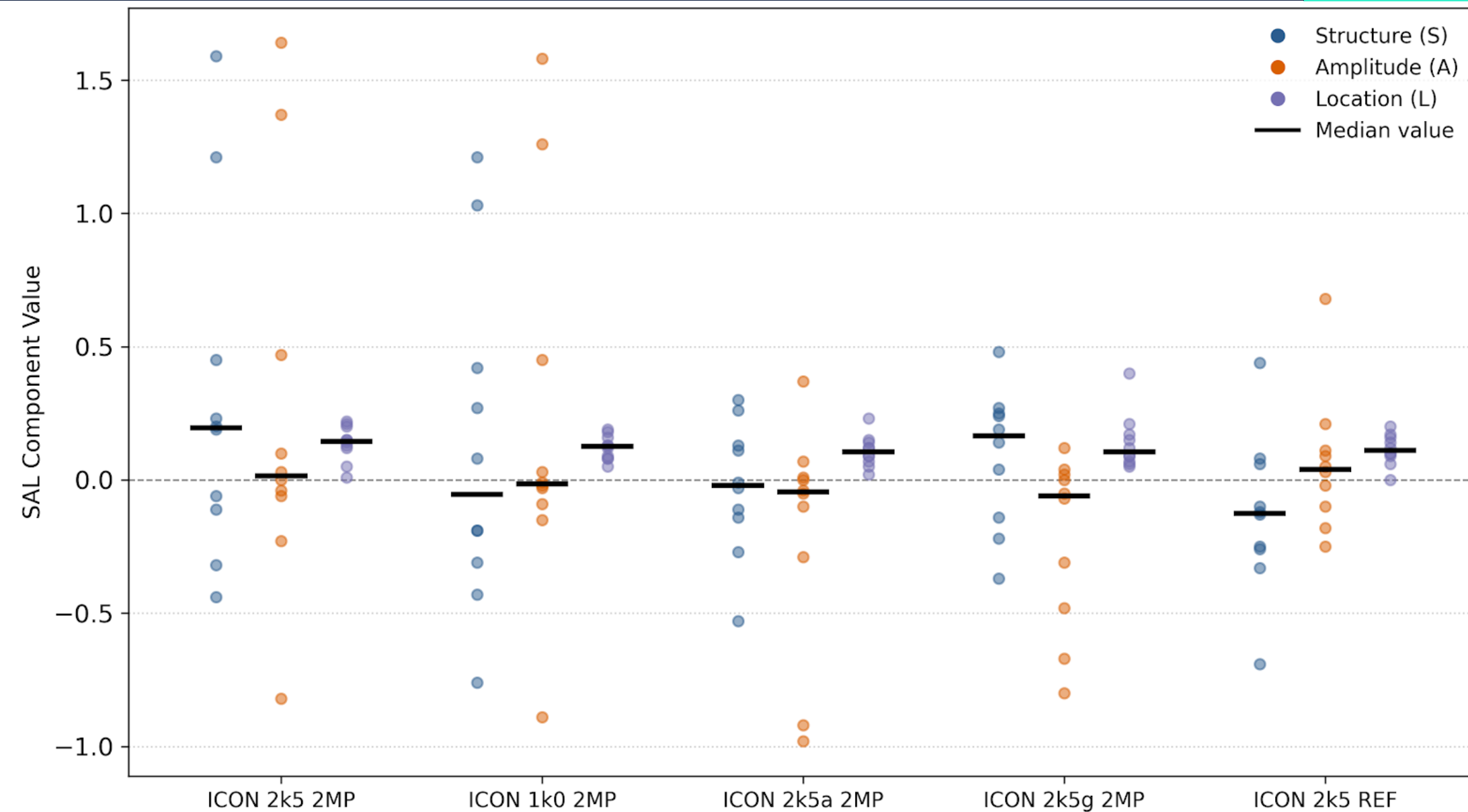
The 2026 summer deep convection cases – 21/22.08.2026, SAL



