PP C2I - ICON-LAM at IMS

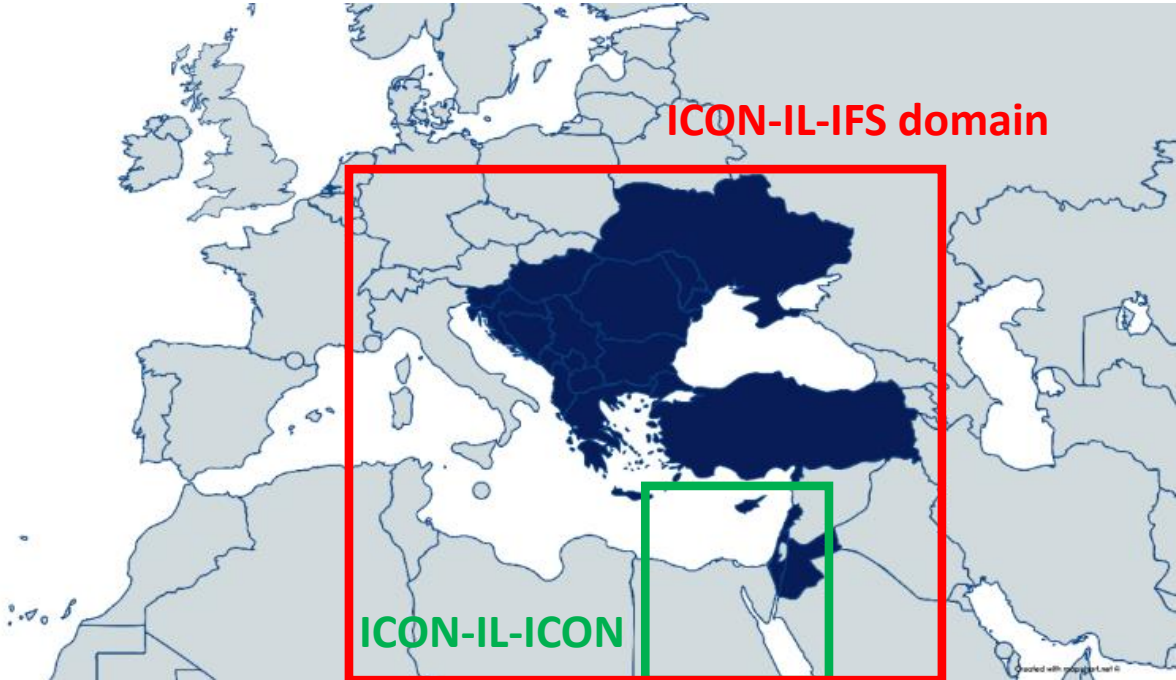
IMS COSMO team

COSMO virtual GM September 2020

ICON-IL-IFS

- **Platform**: The “Time Critical Suite” for running ICON-LAM model was prepared on the ECMWF HPC *(Thanks a lot to: Bojan Kasic & Cristian Simarro, ECMWF)*
- **Model setup:** Domain: **4-45.5E/25.5-53N**
  Resolution: **~2.5km** horizontal, 65 levels vertical
  Range: **78h**
  IC/BC: **det. IFS**
  SBU/run: **~50K**
- **Oper. runs:** **2 runs/day** (00, 12 UTC)
  SBU/year: **36.5M**
  (not including runs for model tuning)
  Storage: **~150 T/year**
- **Data assimilation:** Planned for future
- **Model tuning:** Planned for future

WMO project SEE-MHEWS-A
Multi-Hazard Early Warning Advisory System for South-East Europe



