

PP C2I: ICON Implementation Status @NMA

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- Model version i used at ICON-LAM training course in April 2018

First implementation (old IBM platform)

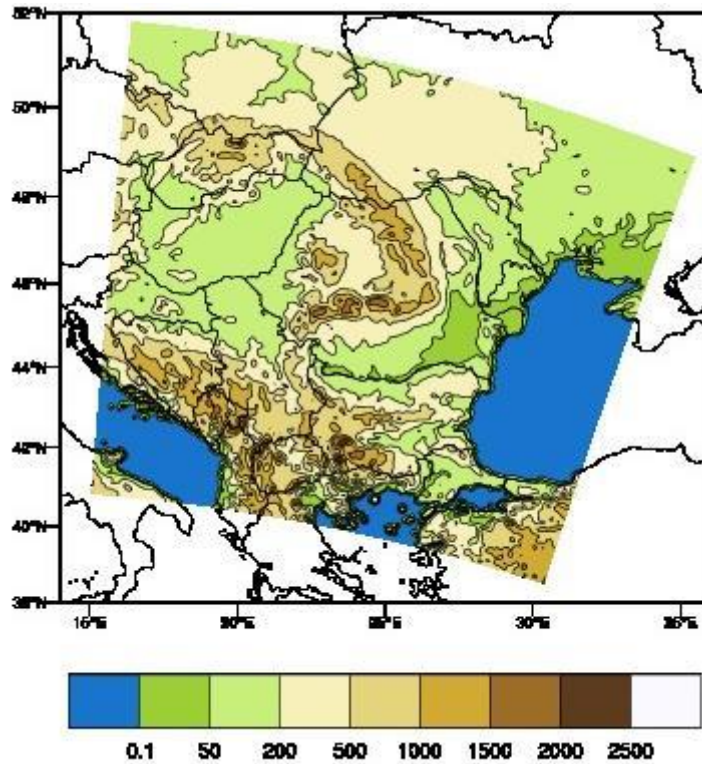
- Compiler i gnu-5.4.0
- openmpi-2.0.1
- libxml2-2.7.2
- zlib-1.2.11
- szip-2.1.1
- Hdf5-1.10.2
- Netcdf-4.2.1
- grib_api-1.26.1

Second implementation (new IBM platform)

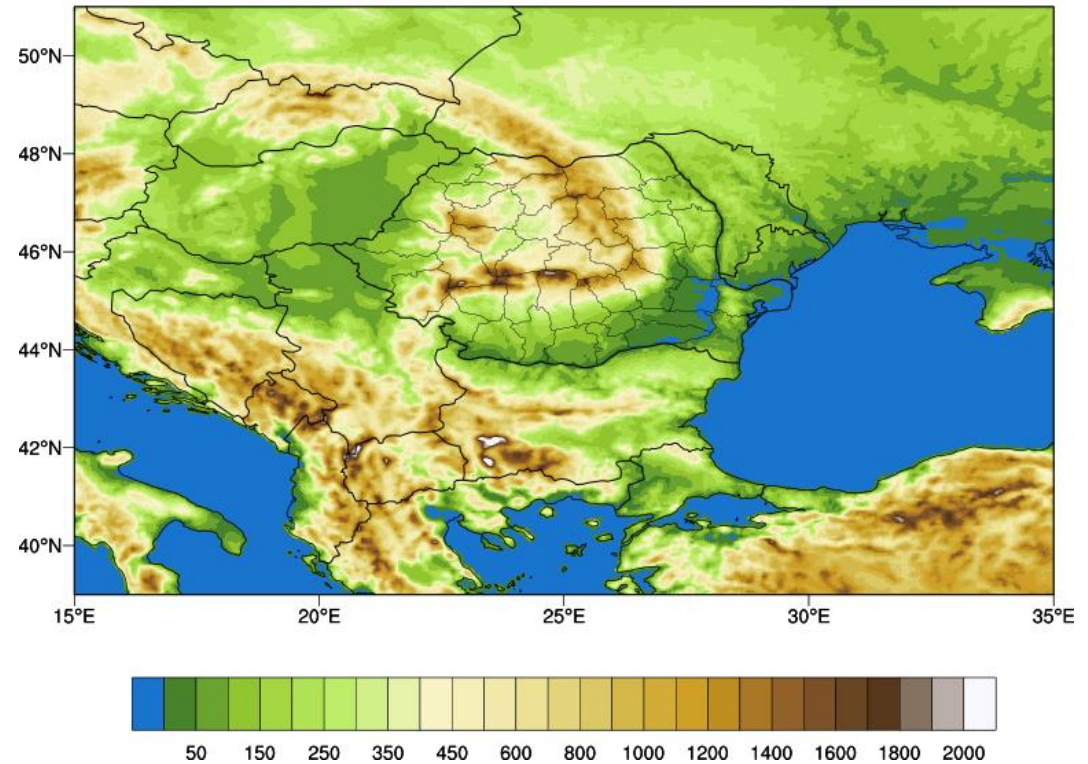
- Compiler i gnu-6.5.0
- openmpi-3.1.1
- libxml2-2.7.2
- zlib-1.2.11
- szip-2.1.1
- hdf5-1.10.2
- netcdf-4.6.3 + netcdf-f-4.4.5
- eccodes-2.13.0

