

Bug fix LT1-2moml

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Description

- Large values of Dmi (mean mass-weighted diameter) from the lookup table when Firim is low.
- The reason is the limit to lambda (2MOM, 3MOM, LT2?)

Original code

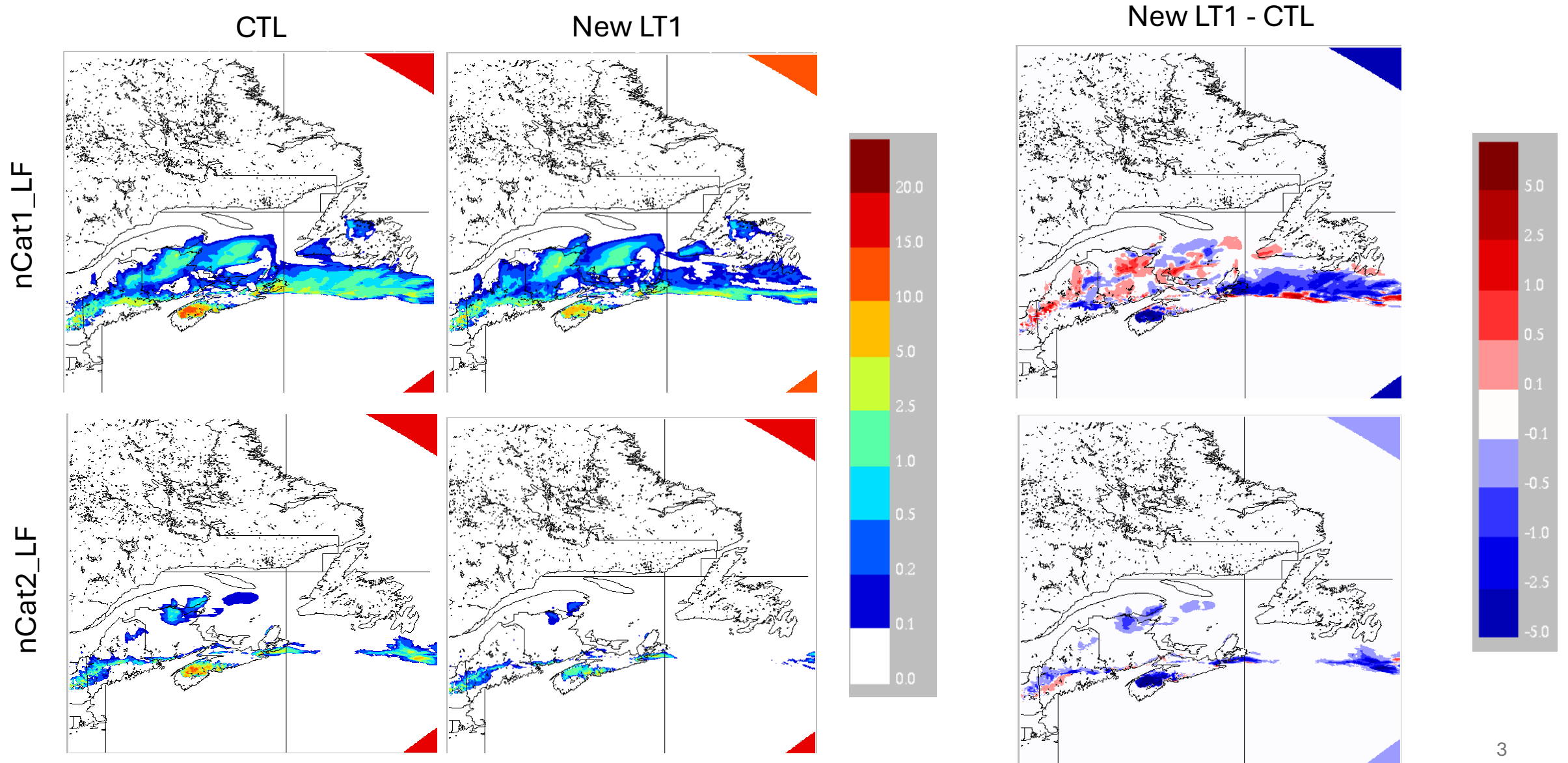
```
real, parameter      :: Dm_max = 40000.e-6 ! max. mean ice [m] size for lambda limiter
real, parameter      :: Dm_min = 2.e-6    ! min. mean ice [m] size for lambda limiter

! for lambda limiter:
  dum = Dm_max
  lam = max(lam,(mu_i+1.)/dum) ! set min lam corresponding to mean size of x
  lam = min(lam,(mu_i+1.)/Dm_min) ! set max lam corresponding to mean size of Dm_min (2 micron)
```