ICON SEE forecast for 31/08/2020 00 UTC

TP | Rain | Snow | Graupel | H_snow

INCAdom | EMEDdom | FULLdom

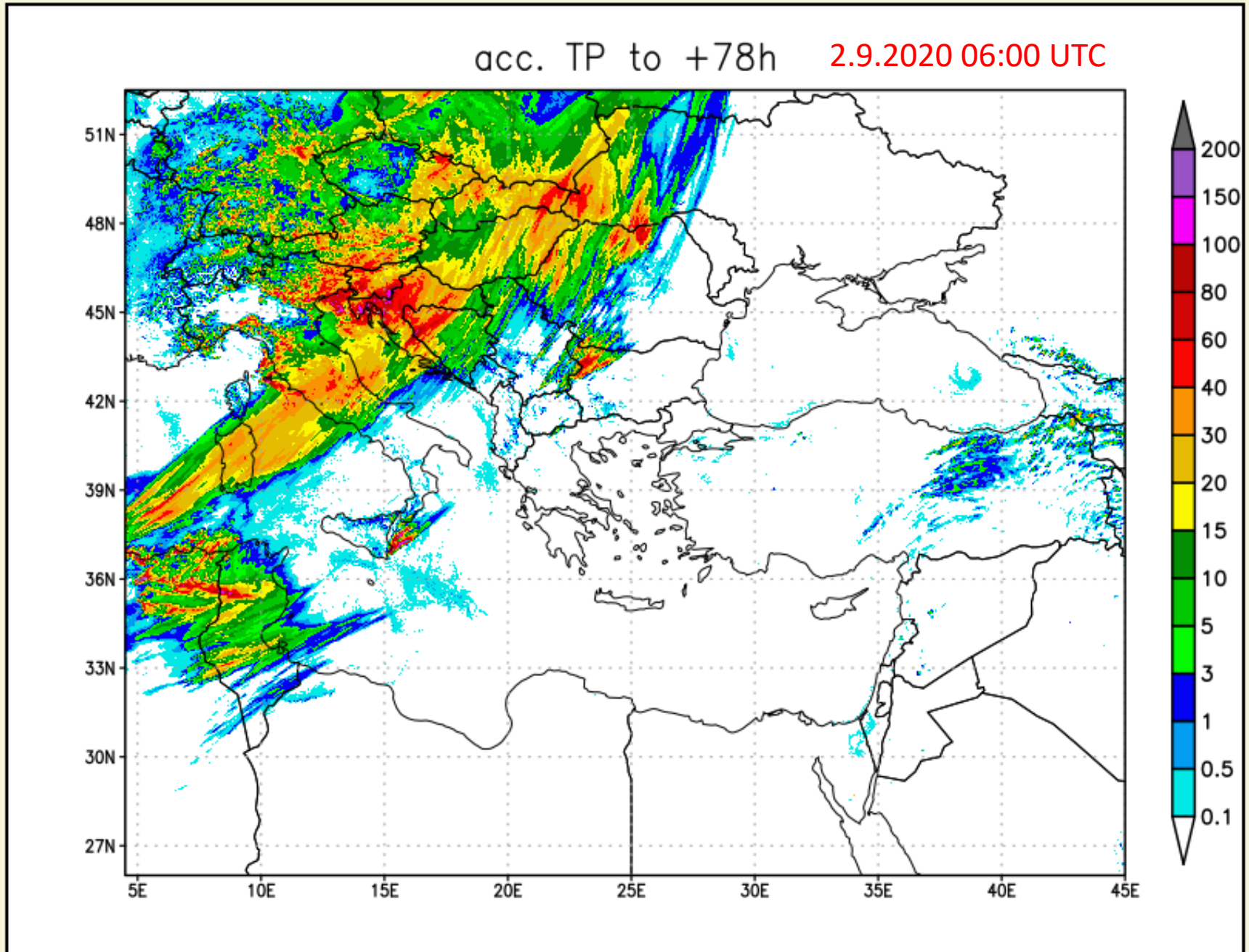
Accum. | 1h | 6h

First time step

-24h | +24h

Prev step | Next step

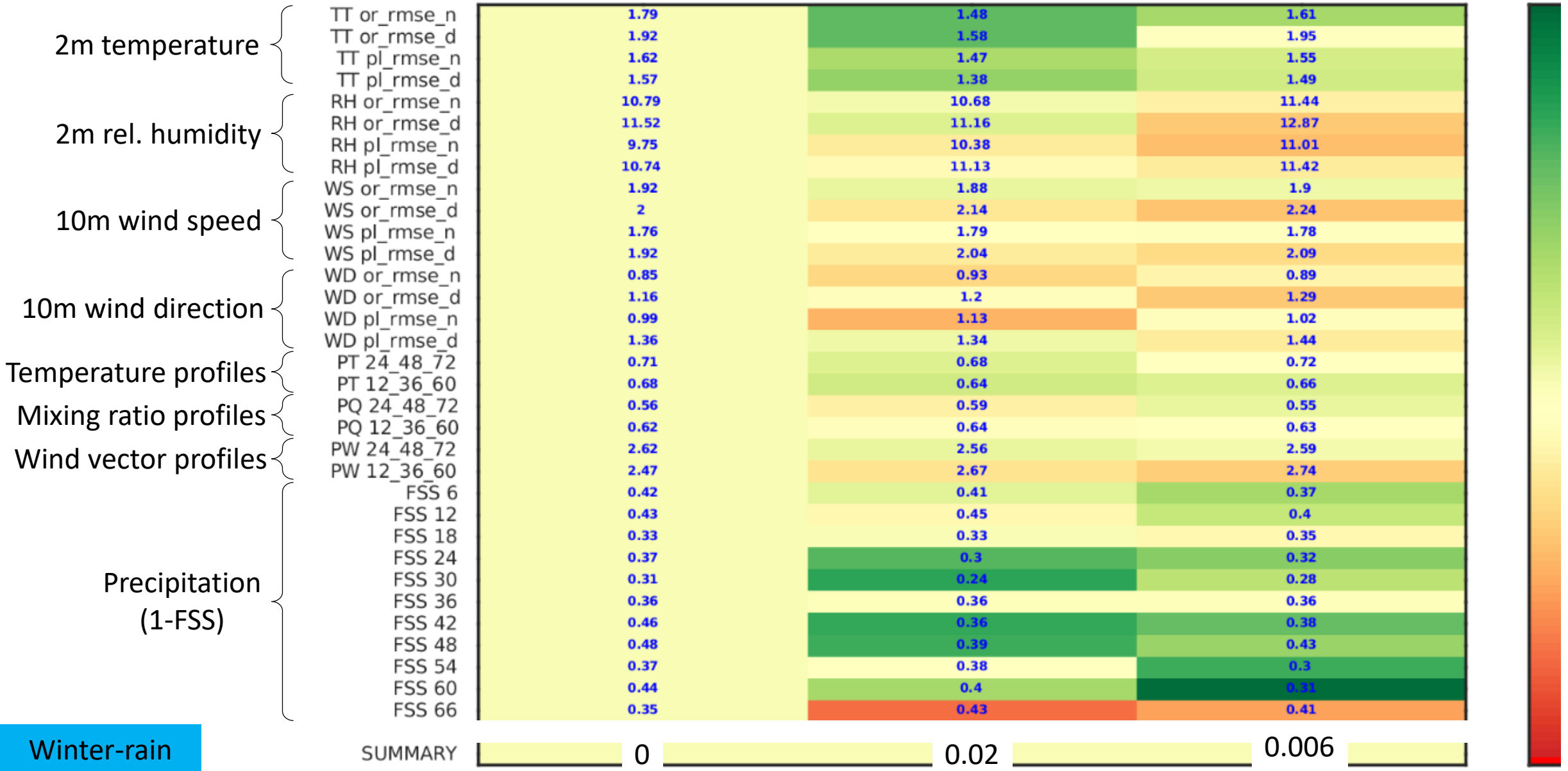
Last time step



Verification over Israel – test cases

Wintertime rain events:

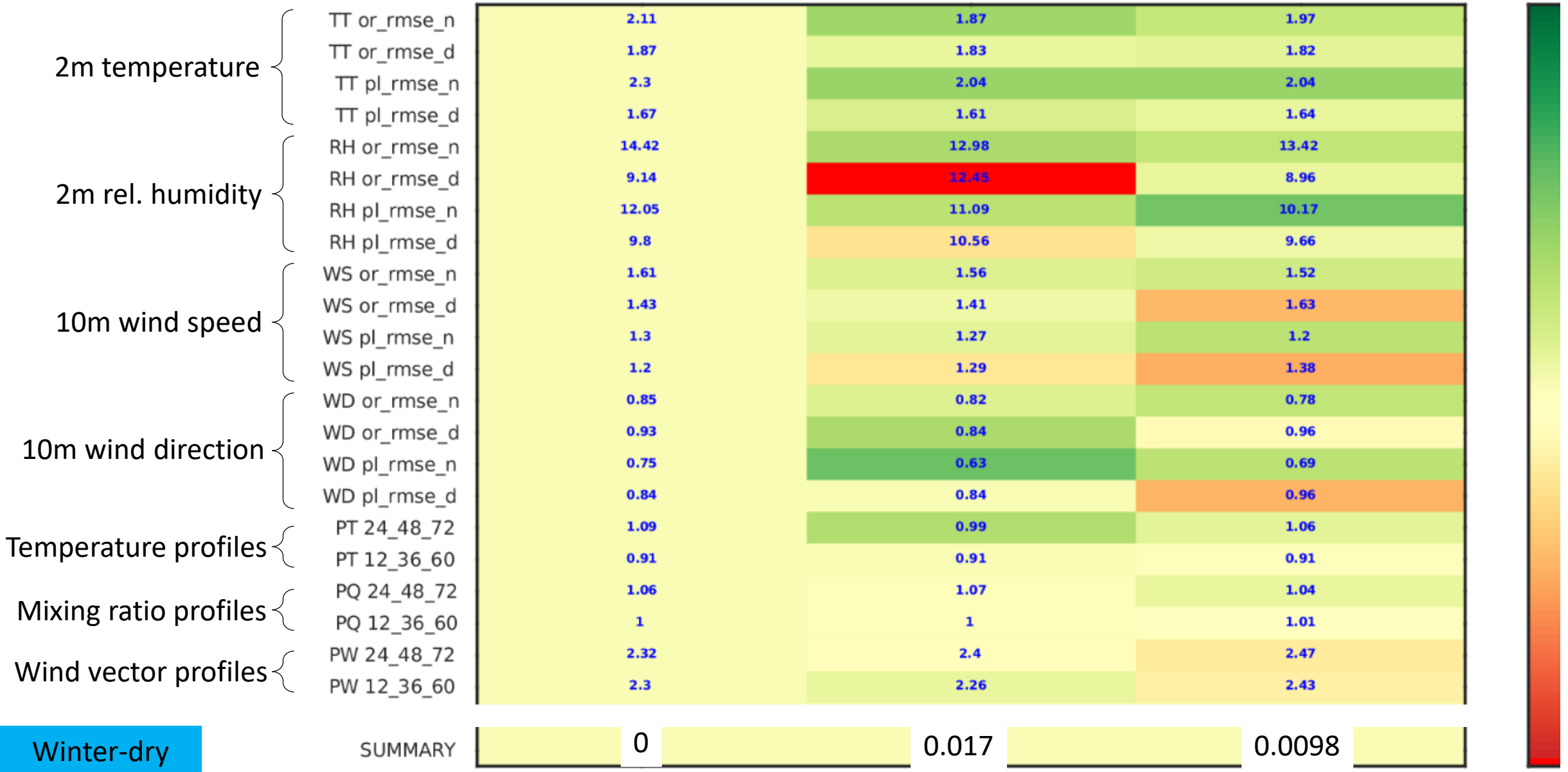
2016121200, 2016122300, 2017021100, 2017021400, 2017041200, 2017112000, 2017120500, 2018010500, 2018011800, 2018021600, 2018042500, 2018042600, 2020010200, 2020010300, 2020010700, 2020010800



Winter-rain events: ICON is better

Wintertime dry events:

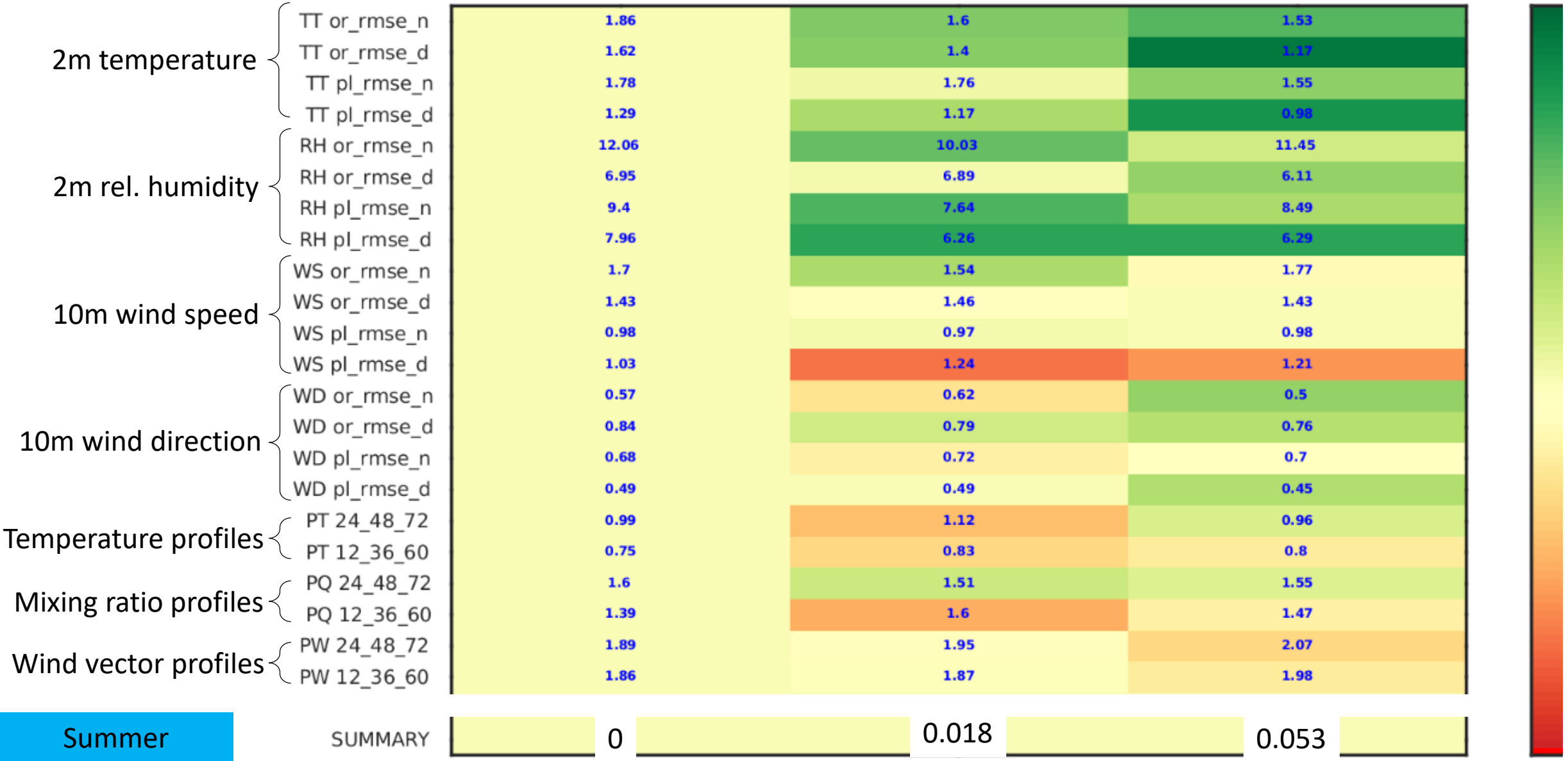
2017043000, 2017102100, 2017120200, 2017122000, 2018010800, 2018011100, 2018020900, 2018022000, 2018022300, 2018030600, 2018040100



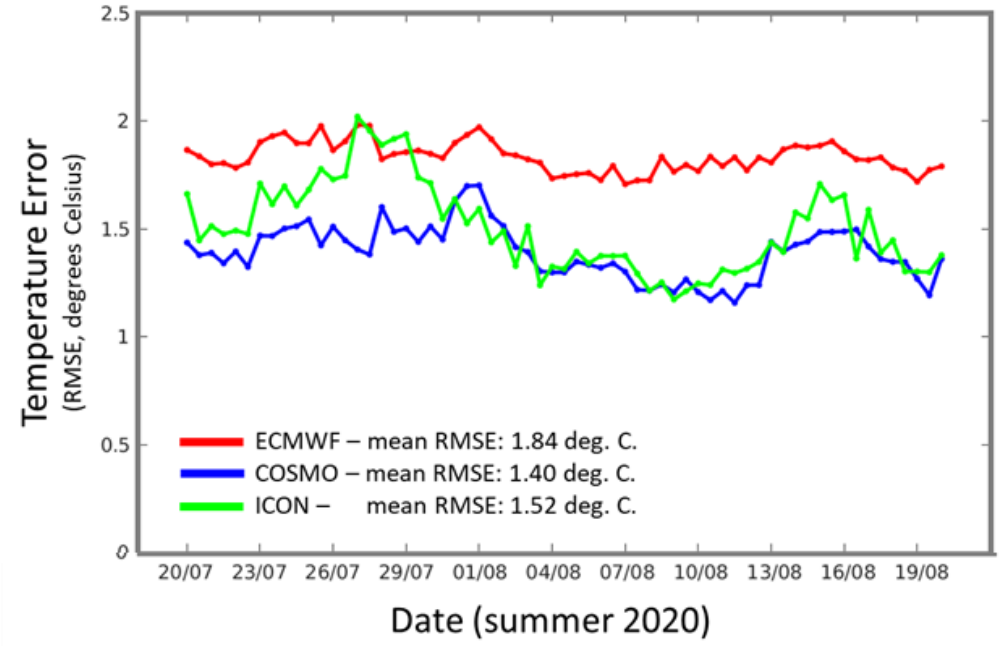
Winter-dry events: ICON is better

Summertime events:

2017060700, 2017063000, 2017071700, 2017080100, 2017082500, 2017090500, 2018060300, 2018071100, 2018072000

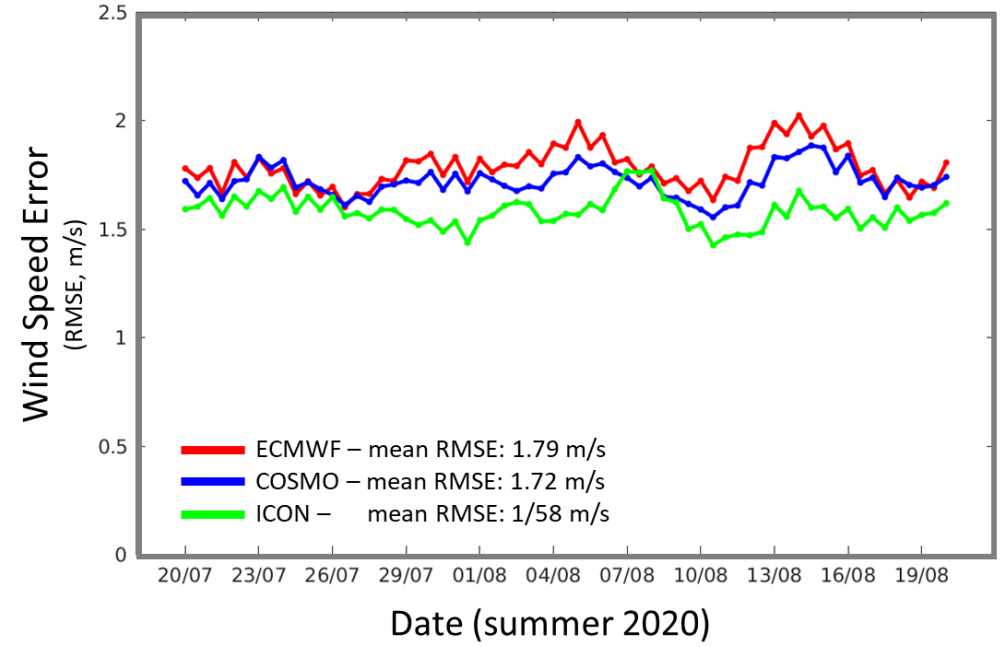


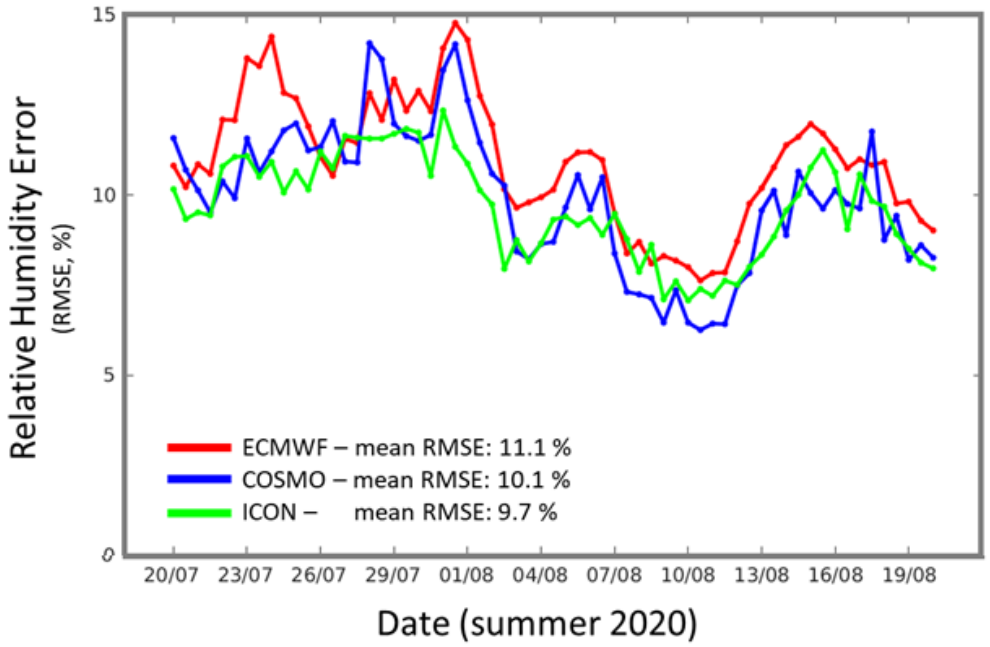
Summer events: COSMO is better



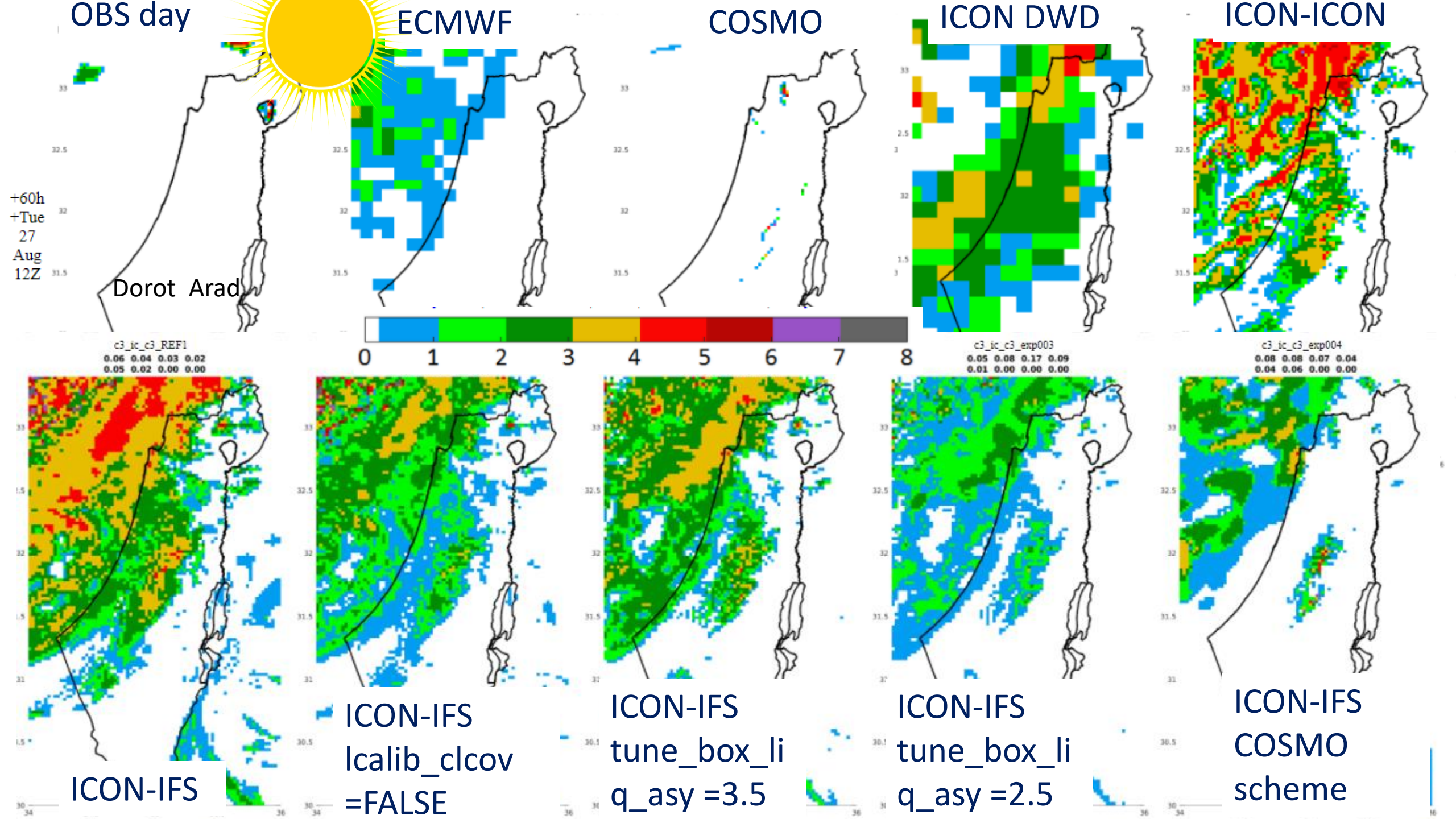
Last month verification (**all** stations, **all** times)