- **Set-up of ICON-LAM** for Romanian territory at 7 km resolution on a similar (slightly larger) domain as the operational COSMO-7km
 - Initial and LBC data from ICON global (same as operational COSMO-7km)
 - 00UTC run
 - 78 forecast hours
 - dtime = 60s
 - dt_rad = 1440s
 - dt_conv = 180s
 - dtime = 66s
- **Output**
 - model, pressure and height levels, regular lat/lon grid (netcdf) ï operational use
 - regular lat/lon grid grib2 output to test in VERSUS
 - 48 forecast hours ï output on native grid, LBC for ICON-LAM-2.8km (grib2)

COSMO-7km: Topography Height (m)



ICON-7km: Topography Height (m)



Pre-operational tests of ICON-LAM for verification purposes

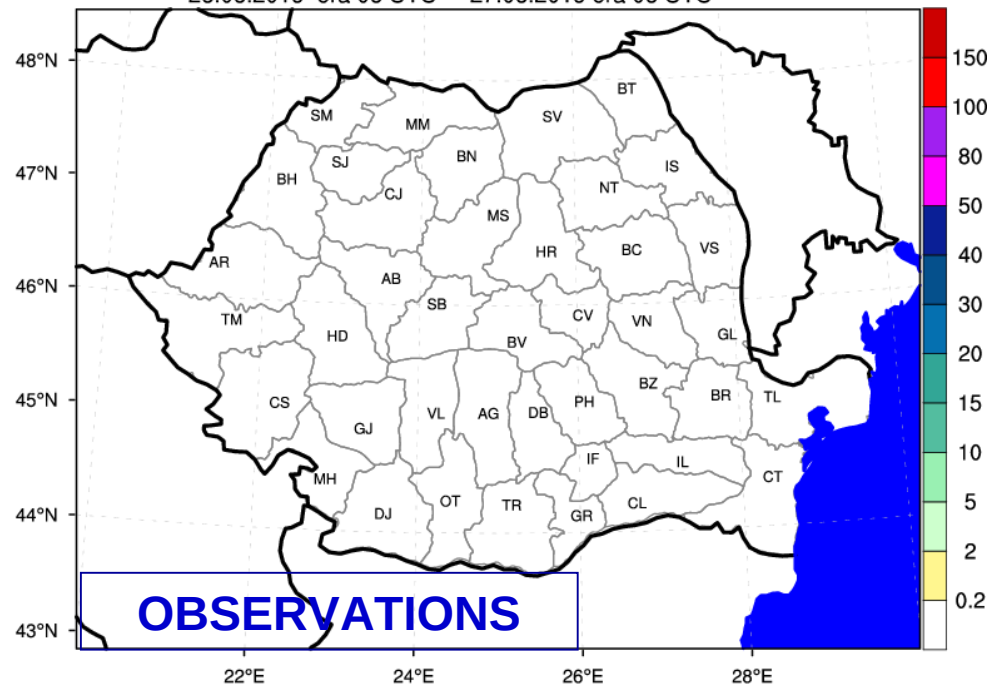
- **summer 2019 very challenging for forecasters** (May, JJA)
- and COSMO-RO (7km)!
- particular cases:
 - May (e.g.: 31.05)
 - June (e.g.: 6.06, 7.06, 9.06-11.06, 19.06-25.06, 27.06-28.06)
 - July (e.g.: 2.07-5.07)
 - August (e.g.: 1.08)
- **similar behaviour for most country domain for these cases (observations):**
 - either no precipitation for entire domain
 - or heavy precipitation in most regions of the country

Low precipitation cases

- Observations: very low or no precipitation for entire country domain
- Both COSMO-7km and ICON-LAM-7km offer good estimates for these periods
- +78 hours anticipation
- Next e.g.: **26.06-27.06 06UTC**

SYNOP+PLUVIO+HYDRO+DESWAT- precipitatii cumulate in intervalul

26.06.2019 ora 06 UTC - 27.06.2019 ora 06 UTC



ICON-RO-7km: 24 hour cumulated precipitation

Base 24.06.2019, 00 UTC

Valid 26.06.2019, 06 UTC-27.06.2019, 06 UTC



ICON-RO-7km: 24 hour cumulated precipitation

Base 25.06.2019, 00 UTC

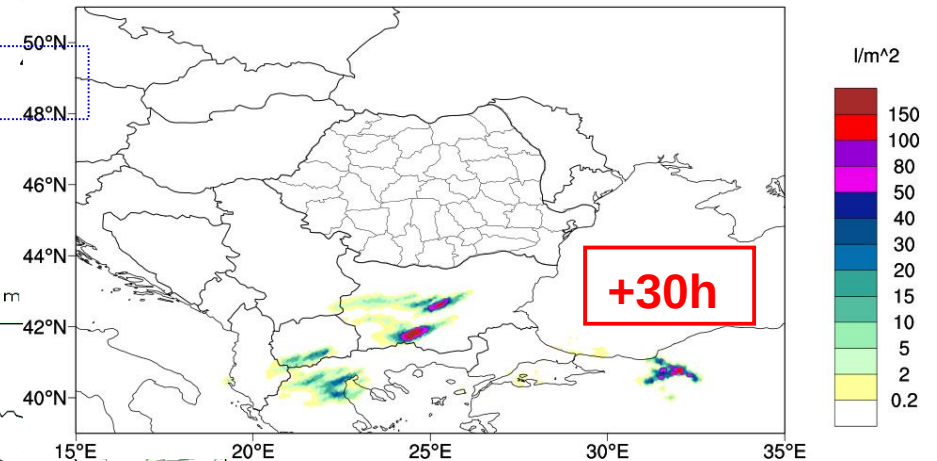
Valid 26.06.2019, 06 UTC-27.06.2019, 06 UTC