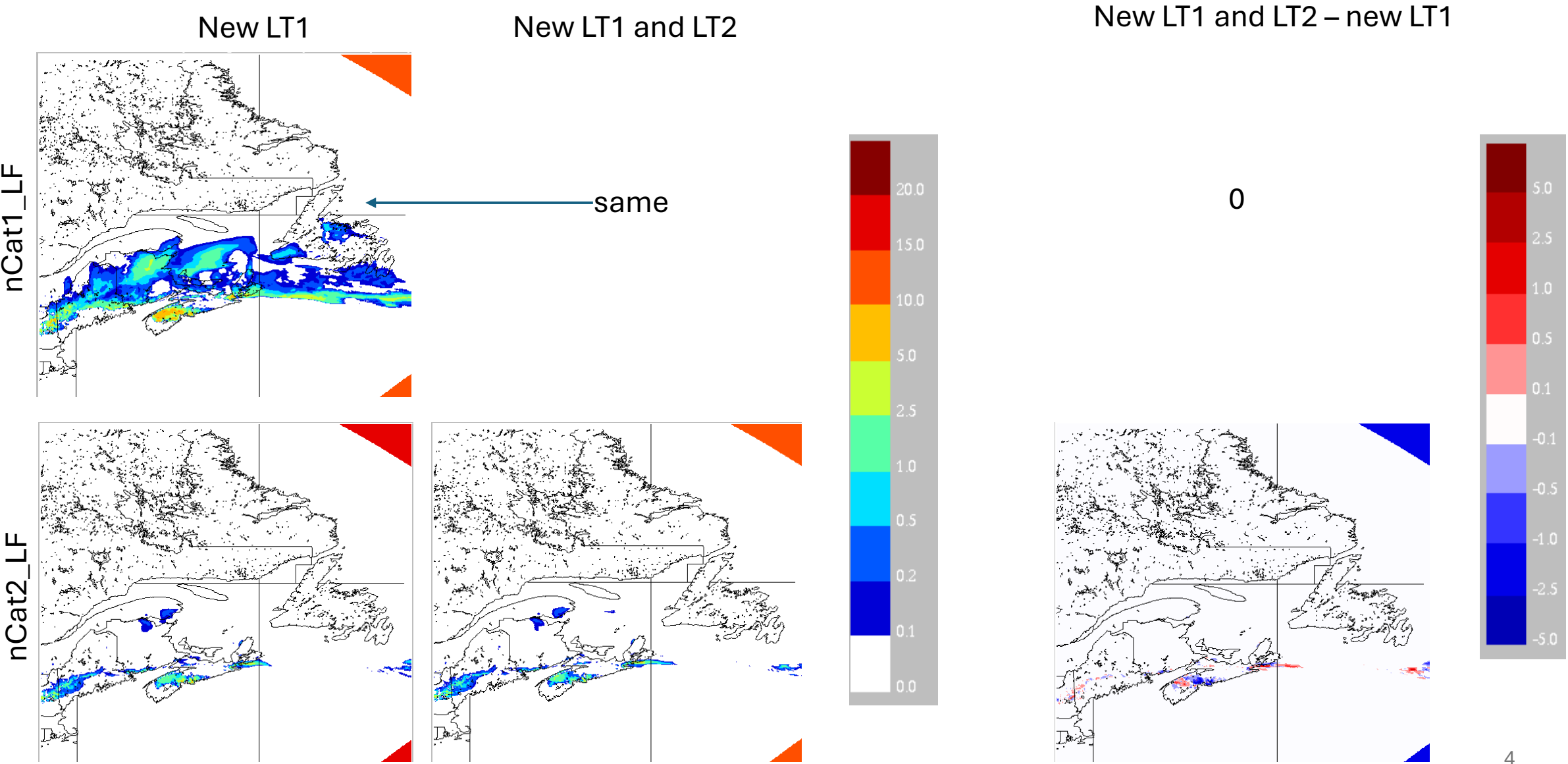
Tested code:

```
real, parameter      :: Dm_max1 = 5000.e-6 ! max. mean ice [m] size for lambda limiter (5 mm Firim=0)
real, parameter      :: Dm_max2 = 20000.e-6 ! max. mean ice [m] size for lambda limiter (20 mm Firim=1)
! for lambda limiter:
  dum = Dm_max1+Dm_max2*Fr**2.
  !dum = Dm_max
  lamd = max(lamd,(mu_id+1.)/dum) ! set min lam corresponding to mean size of x
  lamd = min(lamd,(mu_id+1.)/Dm_min) ! set max lam corresponding to mean size of Dm_min (2 micron)
```