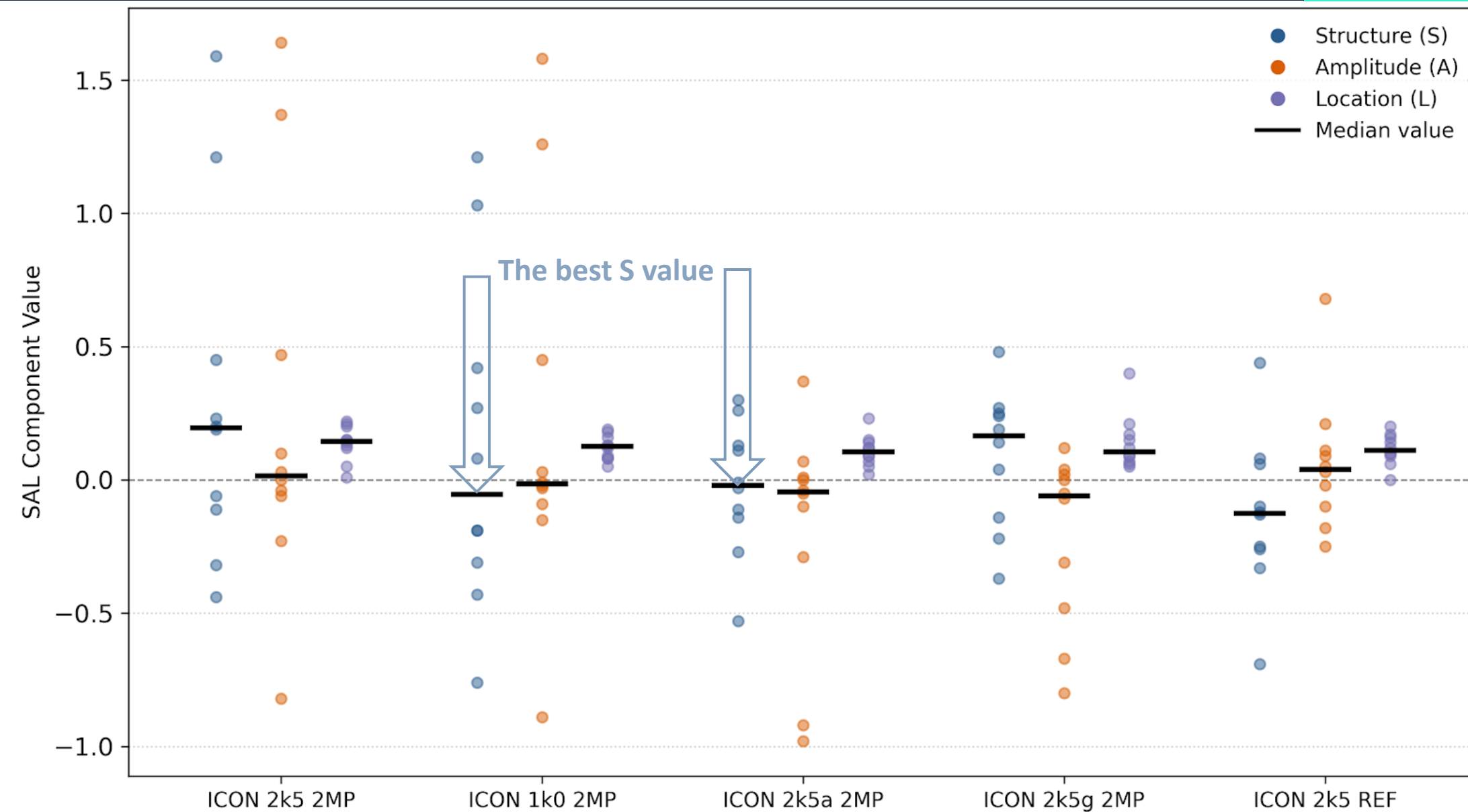
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Model	SAL 18-24 h			SAL 24-30 h		
	S	A	L	S	A	L
ICON 2k5 2MP	0,23	-0,04	0,01	0,45	0,00	0,05
ICON 1k0 2MP	0,08	-0,09	0,05	0,42	0,03	0,09
ICON 2k5a 2MP	0,11	-0,05	0,02	0,30	-0,04	0,05
ICON 2k5g 2MP	0,25	-0,05	0,06	0,48	0,12	0,07
ICON 2k5 REF	-0,10	-0,10	0,00	0,06	0,03	0,06
ALARO 2k4	0,06	0,13	0,13	0,41	0,14	0,12
COSMO 2k8	0,11	0,14	0,05	0,03	0,08	0,05