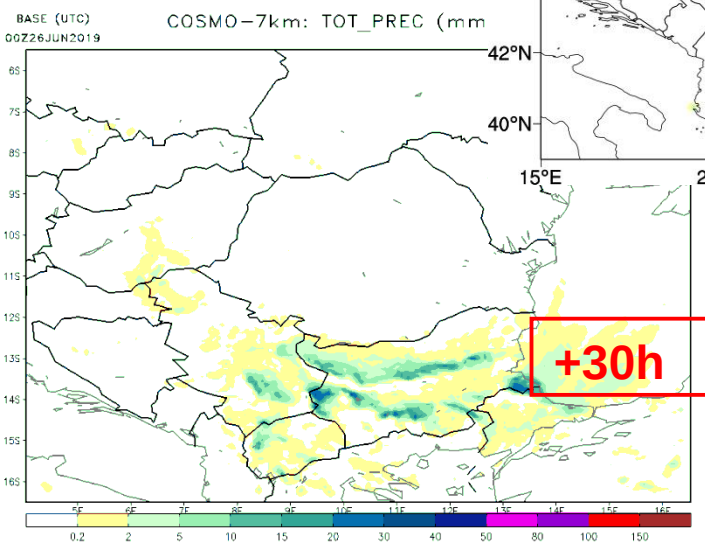
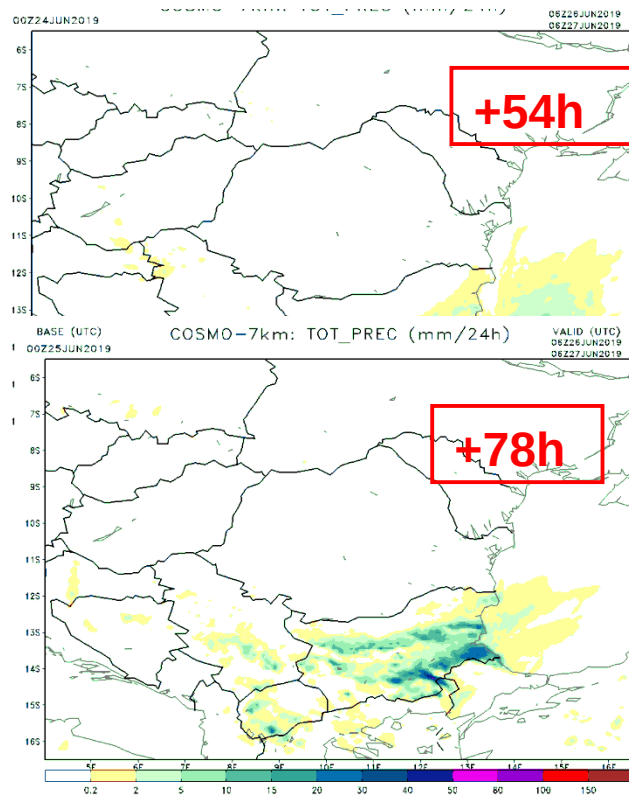
ICON-RO-7km: 24 hour cumulated precipitation

Base 26.06.2019, 00 UTC

Valid 26.06.2019, 06 UTC-27.06.2019, 06 UTC



26.06-27.06 06UTC



Heavy precipitation cases

- Observations: heavy precipitation for large areas of the country
- **COSMO-7km** strong underestimation of heavy precipitation
- **ICON-LAM-7km** overestimation of heavy precipitation areas
- However, **ICON-LAM-7km** captures maximum quantities better and has a better distribution of precipitation areas
- **COSMO-7km** underperformed for the E and SE regions of Romania, with strong underestimation of precipitation events, while **ICON-LAM-7km** partly corrects this behavior
- **ICON-LAM-7km** some underestimation of areas with low precipitation
- Next e.g.:

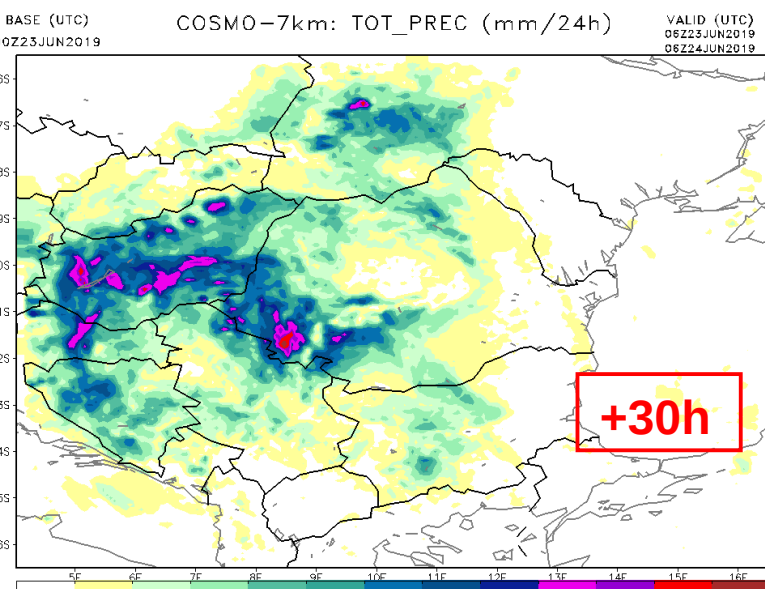
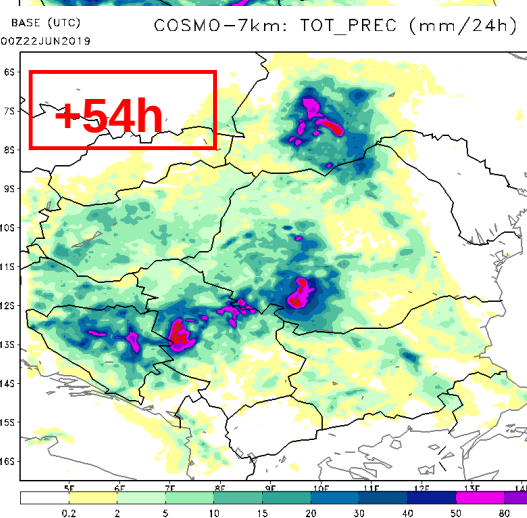
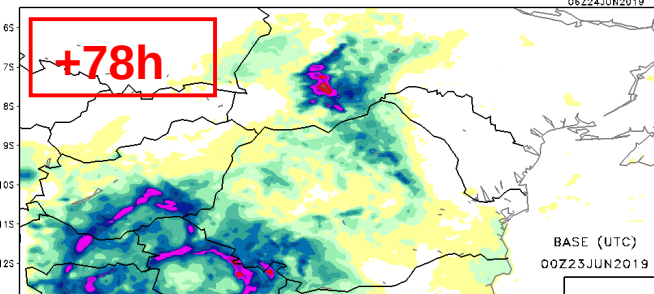
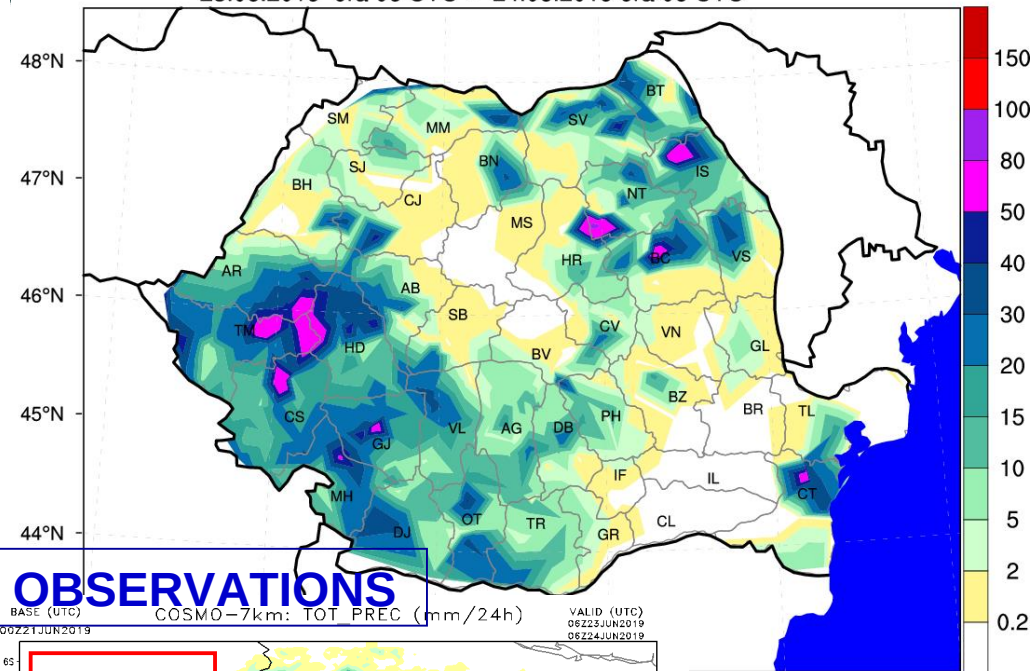
23.06-24.06 06UTC

