Regional Cooperation for
Limited Area Modeling in Central Europe

LACE
nwp central europe

ALARO operational experience in Slovenia

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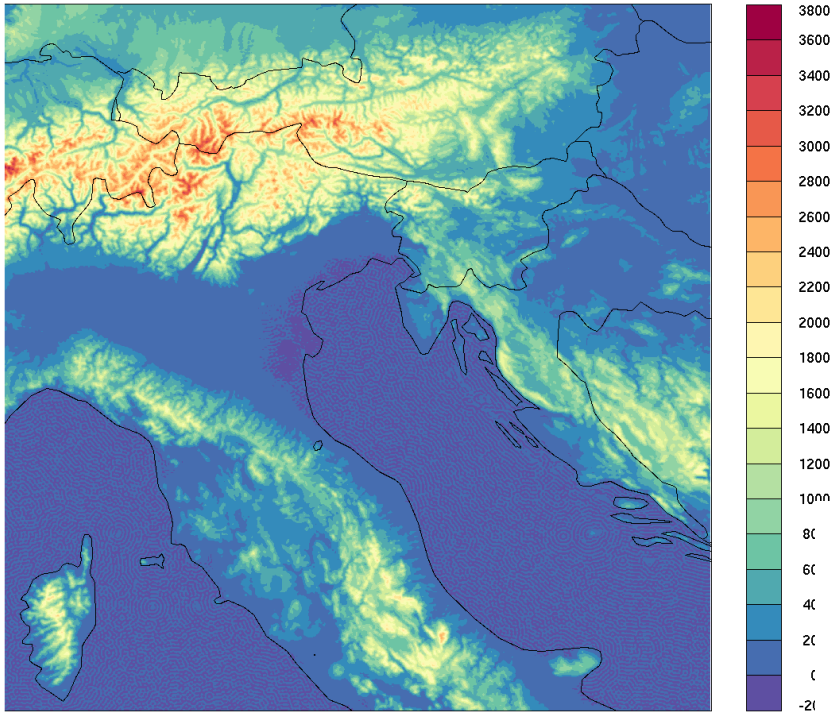
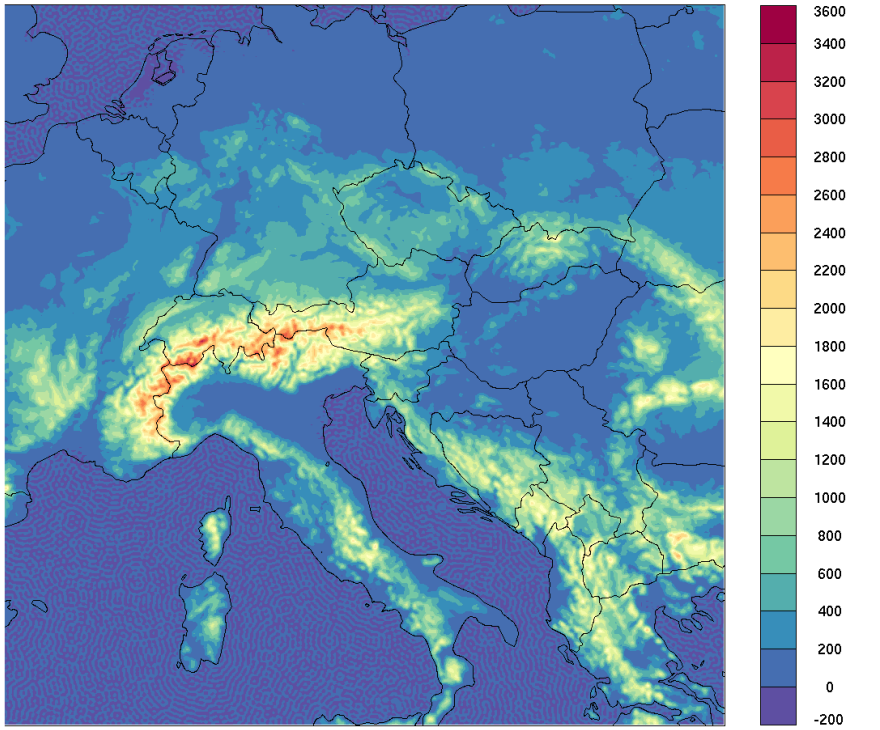
ZAMG DHMZ Czech Hydrometeorological Institute OMSZ IMGW METEO ROMANIA SHMU ARSO METEO Slovenia

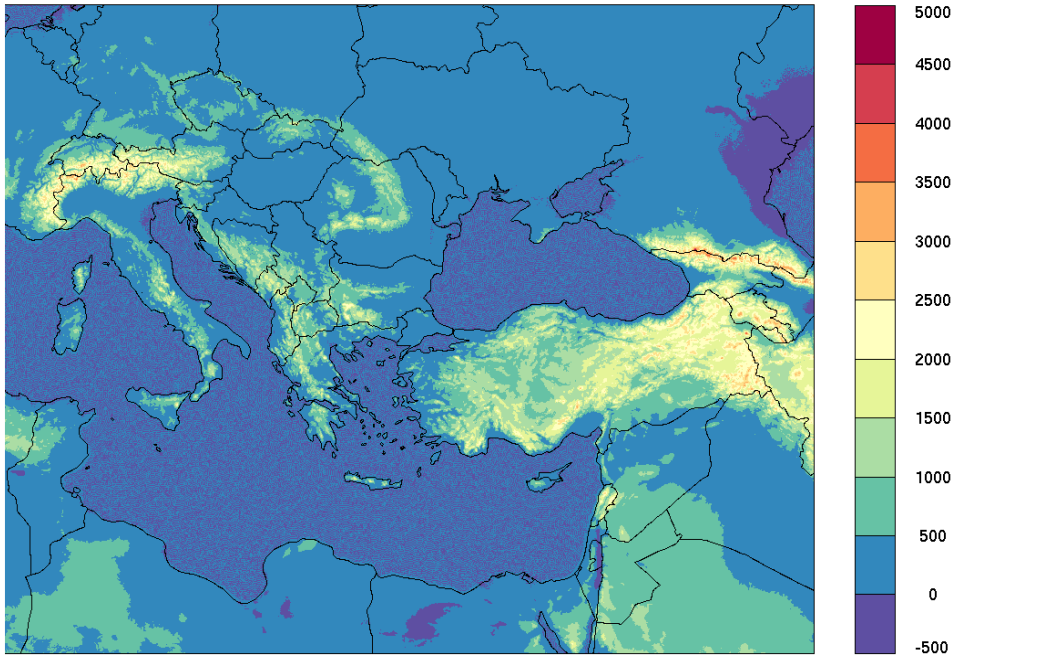
Content

- Operational and experimental setups
  - ALADIN/4km, SEE-MHEWS, NWCRUC
- Validation
  - HARP verification
  - Case studies, presentation of products
  - Verification of 10m wind speed
  - Verification of short wave radiation
- Plans