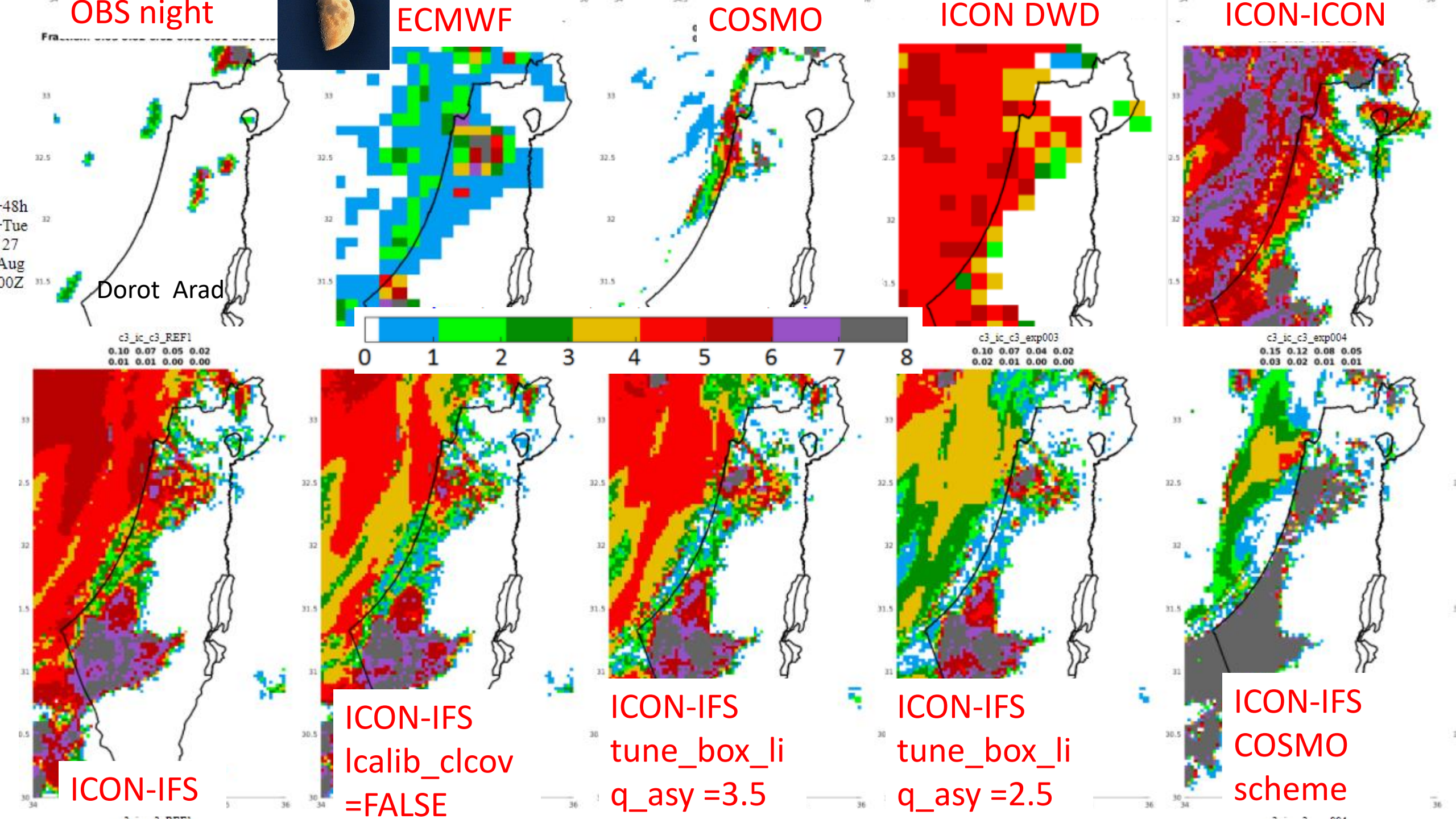
Encouraging results for ICON-LAM





ICON Cloudiness overs-estimation


OBS day
ECMWF
COSMO
ICON DWD
ICON-ICON
+60h
+Tue
27
Aug
12Z
Dorot
Arad
0 1 2 3 4 5 6 7 8
c3_ic_c3_REF1
0.06 0.04 0.03 0.02
0.05 0.02 0.00 0.00
c3_ic_c3_exp003
0.05 0.08 0.17 0.09
0.01 0.00 0.00 0.00
c3_ic_c3_exp004
0.08 0.08 0.07 0.04
0.04 0.06 0.00 0.00
ICON-IFS
ICON-IFS
lcalib_clcov
=FALSE
ICON-IFS
tune_box_li
q_asy =3.5
ICON-IFS
tune_box_li
q_asy =2.5
ICON-IFS
COSMO
scheme


OBS night