25.06-26.06 06UTC

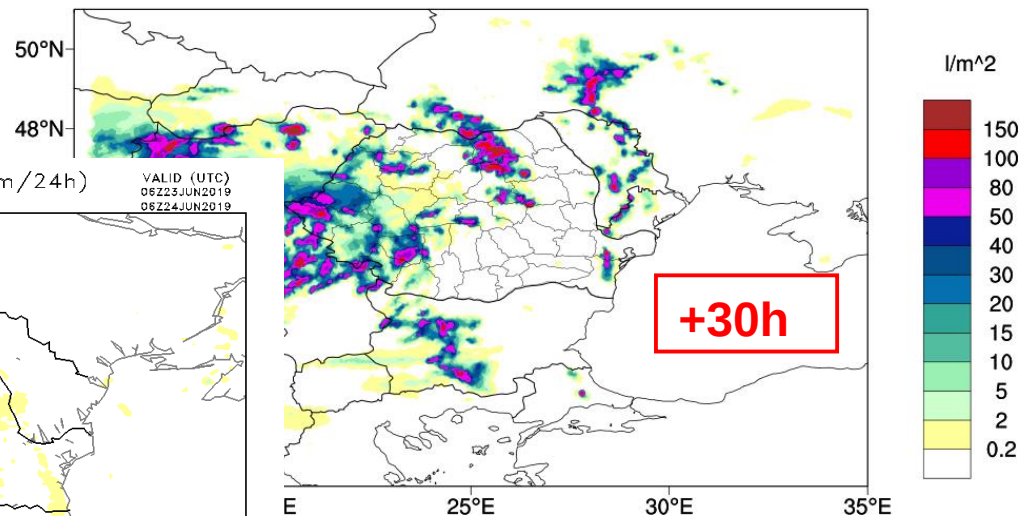
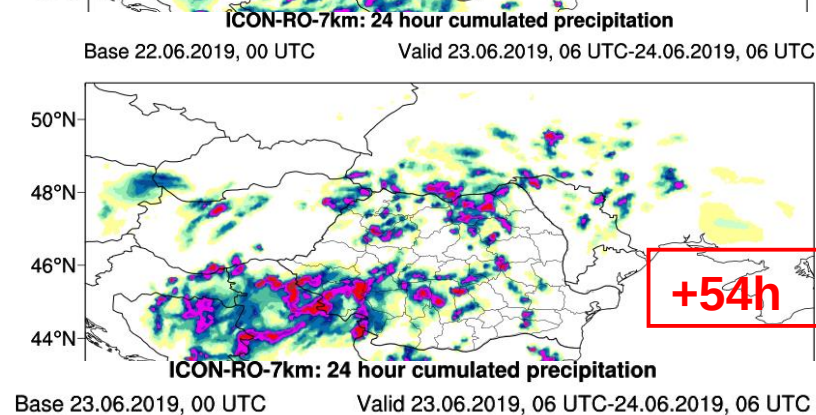
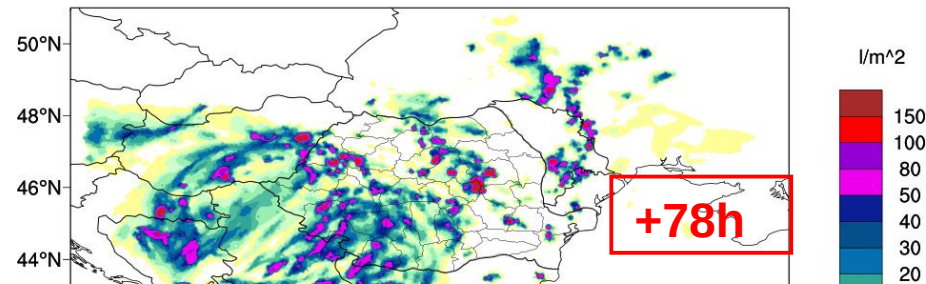
27.06-28.06 06UTC

SYNOP+PLUVIO+HYDRO+DESWAT- precipitatii cumulate in intervalul

23.06.2019 ora 06 UTC - 24.06.2019 ora 06 UTC



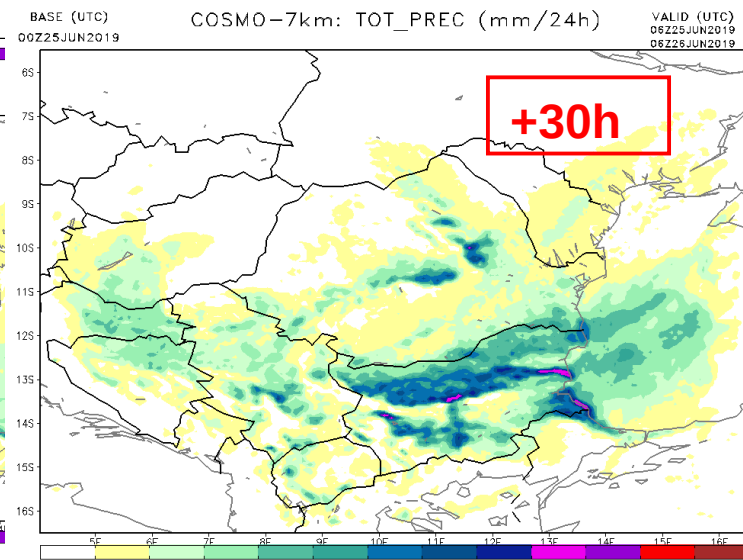
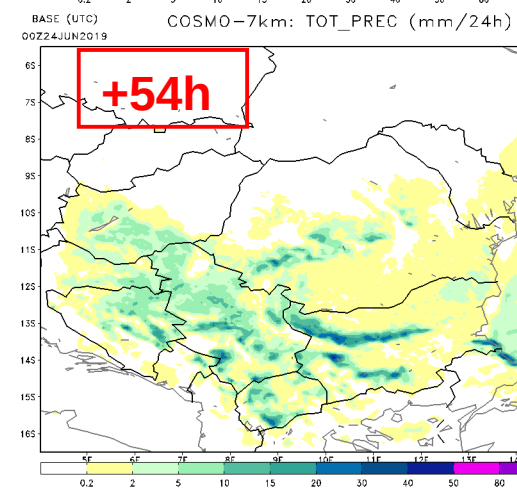
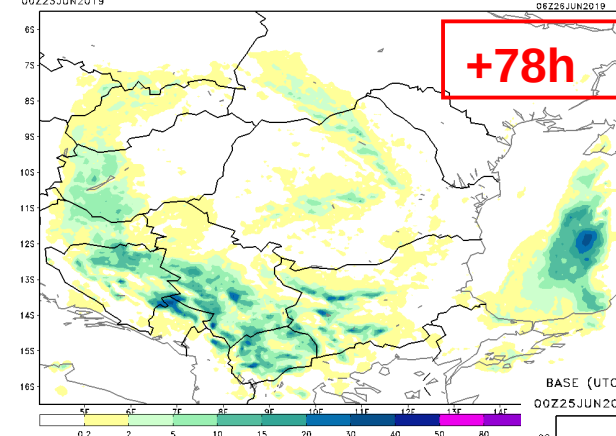
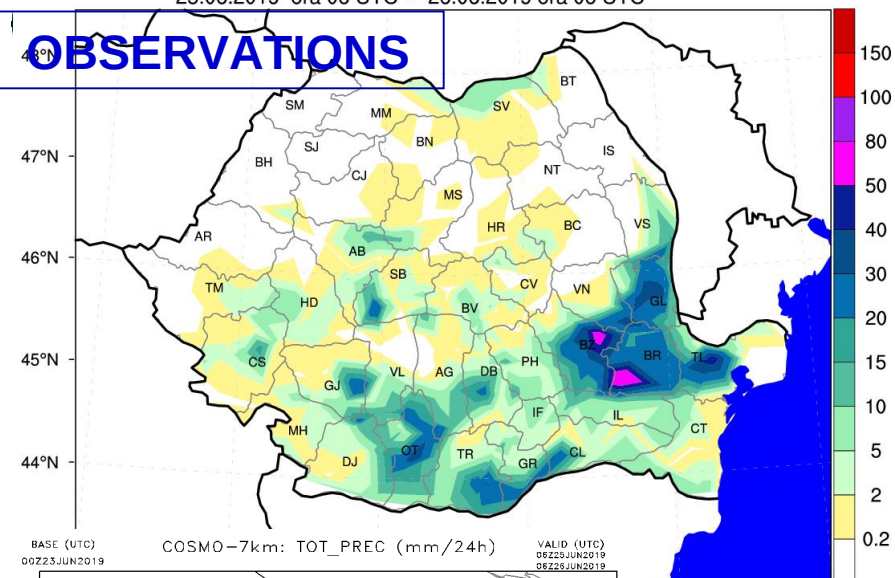
ICON-RO-7km: 24 hour cumulated precipitation
Base 21.06.2019, 00 UTC Valid 23.06.2019, 06 UTC-24.06.2019, 06 UTC