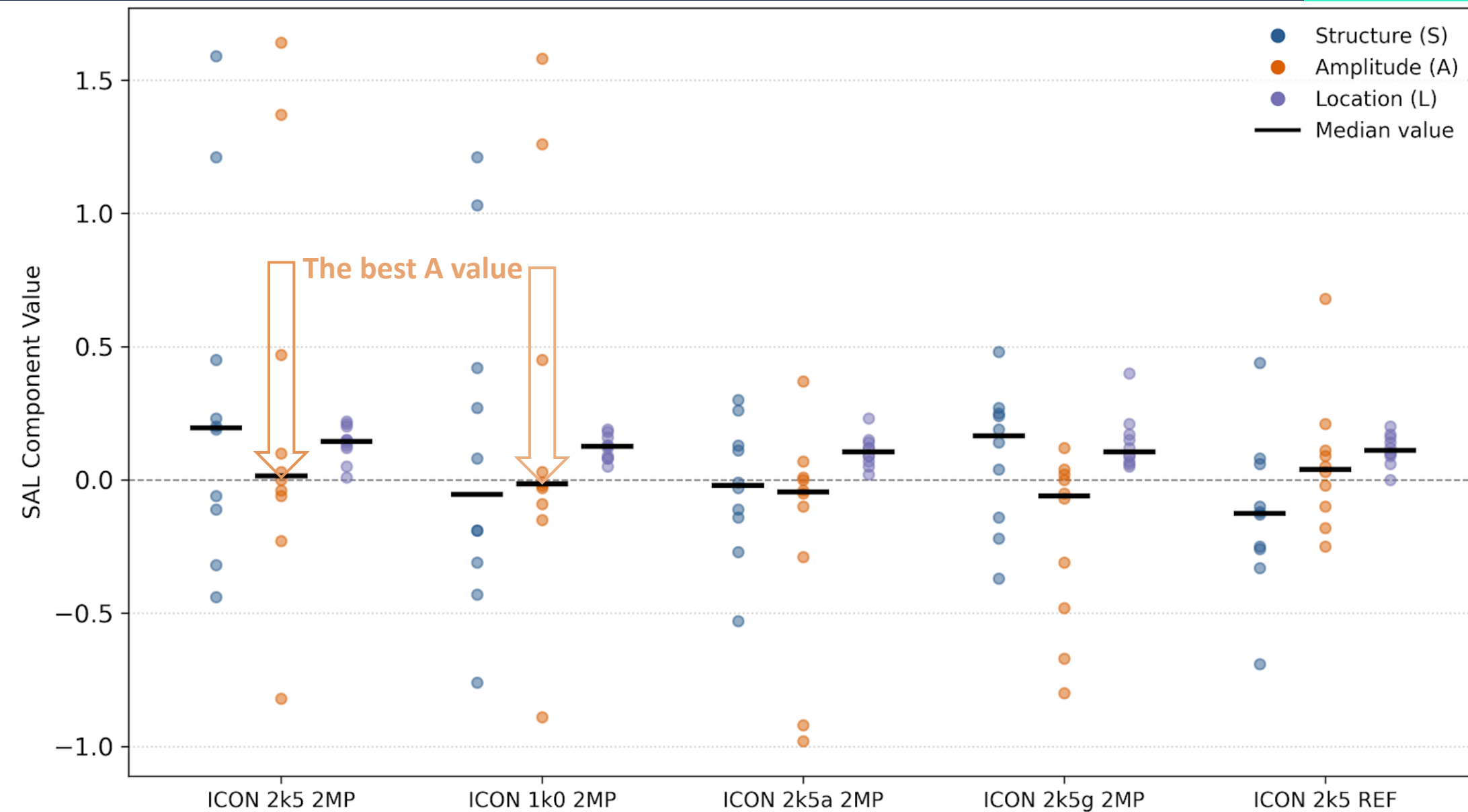
The 2026 summer deep convection cases – SAL summary