Operational systems - domains







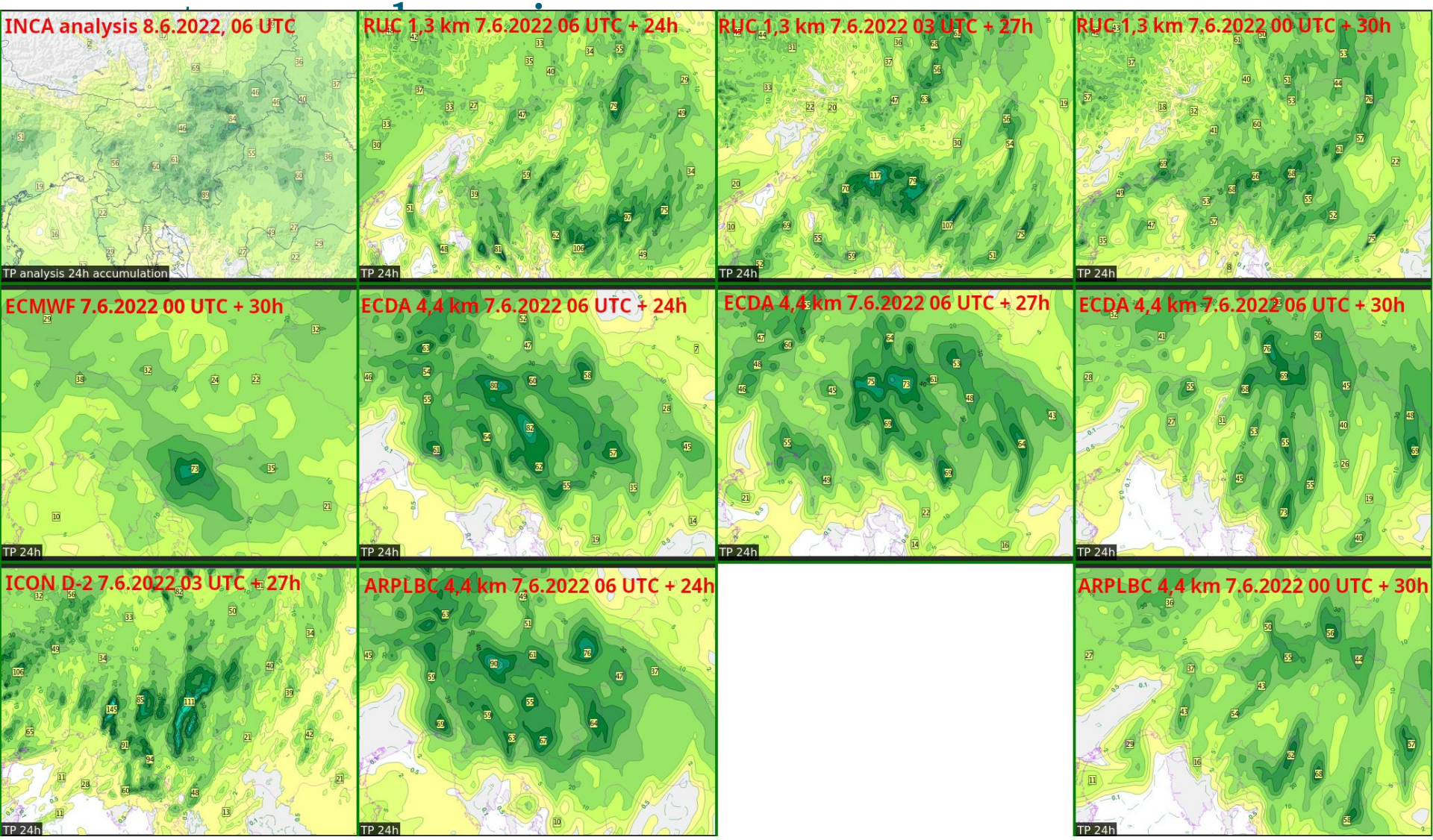
Operational systems

	aosruc04ec	**aos01ruc**	**seemhews**
Model code version	cy43t2	cy43t2	cy43t2
Resolution	**4.4 km**	**1.3 km**	**2.5 km**
Levels	87	87	87
Grid points	432 x 432	589 x 589	**1429 x 1141**
Initial conditions	CANARI,3DVAR	CANARI,3DVAR	CANARI,3DVAR
initialization	none/SCC	none/SCC	none/SCC
Physics	ALARO	ALARO	ALARO
Dynamics	hydrostatic	***NH***	***NH***
time step	180 s	60 s	90 s
Boundaries	ECMWF HRES	ECMWF HRES	ECMWF HRES
Forecast length	72/36 hours	36 hours	72 hours
Cycle interval	3 hours	1 hour	3 hours
Frequency of output	1 hour	5 min for selected fields, otherwise 1 hour	1 hour
Initial times	00, 03, 06, … UTC	**Every hour**	00 and 12 UTC
Computing site	ARSO (SGI ICE forman)	ARSO (SGI ICE ventus)	cca/ccb@ECMWF
status	operational	pre-operational	operational (not yet TC)
Observations	SYNOP + AWS, AMDAR/MODE-S MRAR/EHS, AMV, TEMP, SEVIRI, AMSU-A/MHS/IASI, ASCAT/OSCAT,ZTD EGVAP(passive.)		
		& **radar reflectivity**	&SEE-MHEWS surface observations
Cut-off	2h5min	35 min	9h15min

- A nowcasting-oriented setup NWCRUC (aos01ruc)
  - Technical issues
    - Occasionally increased CPU time in the steps of time integration
  - Validation of radar assimilation
    - Reach satisfactory performance of reflectivity DA
    - excessive drying by radar DA analysed and solved
  - Verification of forecast