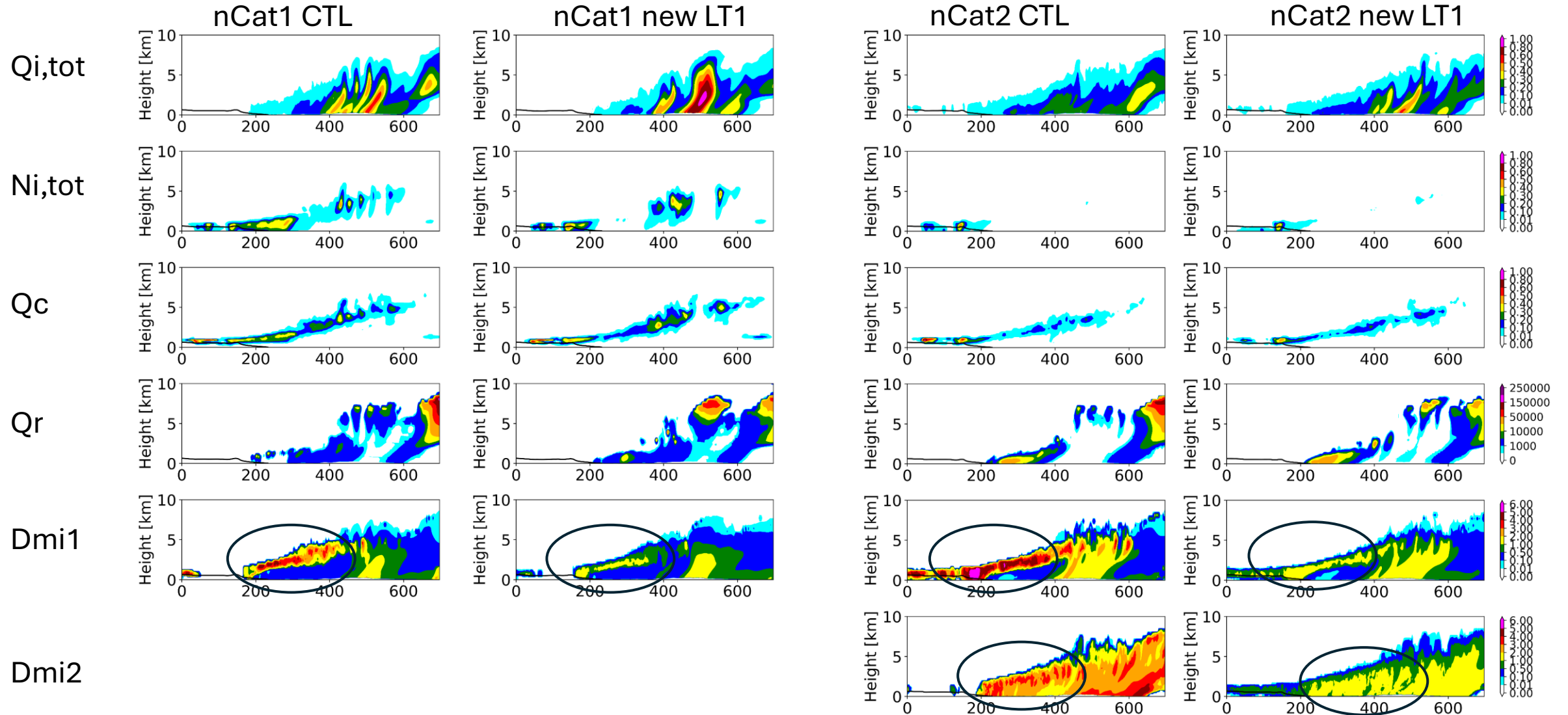
The freezing rain case (FR2 acc.)



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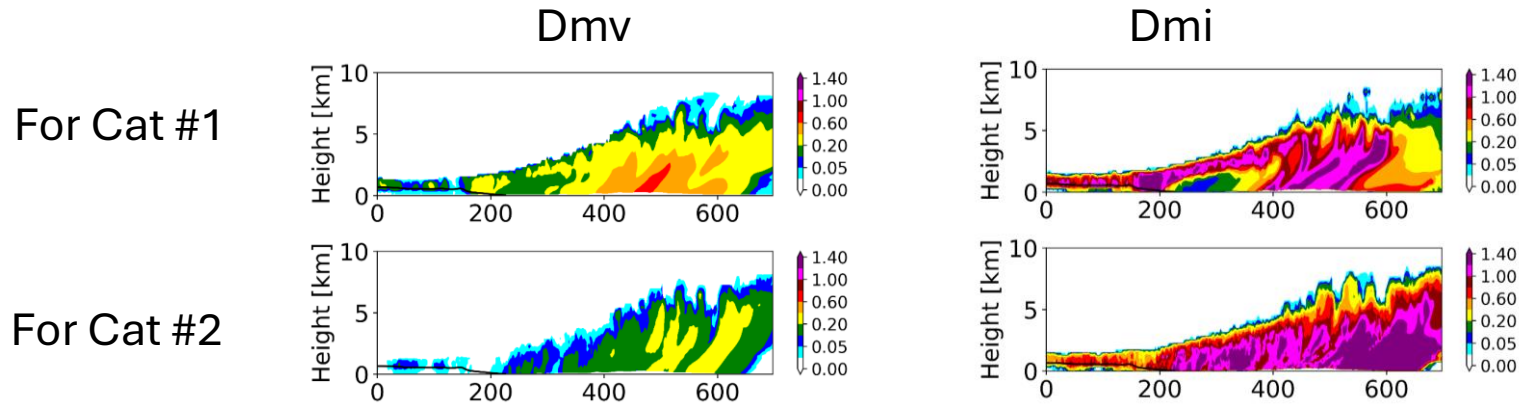


The freezing rain case (cross-sections)