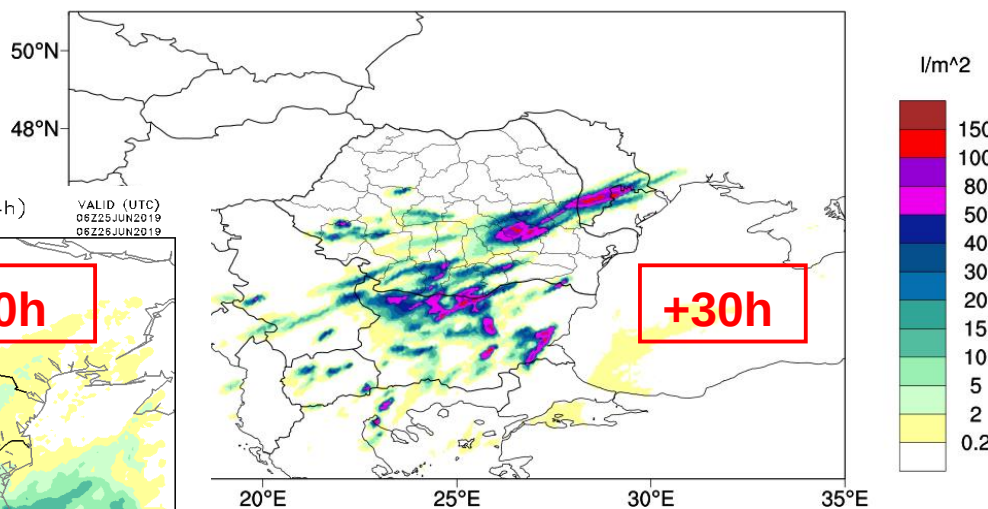
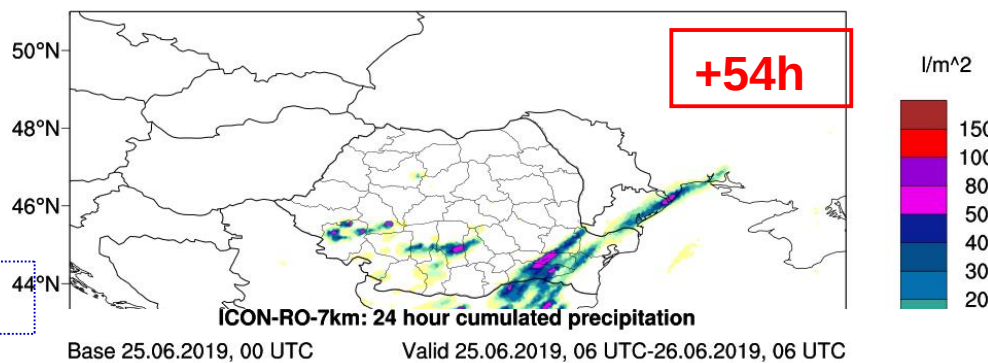
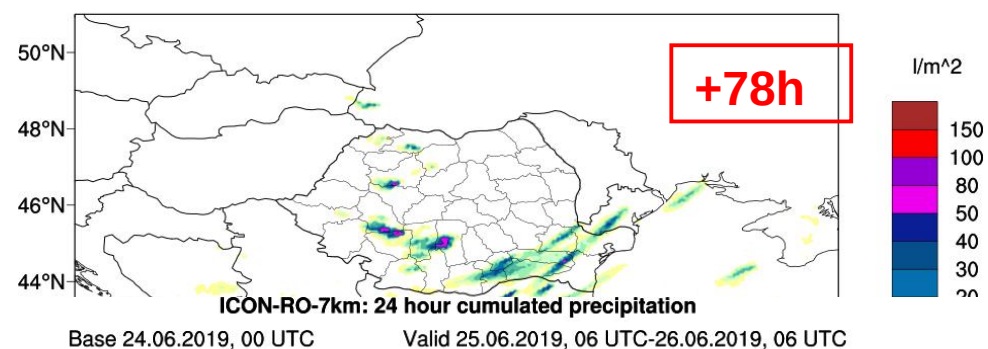
23.06-24.06 06UTC