Model comparision

24h precipitation



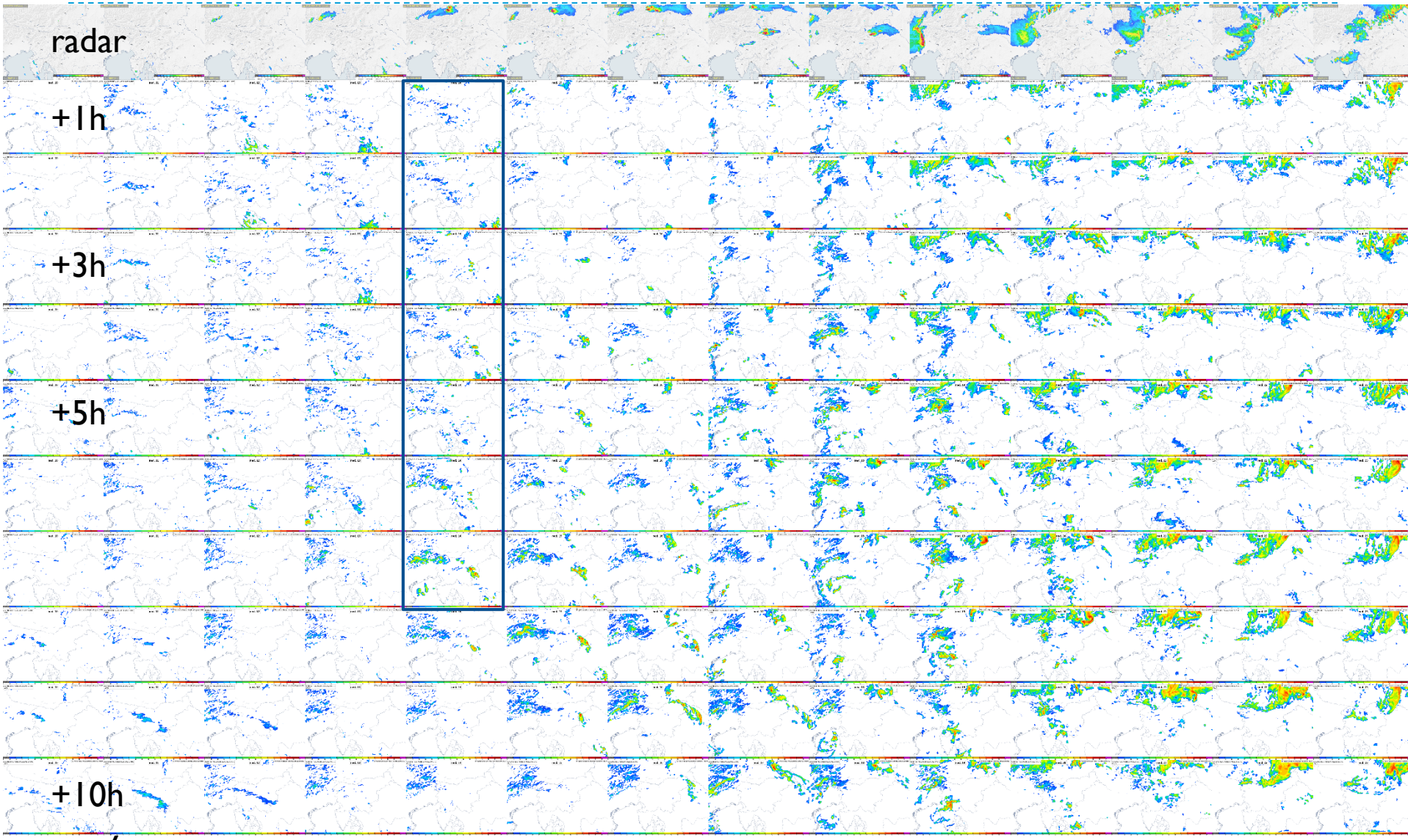
00 run

03 run

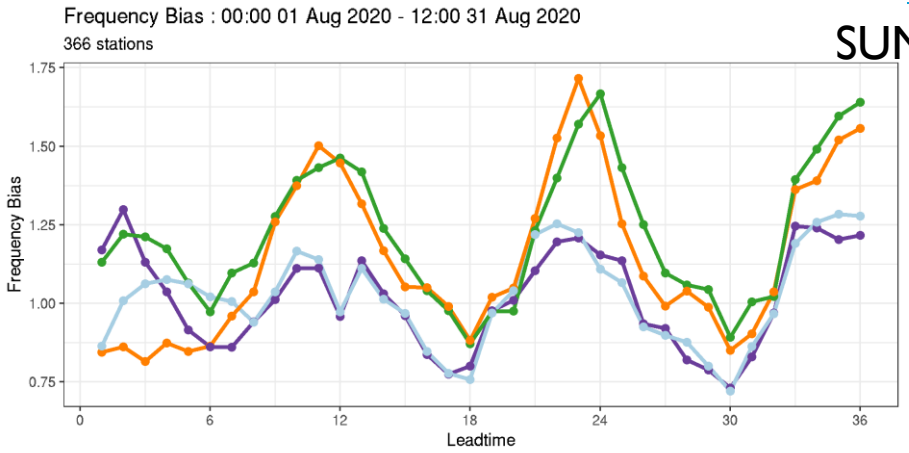
06 run

Convective case

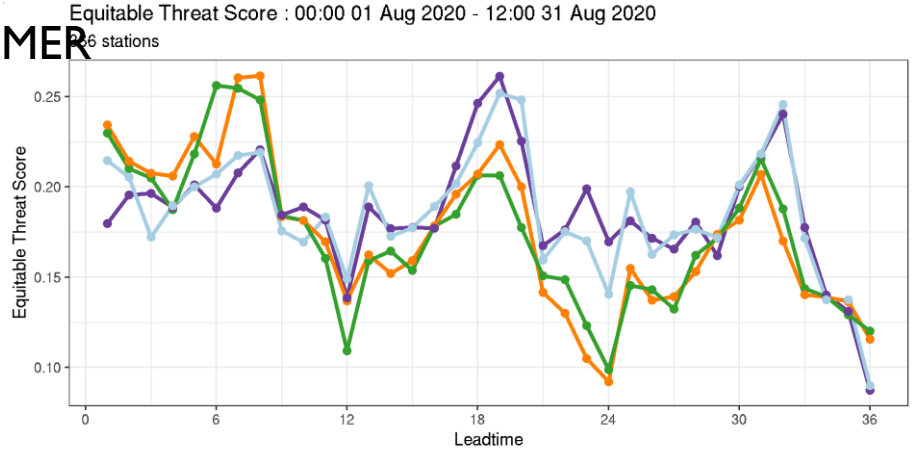
Single convective storm
(large hail)