The freezing rain case (cross-sections)

nCat2 new LT1

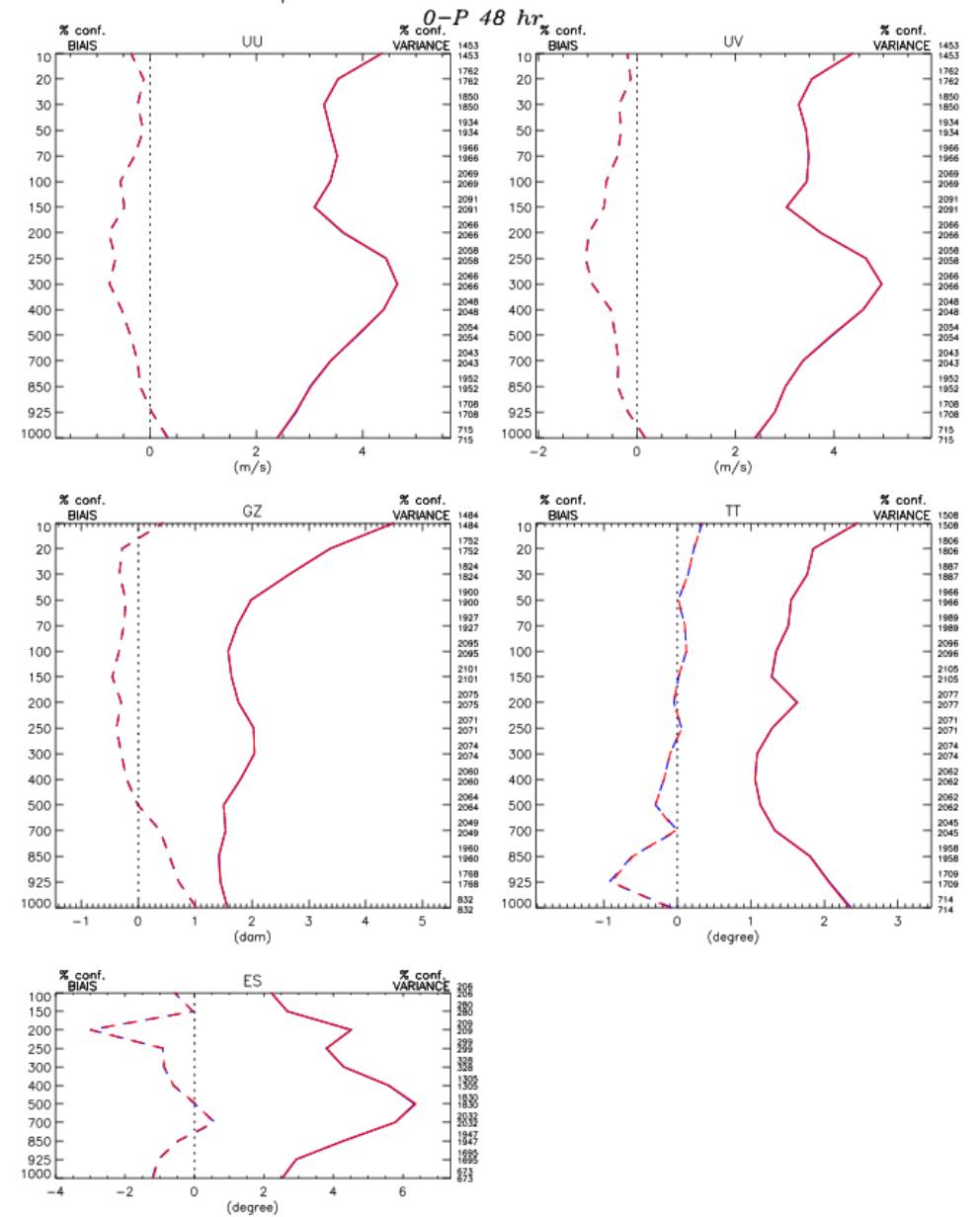


Conclusions:

- Dmi with the new lambda limiter has smaller values (not exceeding 2 cm in general).
- But Dmi is still different than Dmv (mean volume diameter).
- The HRDPS scores are quasi neutral (next slides).

Winter 2022 (5.3.0-a5)