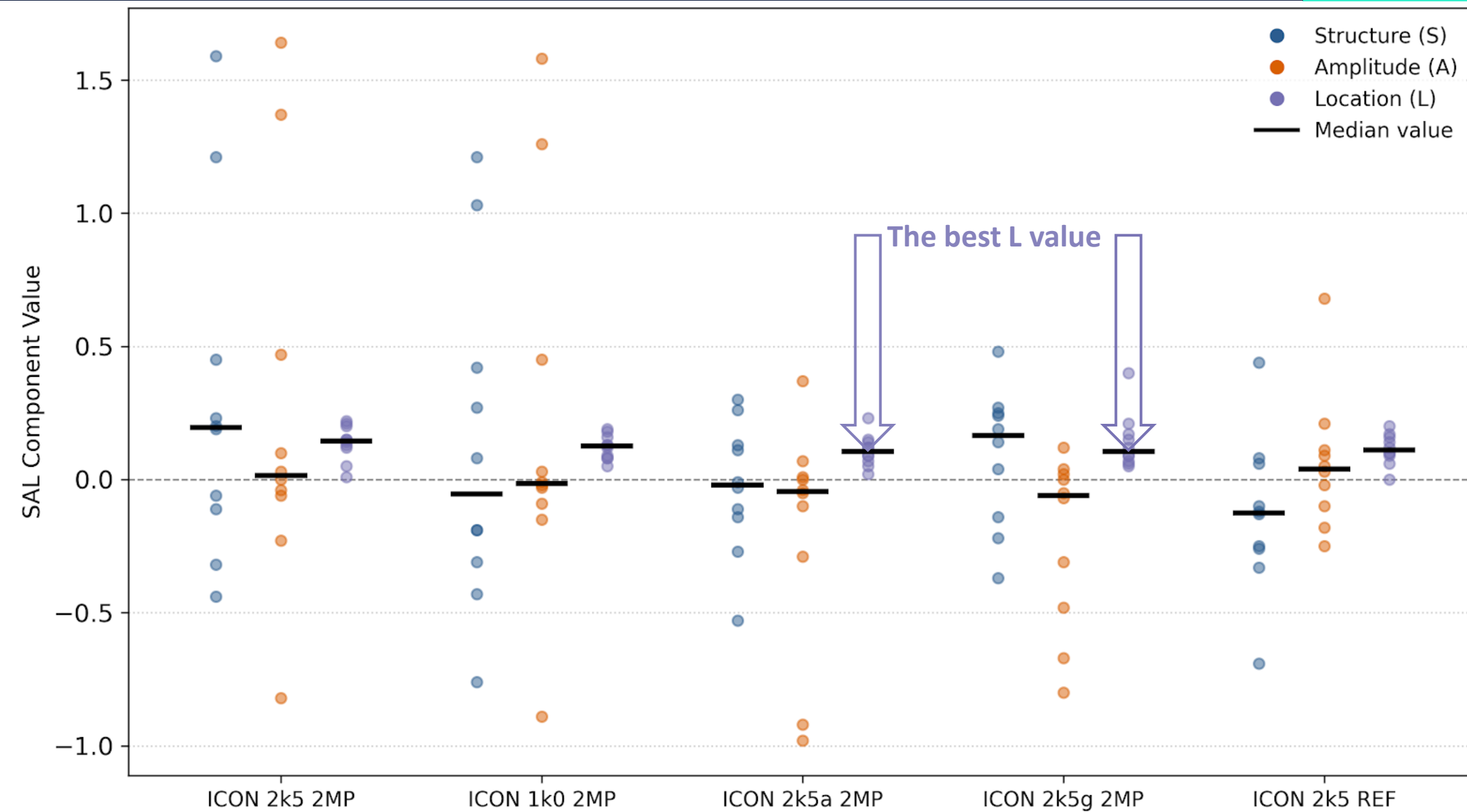
The 2026 summer deep convection cases – SAL summary



The 2026 summer deep convection cases – SAL summary



The 2026 summer deep convection cases – SAL summary



1. In many situations, the application of a **two-moment cloud microphysics scheme** improves the **forecast** obtained in terms of its verifiability. However, **the spread of individual SAL values is quite wide**, reflecting high variability depending on the specific synoptic situation.
2. An **increase in resolution** has a **slight effect** on the forecast quality, and the grey zone option degrades the model accuracy.
3. Additional model settings for the two-moment scheme (e.g., **continental aerosol scenario** for condensation nuclei) **can increase the accuracy** of precipitation field forecasts in selected cases.
4. **The accuracy of forecasts for other weather elements** in the ICON-LAM model **is not lost** as a result of applying the two-moment cloud microphysics scheme.
5. Results are presented only for a few significant cases of deep convection in Poland, which prevents a decision on the best scenario; **a larger number of cases**, considering different types of convective environments, **is necessary for analysis**.

Thank you

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14/09/2026, COSMO GM



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