Performance of RUC & impact of radar data

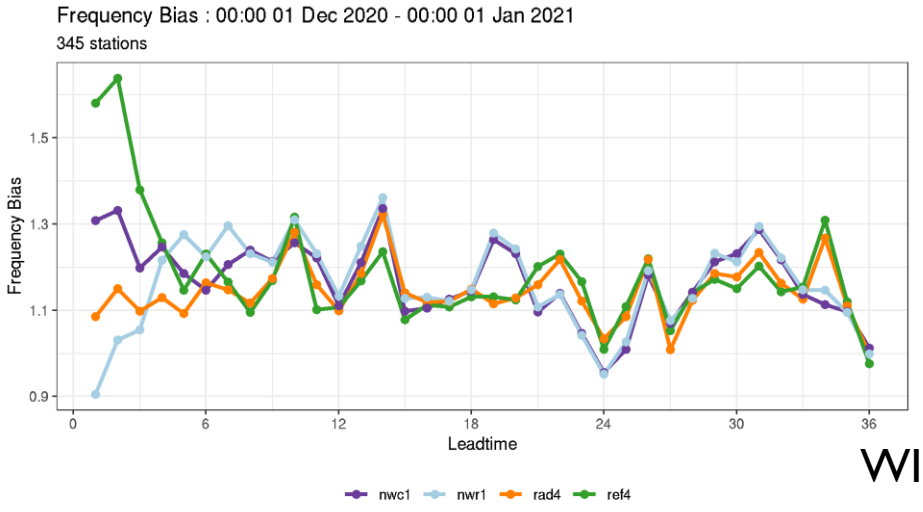


SUMMER

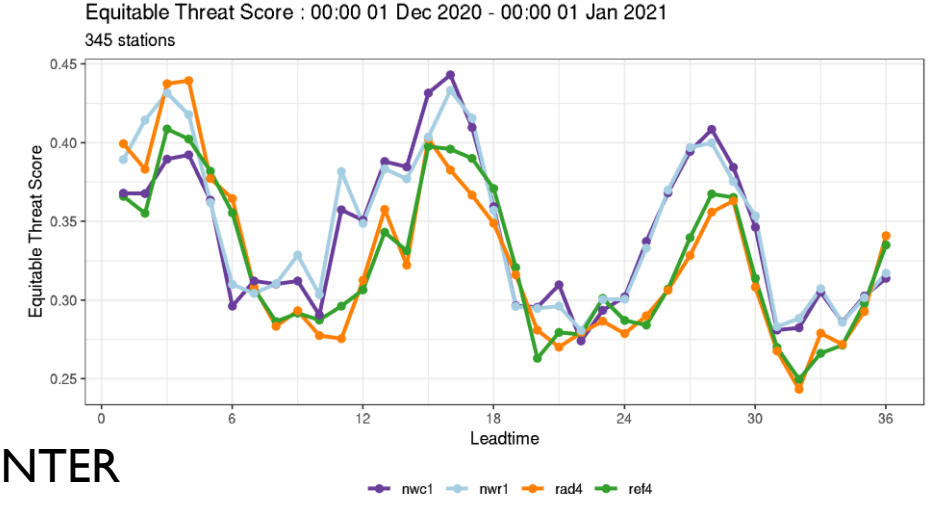


RUC RUC+RADAR OPER OPER+ RADAR

Verification for AccPcp1h



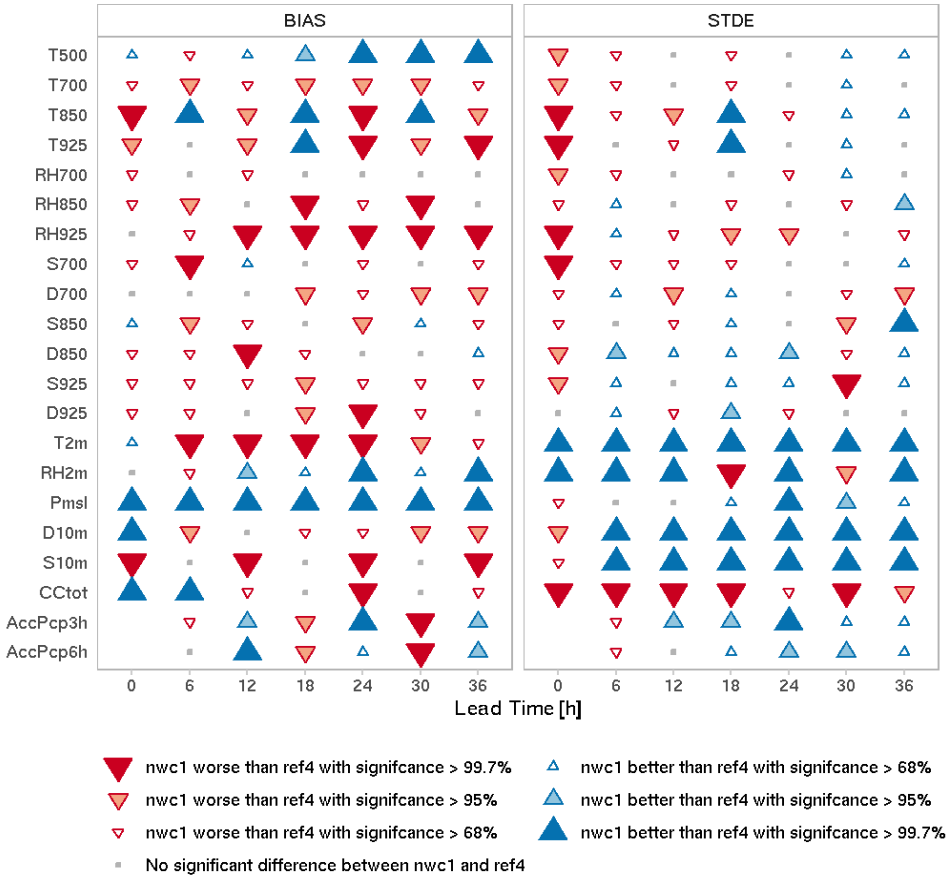
WINTER



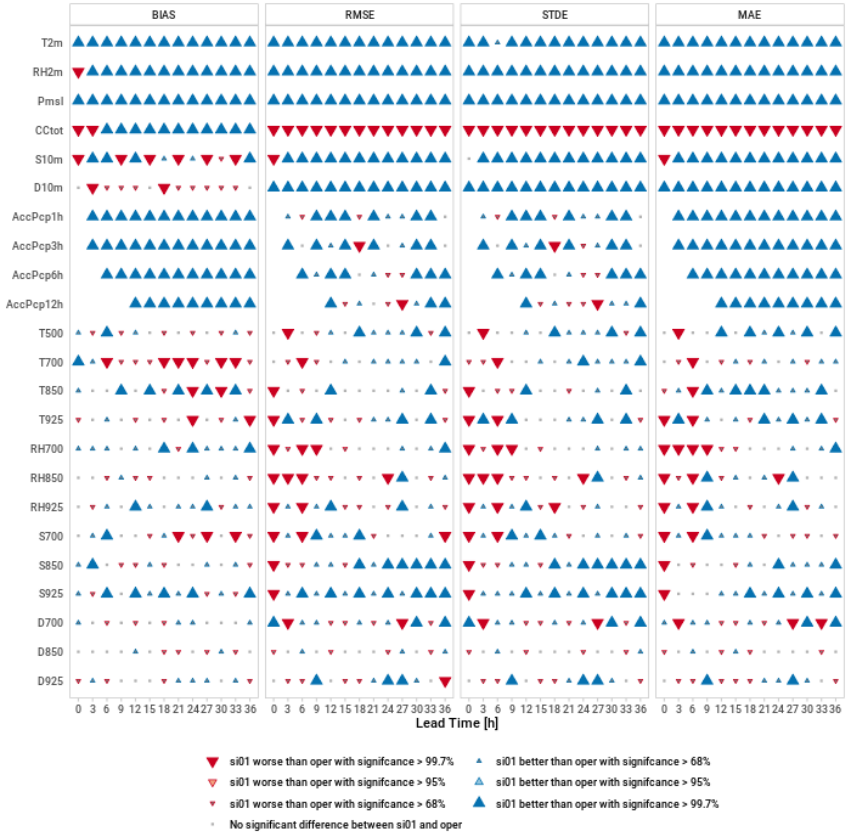
2 mm/h precipitation threshold

Performance of RUC

RUC (1.3 km) vs. OPER (4.4 km)

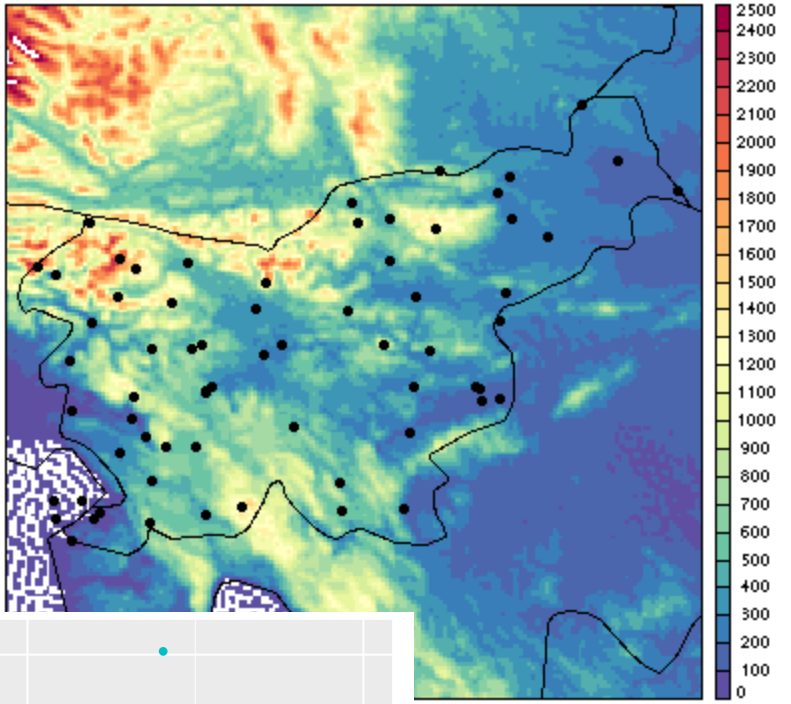


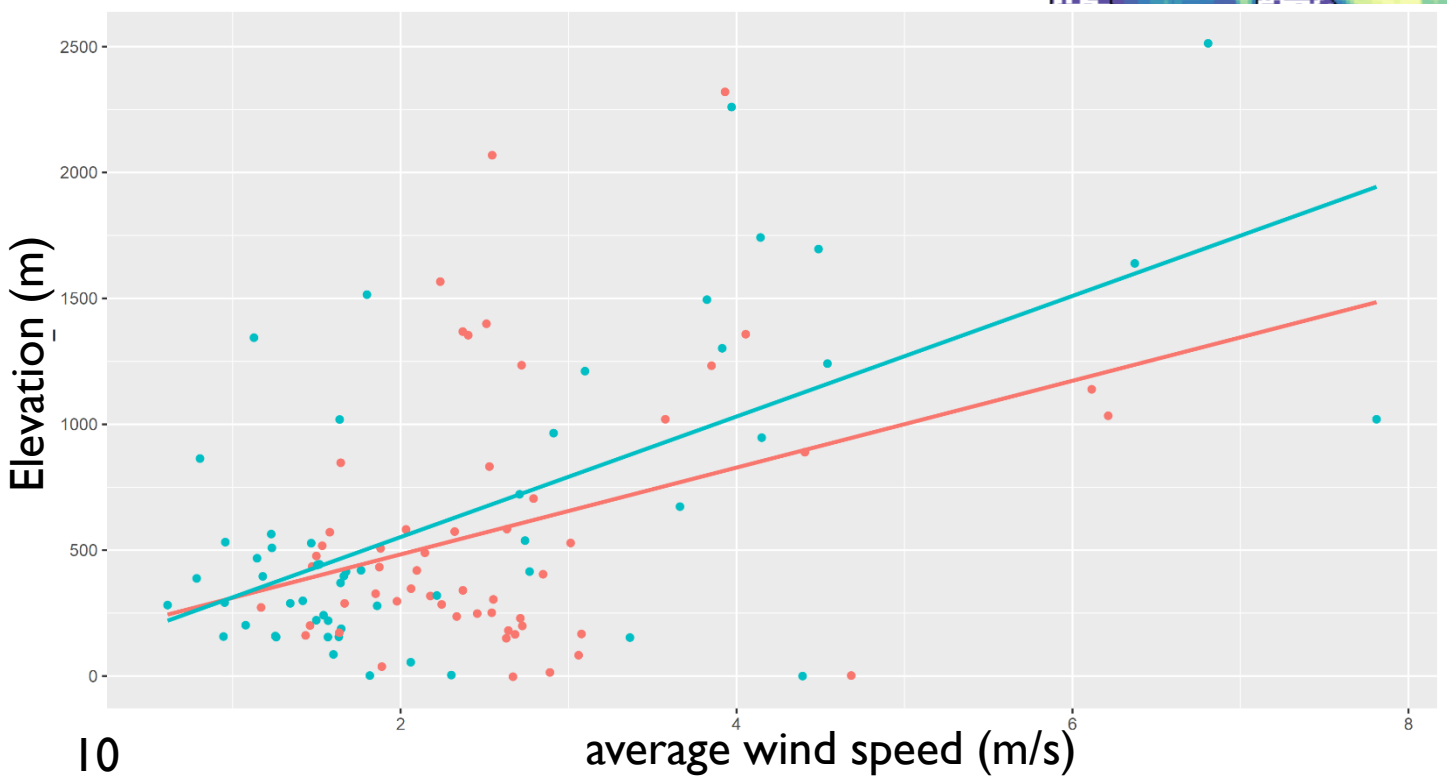
RUC (1.3 km) vs. OPER (4.4 km)
April and May 2022



10 m wind verification

7 months (Nov21-May22)
Daily average 10 m wind
Model: 1h forecast from houly runs (lowest model level)
Observations: automatic stations