- Arcad scores neutral
- Emet is also very neutral

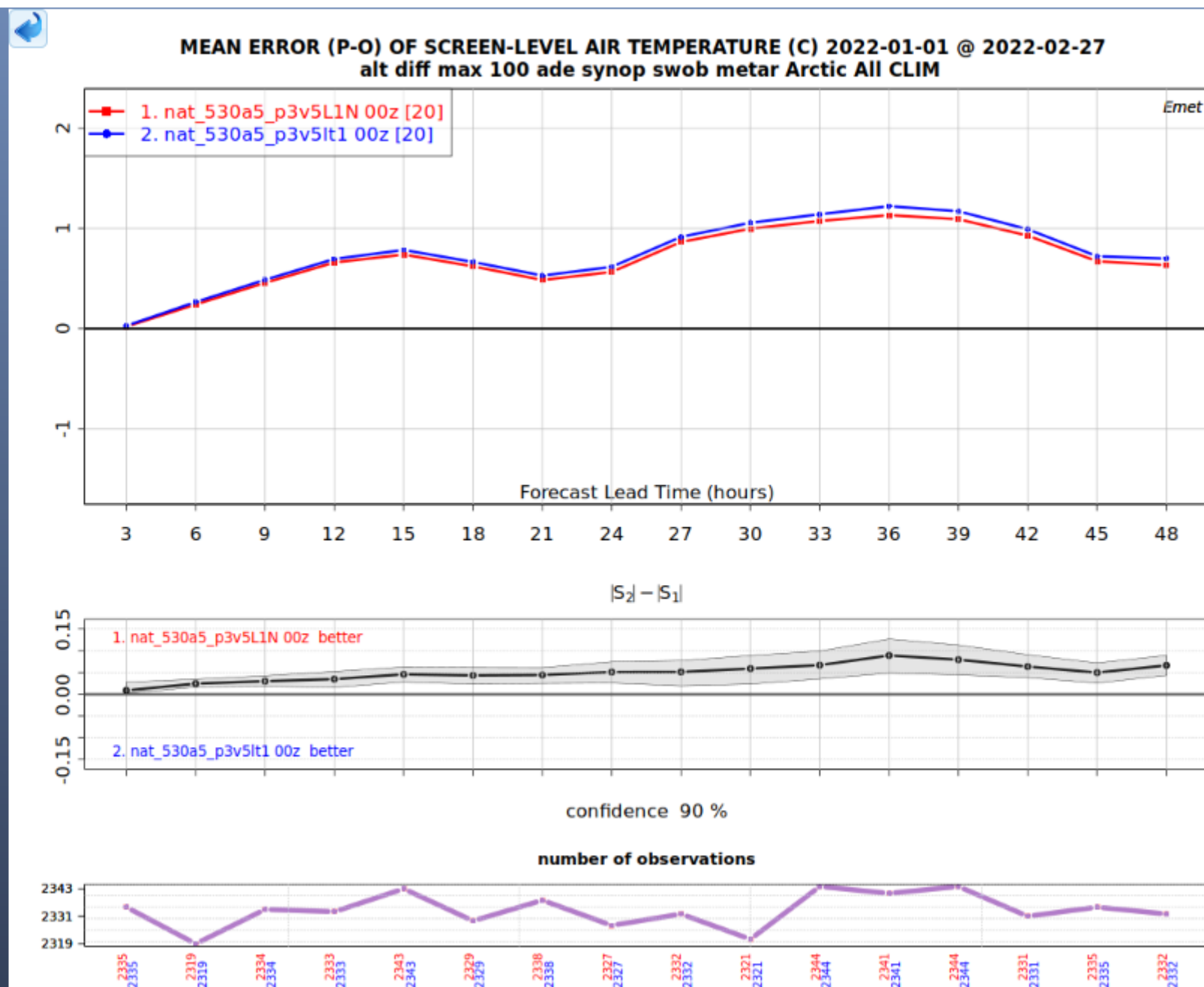


◇ — E-T m_uo_530a5_p3v5L1N_2022010100.2022022812 (40)
 □ - - - BIAS m_uo_530a5_p3v5L1N_2022010100.2022022812
 ◇ — E-T m_uo_530a5_p3v5L1N_2022010100.2022022812 (40)
 □ - - - BIAS m_uo_530a5_p3v5L1N_2022010100.2022022812

Type : 0-P 48 hr
 Region : Amerique du Nord plus
 Lat-lon: (25N, 170W) (85N, 40W)
 Stat. inversees

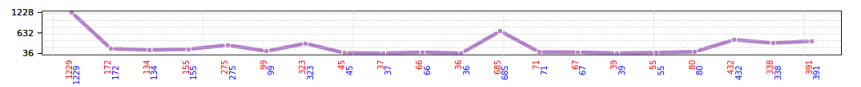
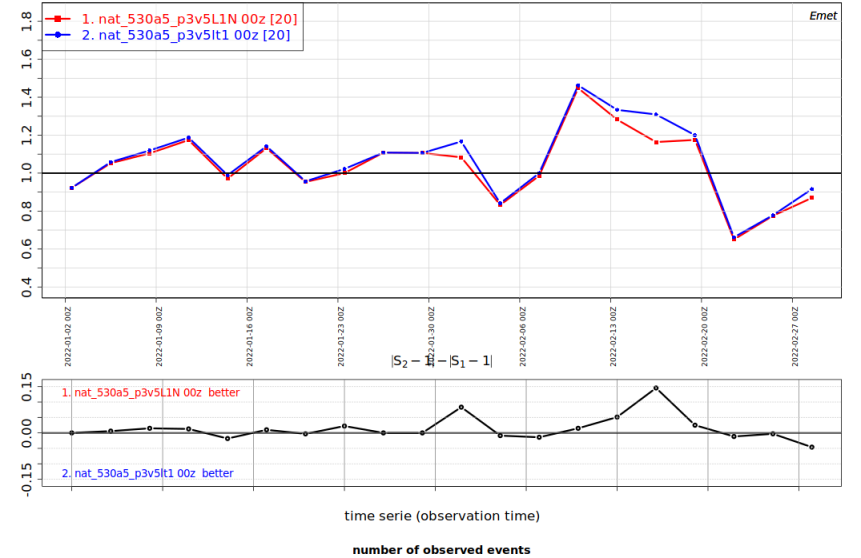
TT