ECMWF
COSMO
ICON DWD
ICON-ICON
-48h
-Tue
27
Aug
00Z
Dorot Arad
0 1 2 3 4 5 6 7 8
c3_ic_c3_REF1
0.10 0.07 0.05 0.02
0.01 0.01 0.00 0.00
c3_ic_c3_exp003
0.10 0.07 0.04 0.02
0.02 0.01 0.00 0.00
c3_ic_c3_exp004
0.15 0.12 0.08 0.05
0.03 0.02 0.01 0.01
ICON-IFS
ICON-IFS
lcalib_clcov
=FALSE
ICON-IFS
tune_box_li
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ICON-IFS
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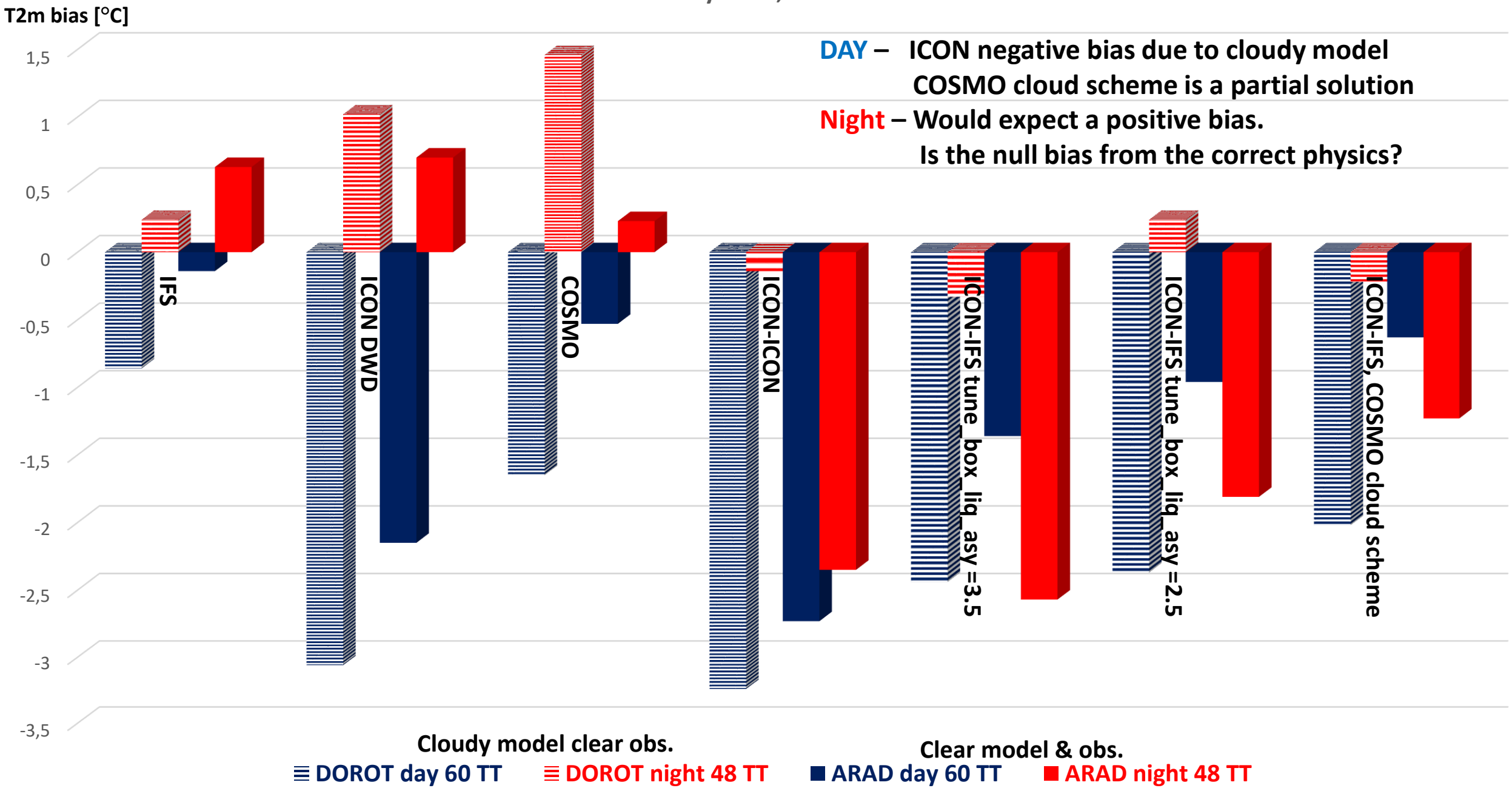
q_asy =2.5
ICON-IFS
COSMO
scheme