SYNOP+PLUVIO+HYDRO+DESWAT- precipitatii cumulate in intervalul
25.06.2019 ora 06 UTC - 26.06.2019 ora 06 UTC

OBSERVATIONS



ICON-RO-7km: 24 hour cumulated precipitation



25.06-26.06 06UTC

+78h

+78h

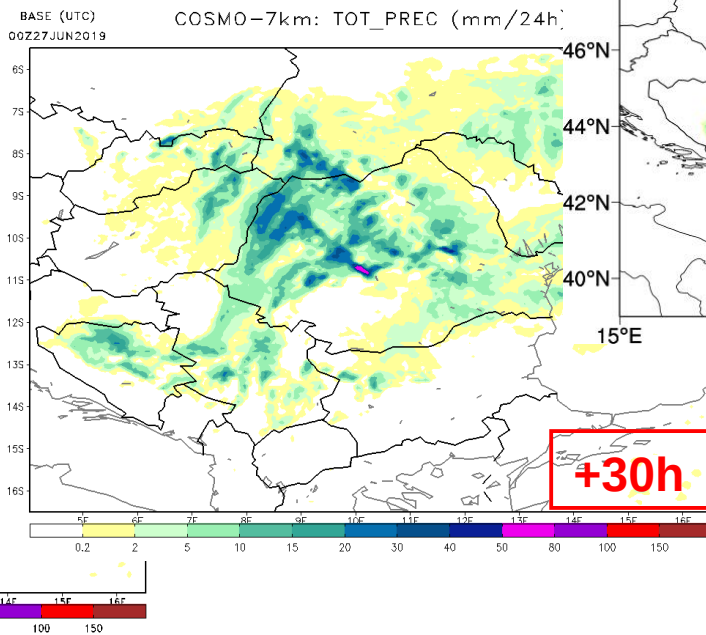
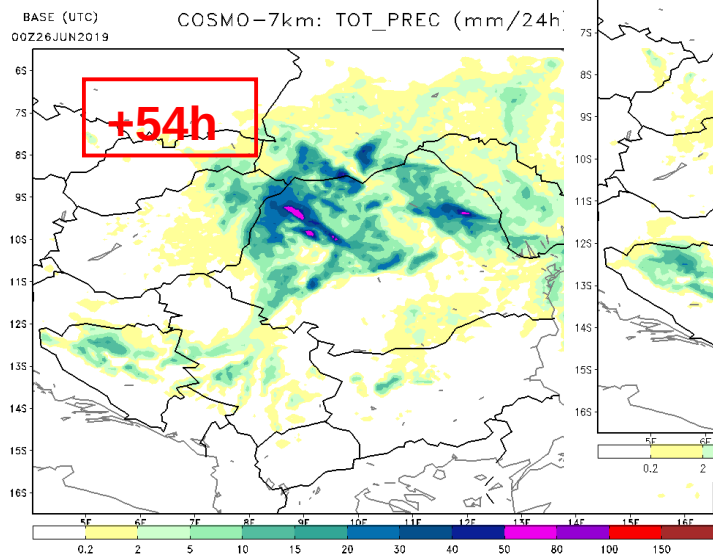
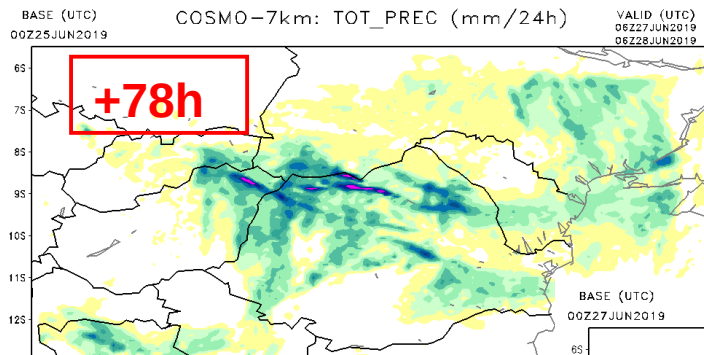
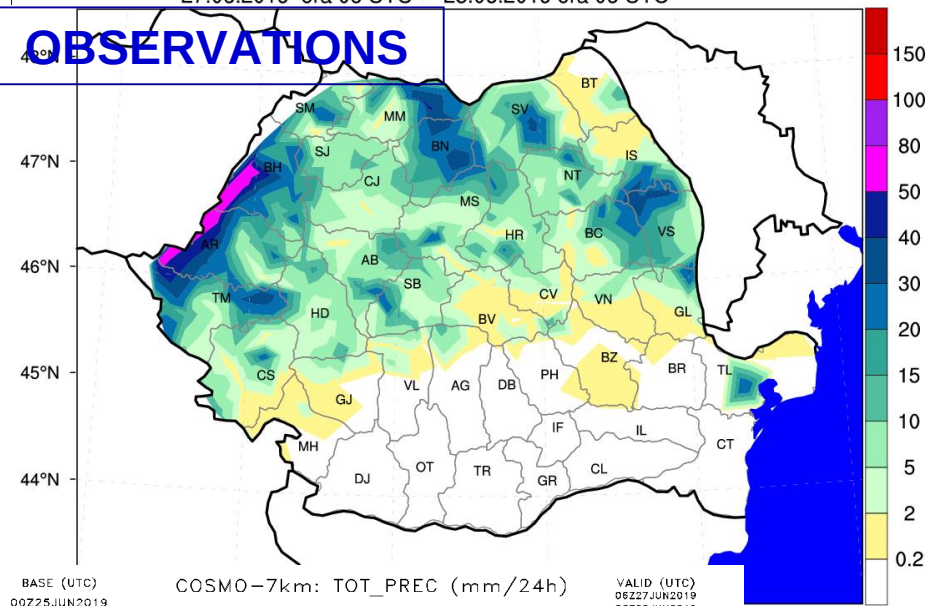
+54h