bias			TD	TT
nat_530a5_p3v5L1N 00z / nat_530a5_p3v5lt1 00z				
Appalachia CLIM	20220101 / 20220228	All	0.00%	0.37%
Arctic All CLIM	20220101 / 20220228	All	6.43%	6.73%
Arctic Land CLIM	20220101 / 20220228	All	7.11%	6.94%
Boreal CLIM	20220101 / 20220228	All	0.96%	0.00%
Canada	20220101 / 20220228	All	0.48%	-0.07%
Central CLIM	20220101 / 20220228	All	-0.43%	0.00%
Central Plains CLIM	20220101 / 20220228	All	0.31%	0.39%
Great Lakes CLIM	20220101 / 20220228	All	-0.06%	0.29%
MidAtlantic CLIM	20220101 / 20220228	All	0.00%	0.32%
Mt West CLIM	20220101 / 20220228	All	1.85%	2.42%
North America plus	20220101 / 20220228	All	0.00%	0.05%
North Atlantic CLIM	20220101 / 20220228	All	0.28%	0.49%
North Plains CLIM	20220101 / 20220228	All	0.00%	0.82%
Pacific North West CLIM	20220101 / 20220228	All	1.25%	-0.43%
Prairie CLIM	20220101 / 20220228	All	-0.46%	0.00%

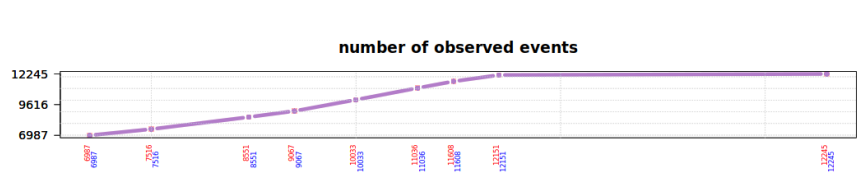
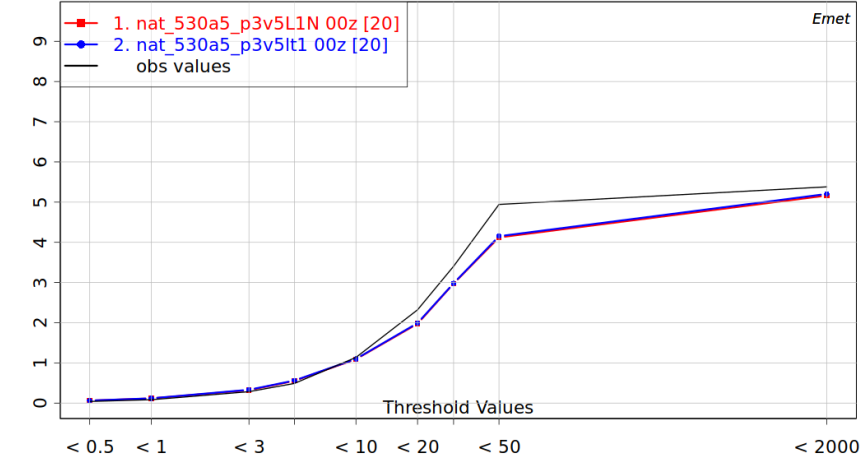


PR_24h

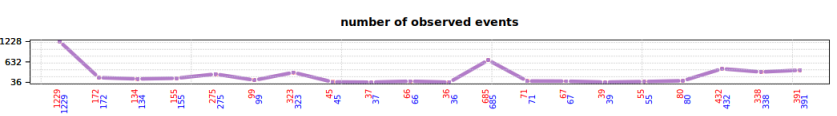
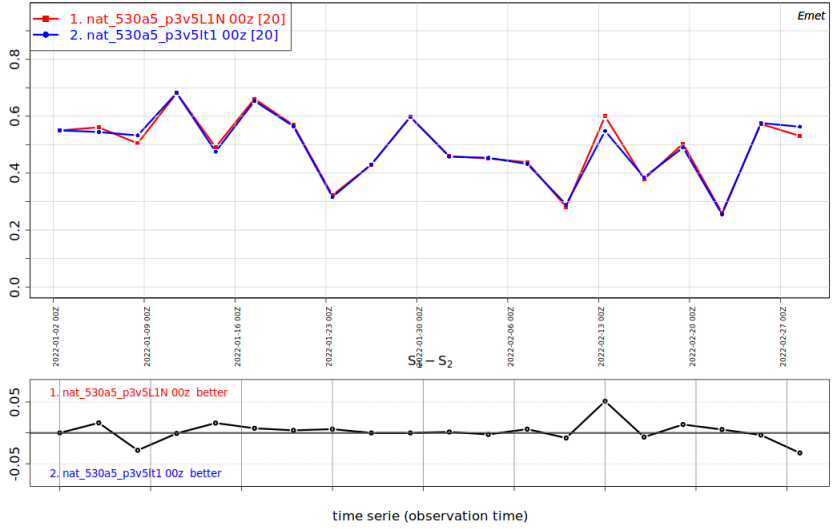
FREQUENCY BIAS INDEX OF 24-HOUR ACC. PRECIPITATION (mm) thresh=1.0mm 2022-01-01 @ 2022-02-27
accum 12h @ 36h run 0z valid 12z day 2 capa North America plus