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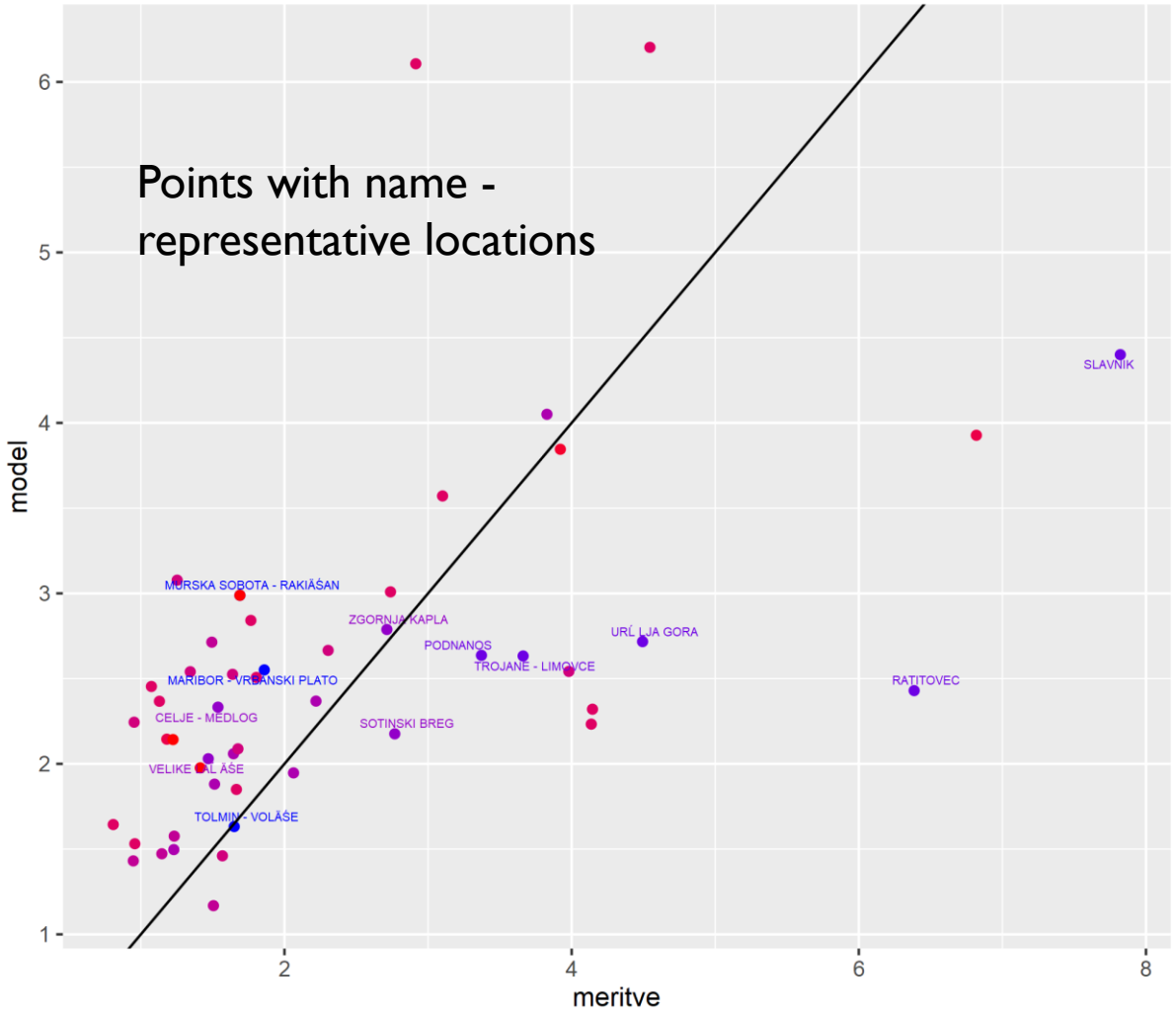
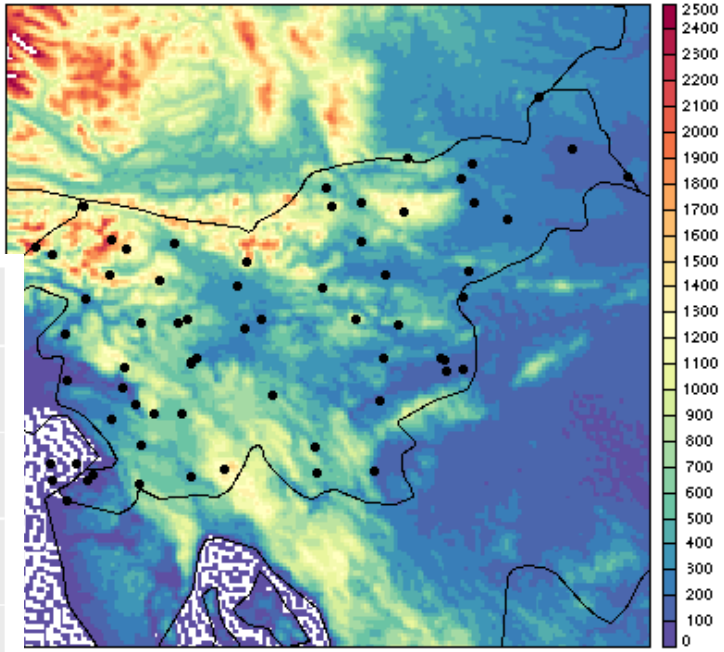
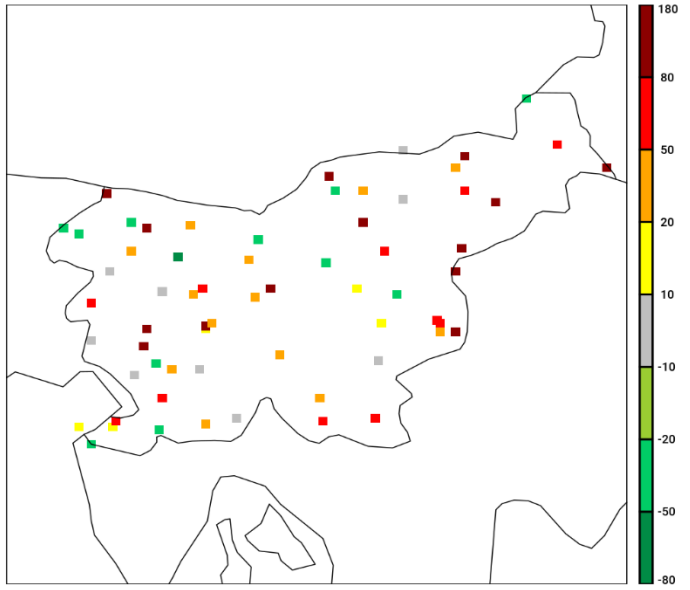




Napaka vetra model/meritve [%]