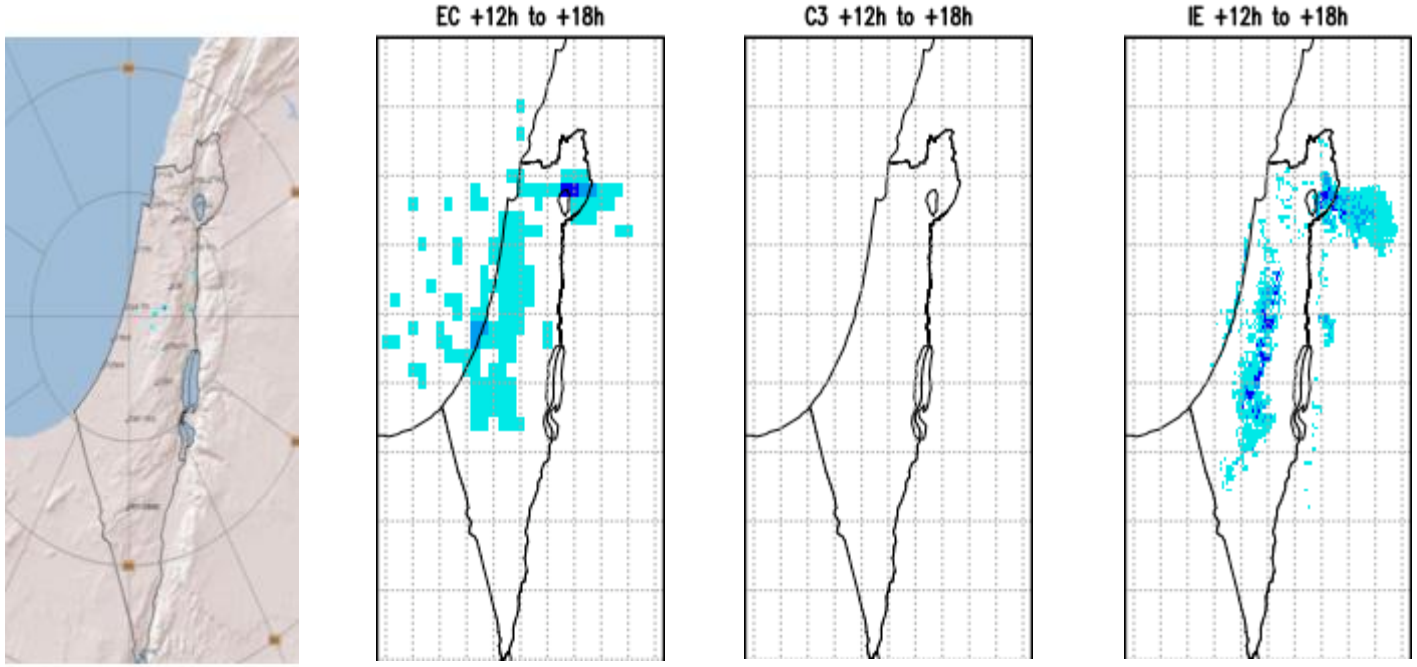
T2m bias for the 25.8.2019 00Z run
DOROT = cloudy ICON, ARAD = clear ICON



Tiedtke-Bechtold scheme - drizzle problem

typical example 5/7/2020 06UTC

RADAR ECMWF COSMO-IL ICON-IL



During summer there is strong inversion over Israel so and precipitation is very rare.
Since ICON shallow convection scheme allows precipitation, its rain pattern is similar to that of ECMWF, which overestimates precipitation during summer. COSMO shallow convection scheme does not allow precipitation, and grid scale precipitation obviously does not develop. That yields some underestimation of precipitation (when it rarely occurs)

Conclusions

- ICON-LAM has promising results
- We are working to solve ICON cloud overestimation
- ICON-LAM will become time critical on ECMWF HPC by Nov. 2020