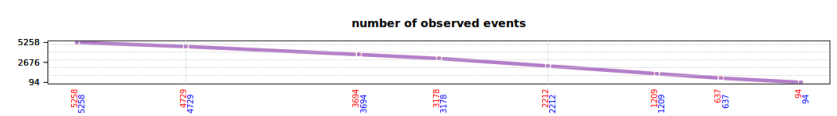
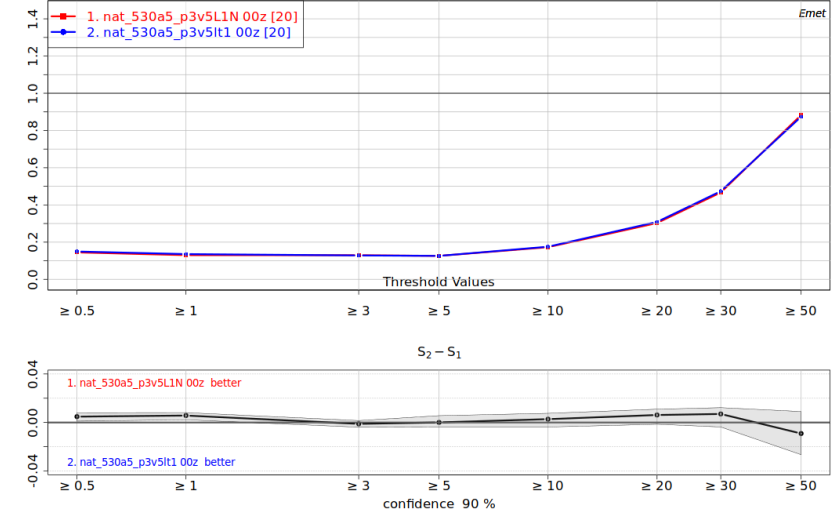
PARTIAL MEAN FORECAST OF 24-HOUR ACC. PRECIPITATION (mm) 2022-01-01 @ 2022-02-27
capa North America plus