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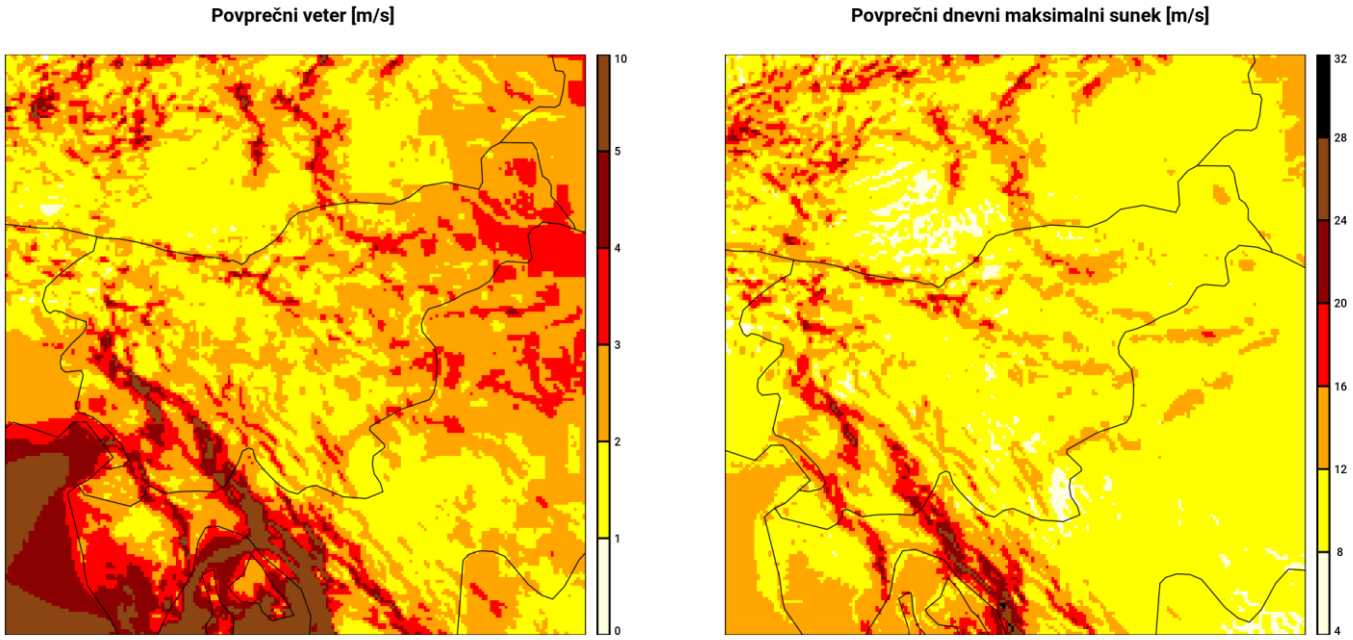
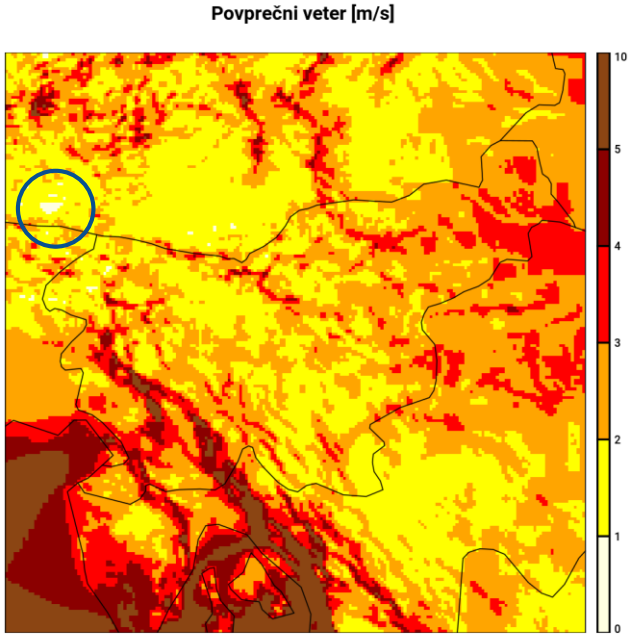
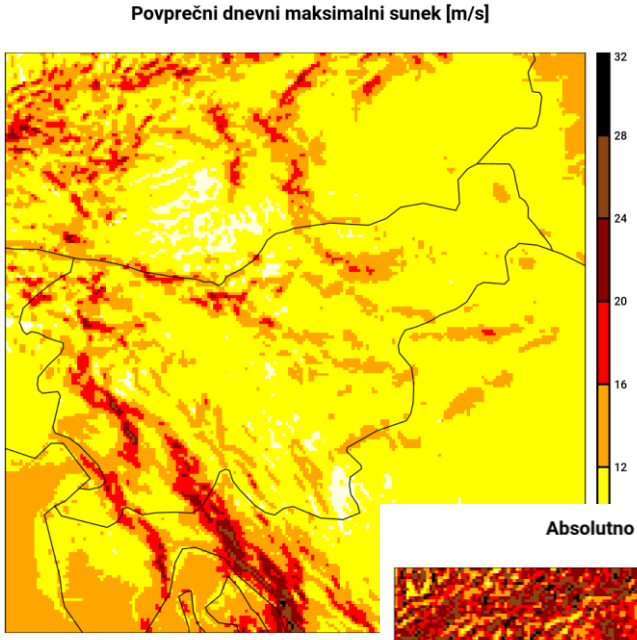
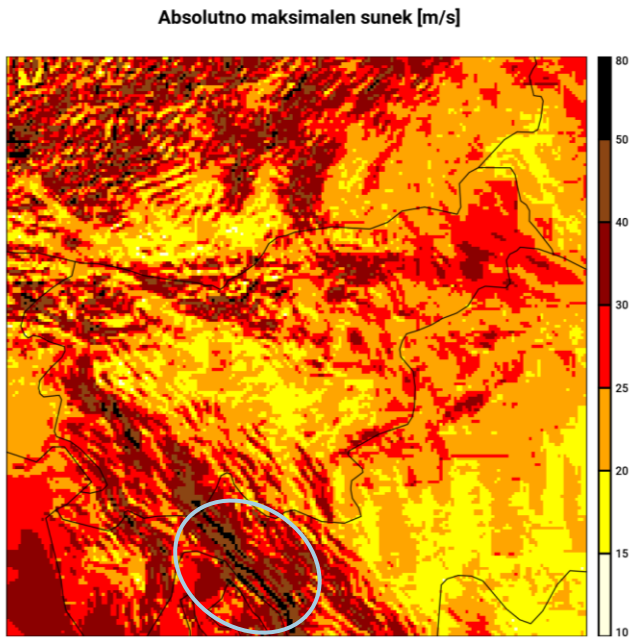


- Mountain stations: too low wind speed, gusts are good