+30h

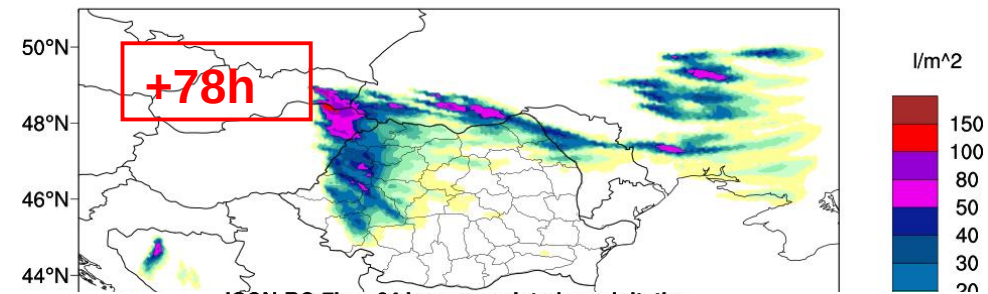
+30h

SYNOP+PLUVIO+HYDRO+DESWAT- precipitatii cumulate in intervalul
27.06.2019 ora 06 UTC - 28.06.2019 ora 06 UTC

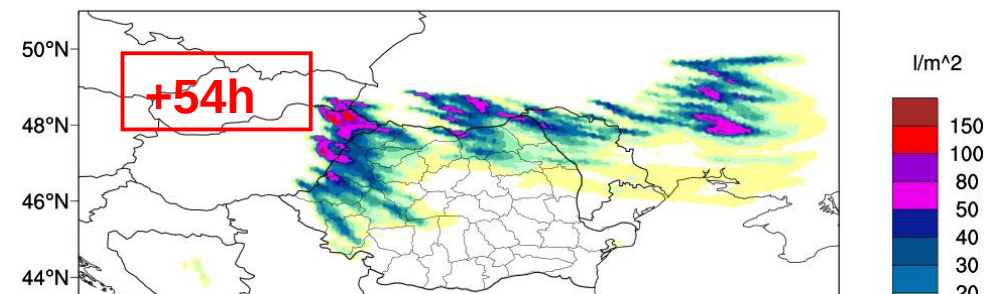
OBSERVATIONS



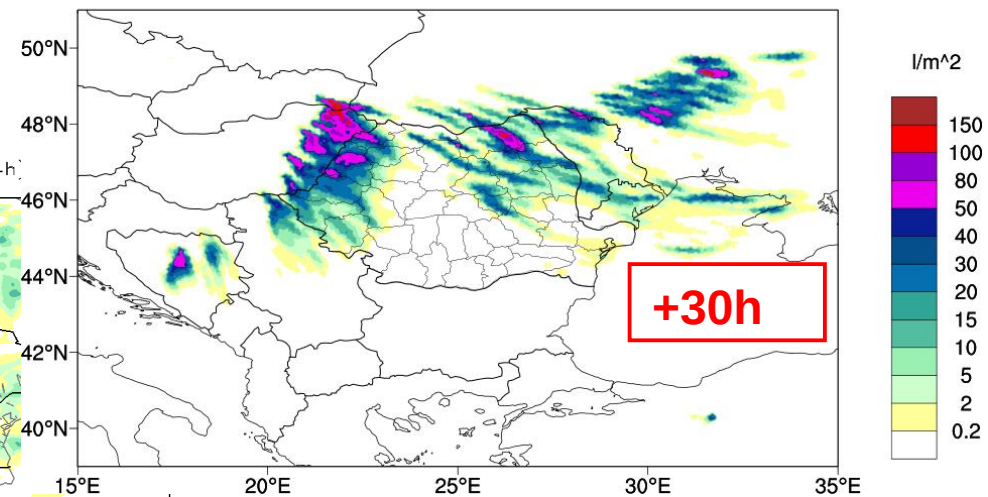
ICON-RO-7km: 24 hour cumulated precipitation
Base 25.06.2019, 00 UTC Valid 27.06.2019, 06 UTC-28.06.2019, 06 UTC



Base 26.06.2019, 00 UTC Valid 27.06.2019, 06 UTC-28.06.2019, 06 UTC



Base 27.06.2019, 00 UTC Valid 27.06.2019, 06 UTC-28.06.2019, 06 UTC



27.06-28.06 06UTC

Computational Aspects

→ tests performed on our back-up machine until now (processors Hs22 i nehalem and Hs21 i quad)

→ new HPC is being implemented:

- ICON & DWD ICON TOOLS compiled

- DWD ICON TOOLS tested

- ICON tests pending

Model	Proc.	No. Proc.	IO	Run time
ICON-LAM-7km	NH	56	0	~250min
ICON-LAM-7km	Q	80	0	~181min
ICON-LAM-7km	Q	80	8	~176min
ICON-LAM-7km	Q	88	8	~163min
ICON-LAM-7km	Q	88	16	~146min
ICON-LAM-7km	Q	96	8	~165min