- NE region: wind speed and gusts too high
- Bora: mixed

10 m Wind verification







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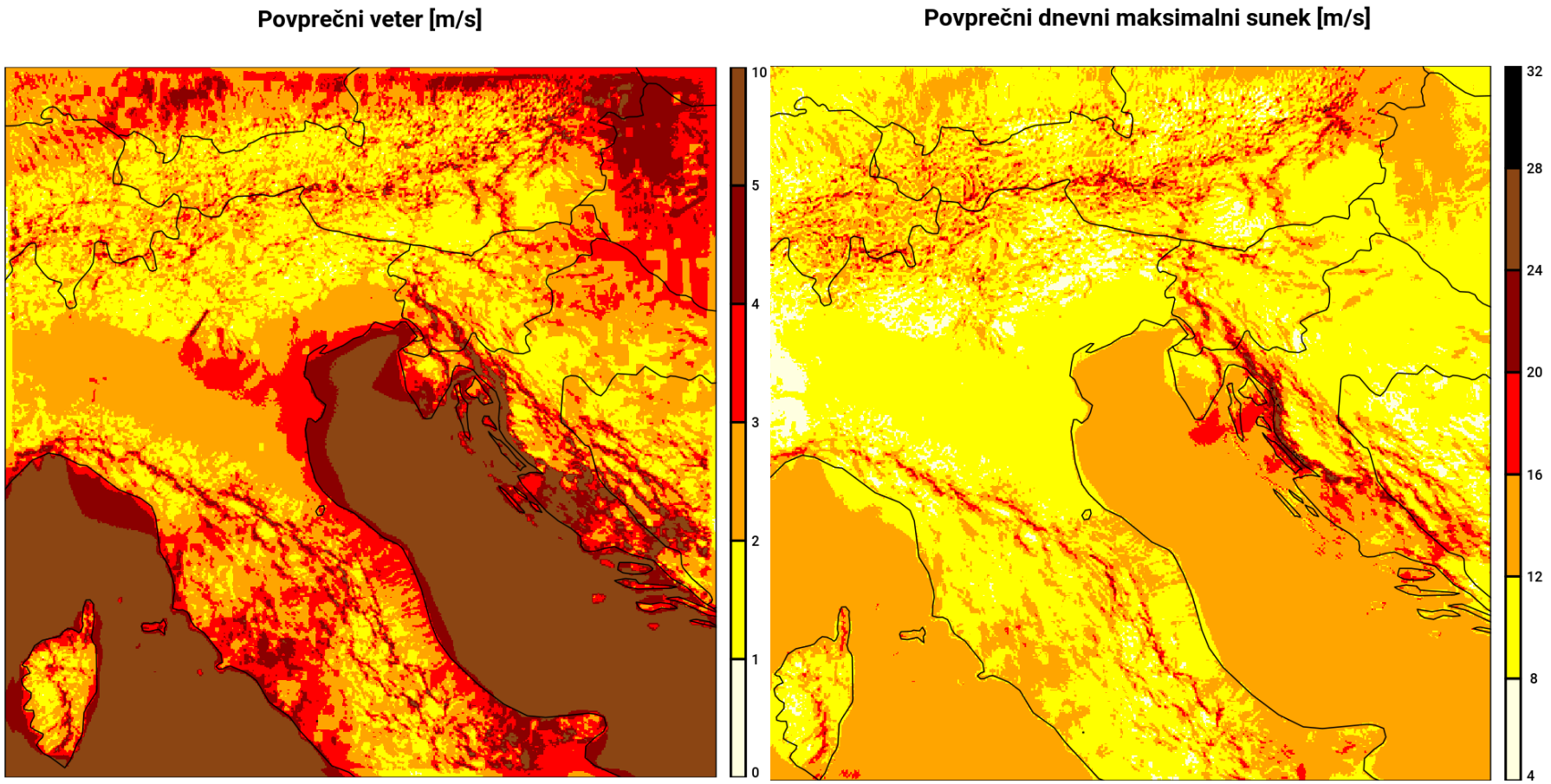
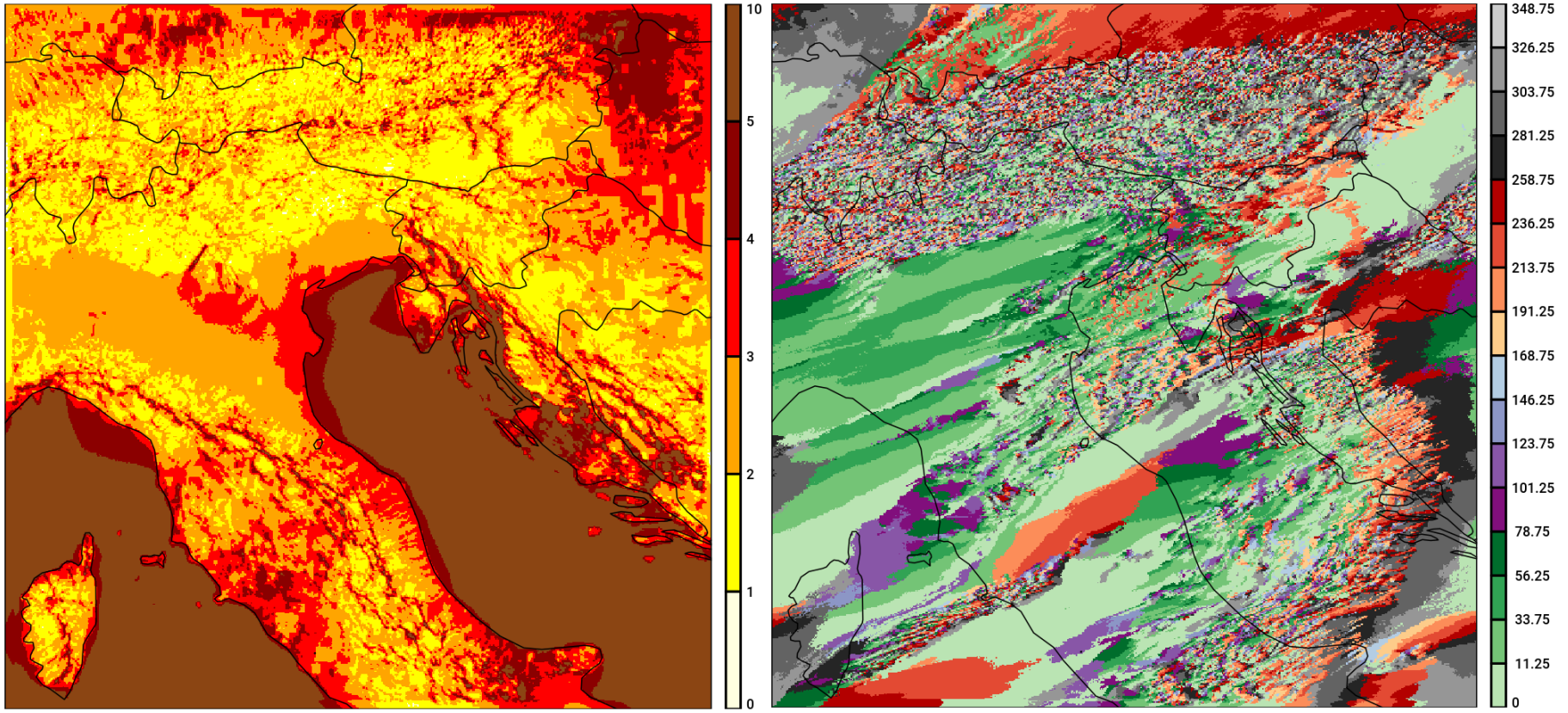


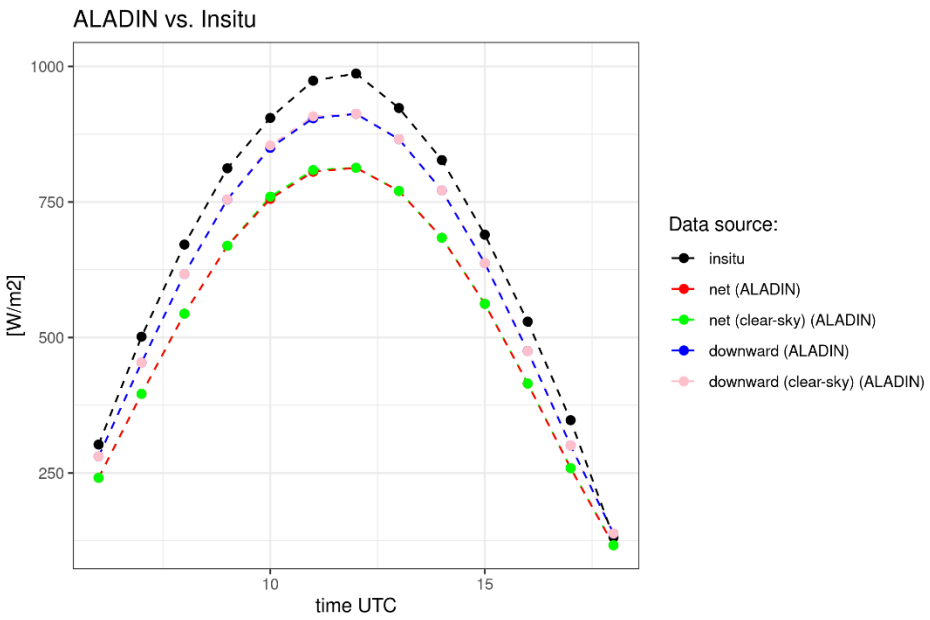
10 m Wind verification



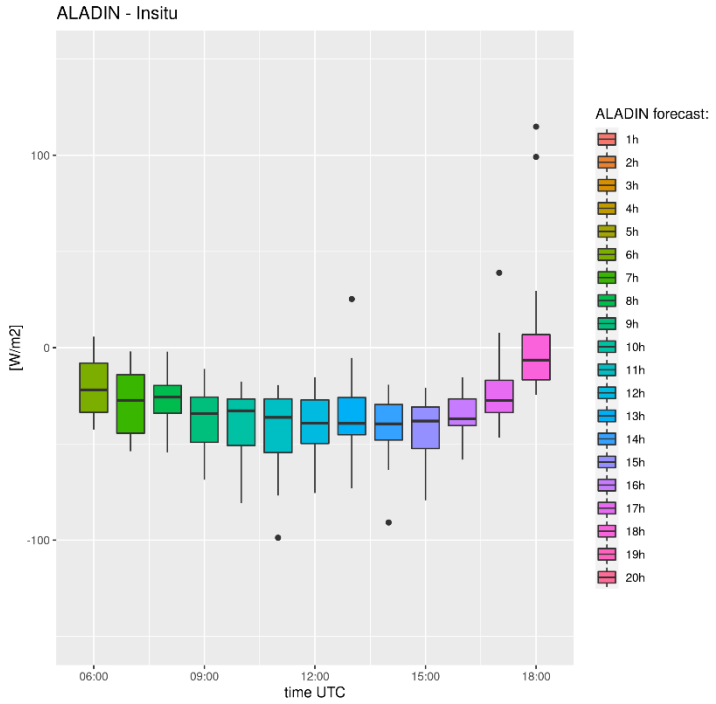
Short wave radiation

Global solar radiation:
- selected days with clear sky
- model: oper 4.4 km

One station

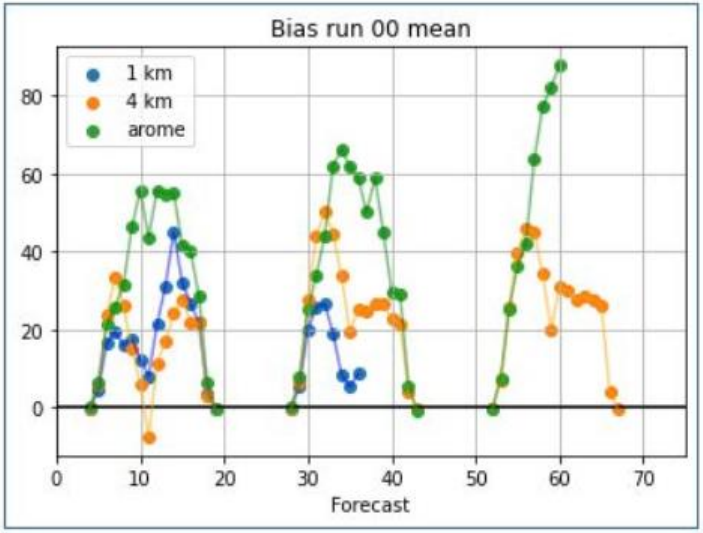


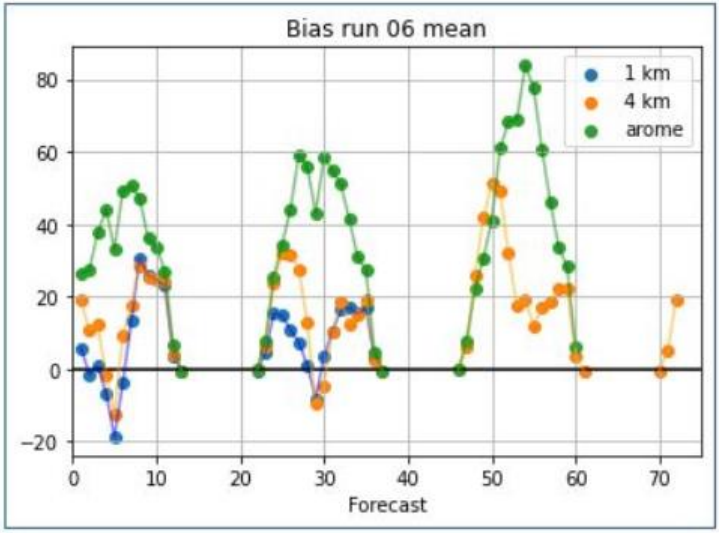
Error distribution
10 days (summer 2021)
13 selected stations

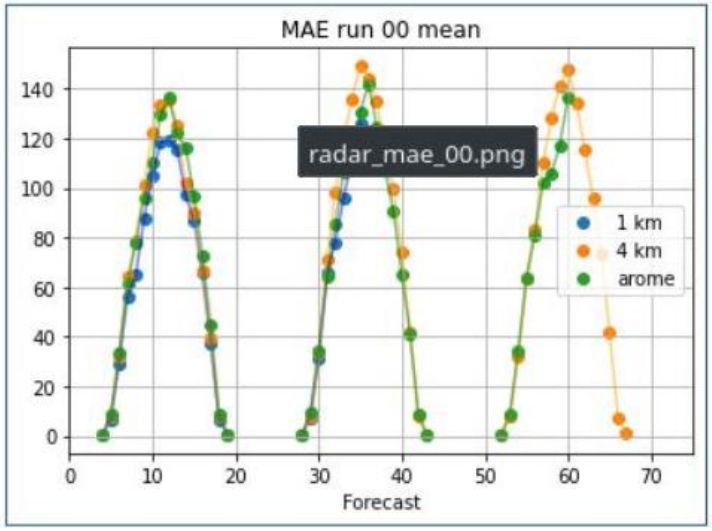


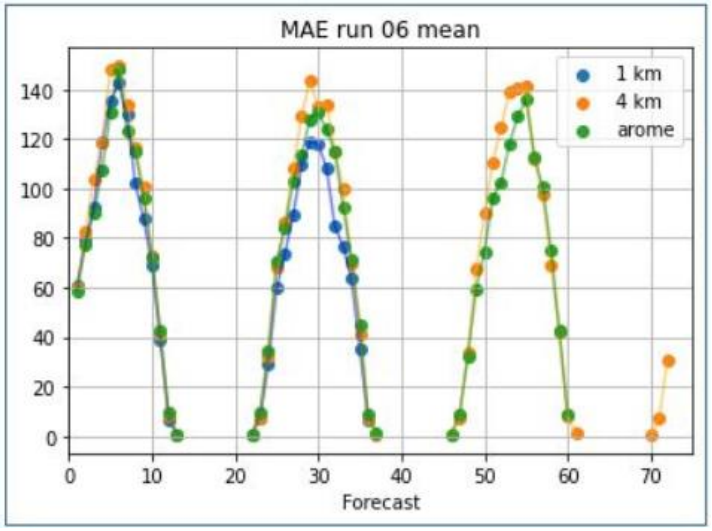
Short wave radiation

global solar radiation
1.4.-9.5.2022, 10 stations

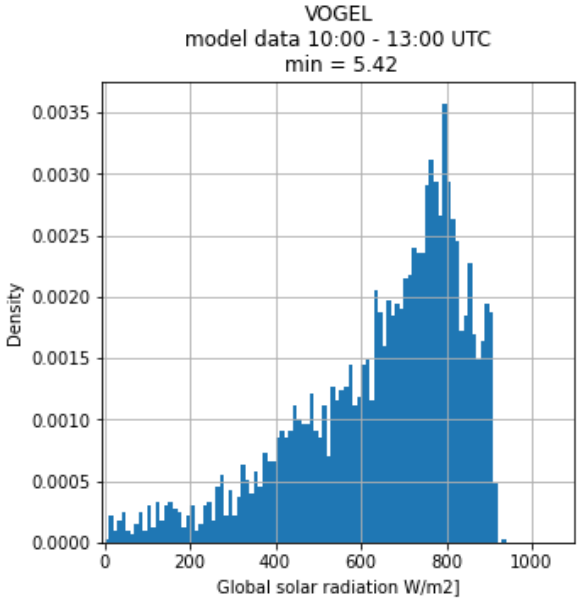


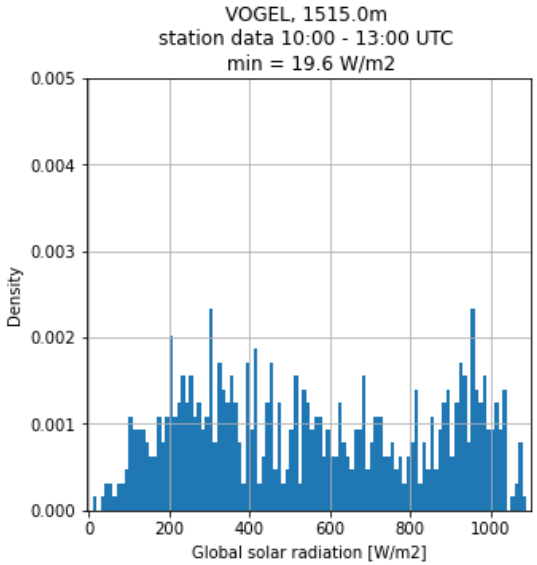


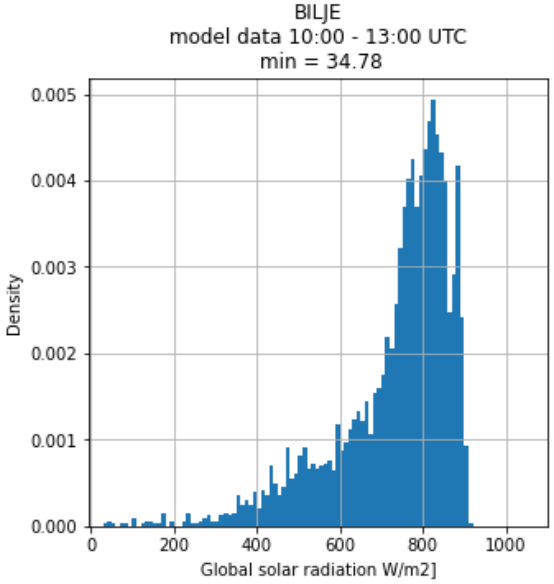


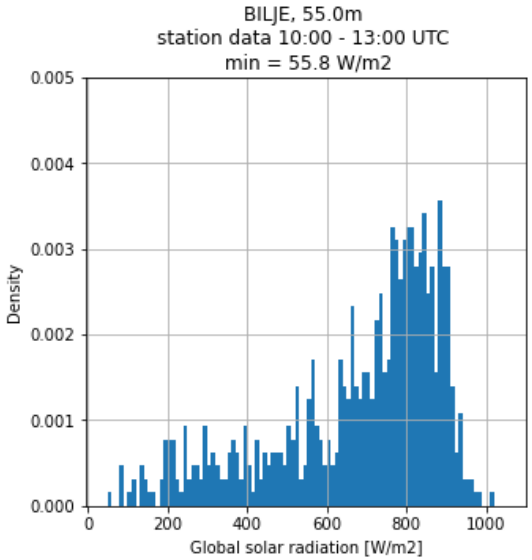


Short wave radiation









Distibution of global solar radiation:

- 3 months (Jun Jul Aug 2021)
- for 3 hours in mid-day
- model: oper 4.4 km

Conclusions and plan

- NWCRUC: optimization and operationalization
  - Reach satisfactory performance of reflectivity DA
  - Presentation of products

- Roughness treatment in ISBA scheme (2019)
- ALARO using SURFEX
- Prognostic graupel

- Validation