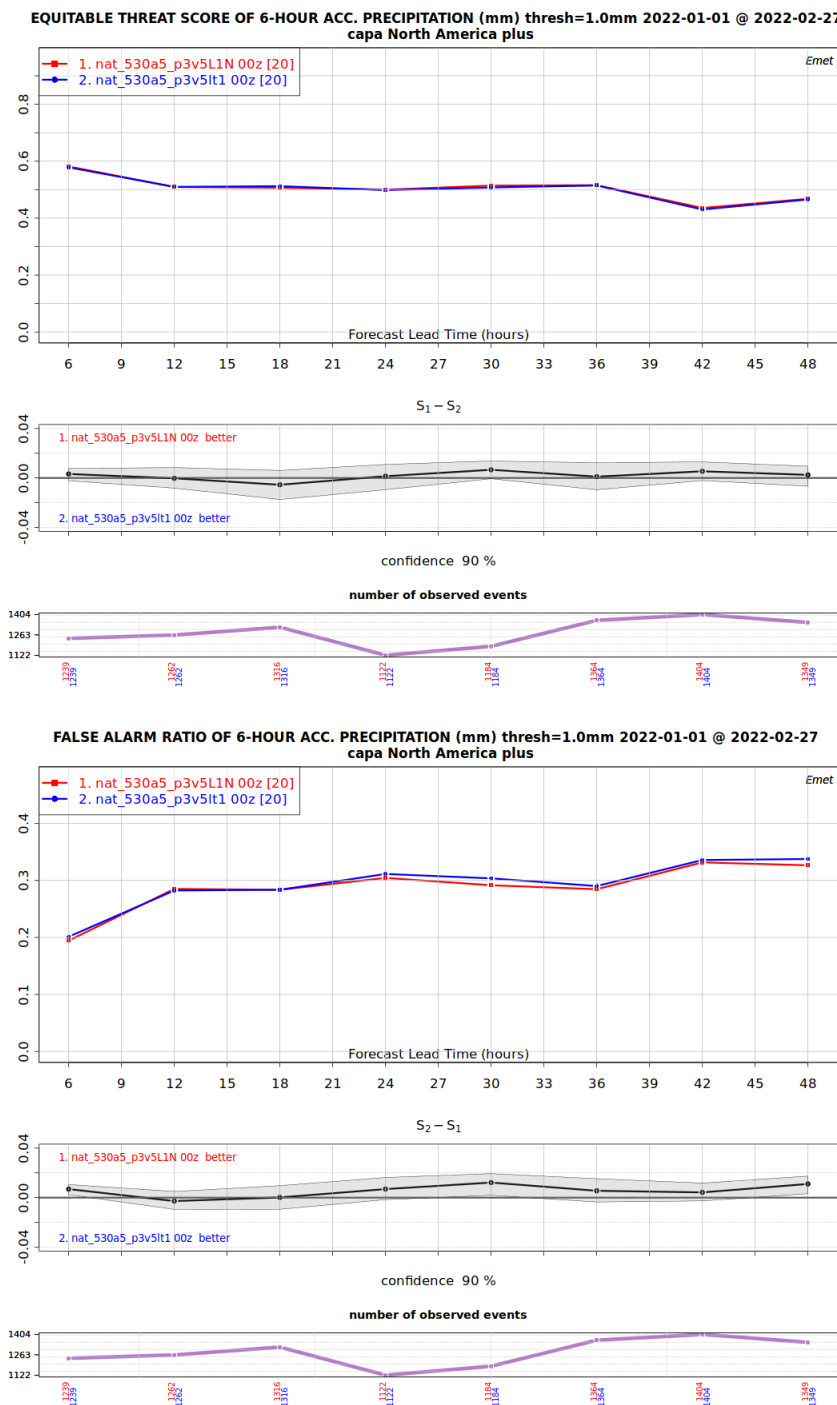
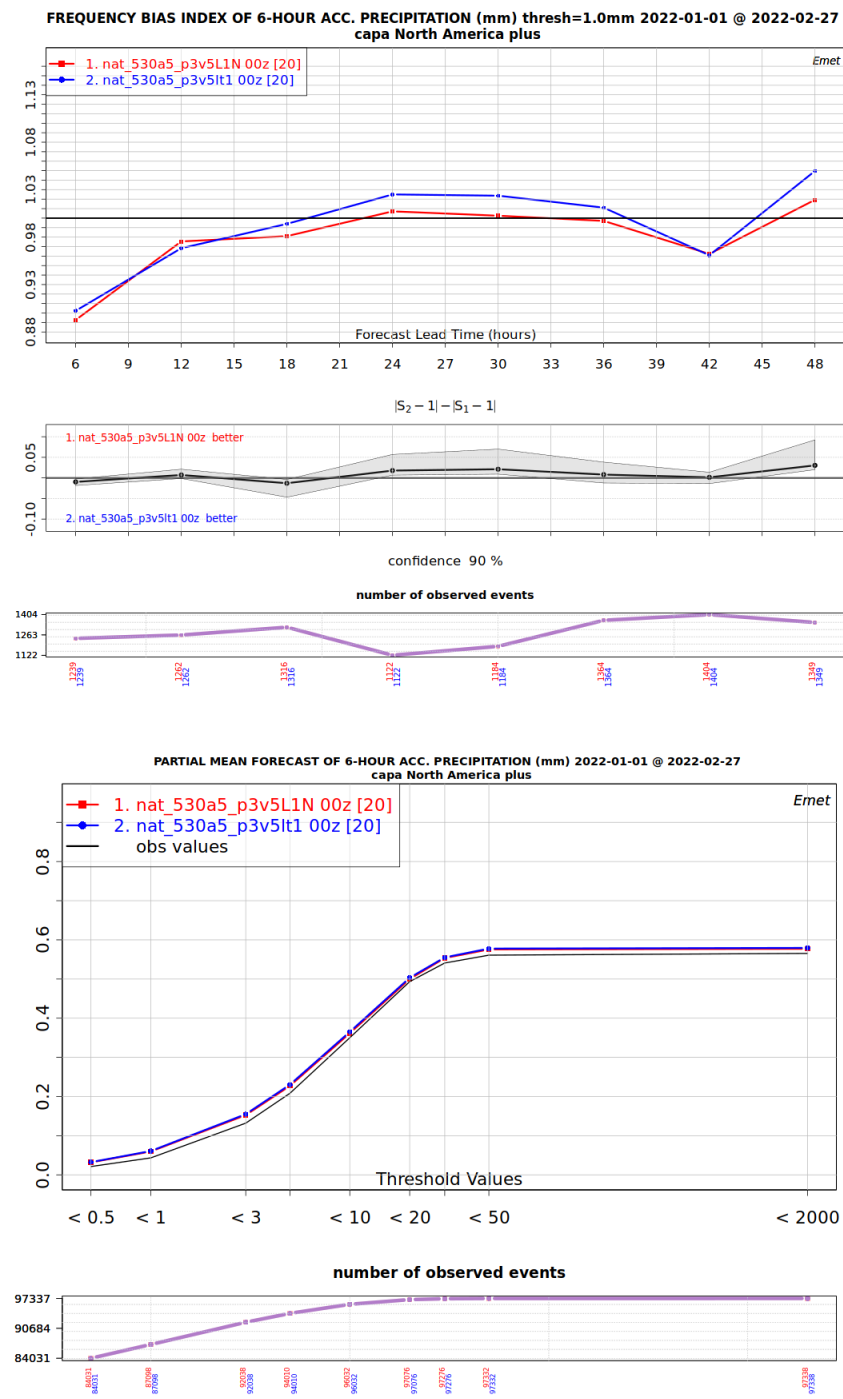
EQUITABLE THREAT SCORE OF 24-HOUR ACC. PRECIPITATION (mm) thresh=1.0mm 2022-01-01 @ 2022-02-27
accum 12h @ 36h run 0z valid 12z day 2 capa North America plus



FALSE ALARM RATIO OF 24-HOUR ACC. PRECIPITATION (mm) 2022-01-01 @ 2022-02-27
capa North America plus

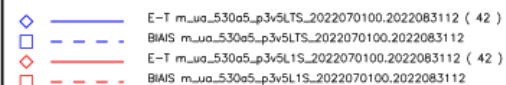
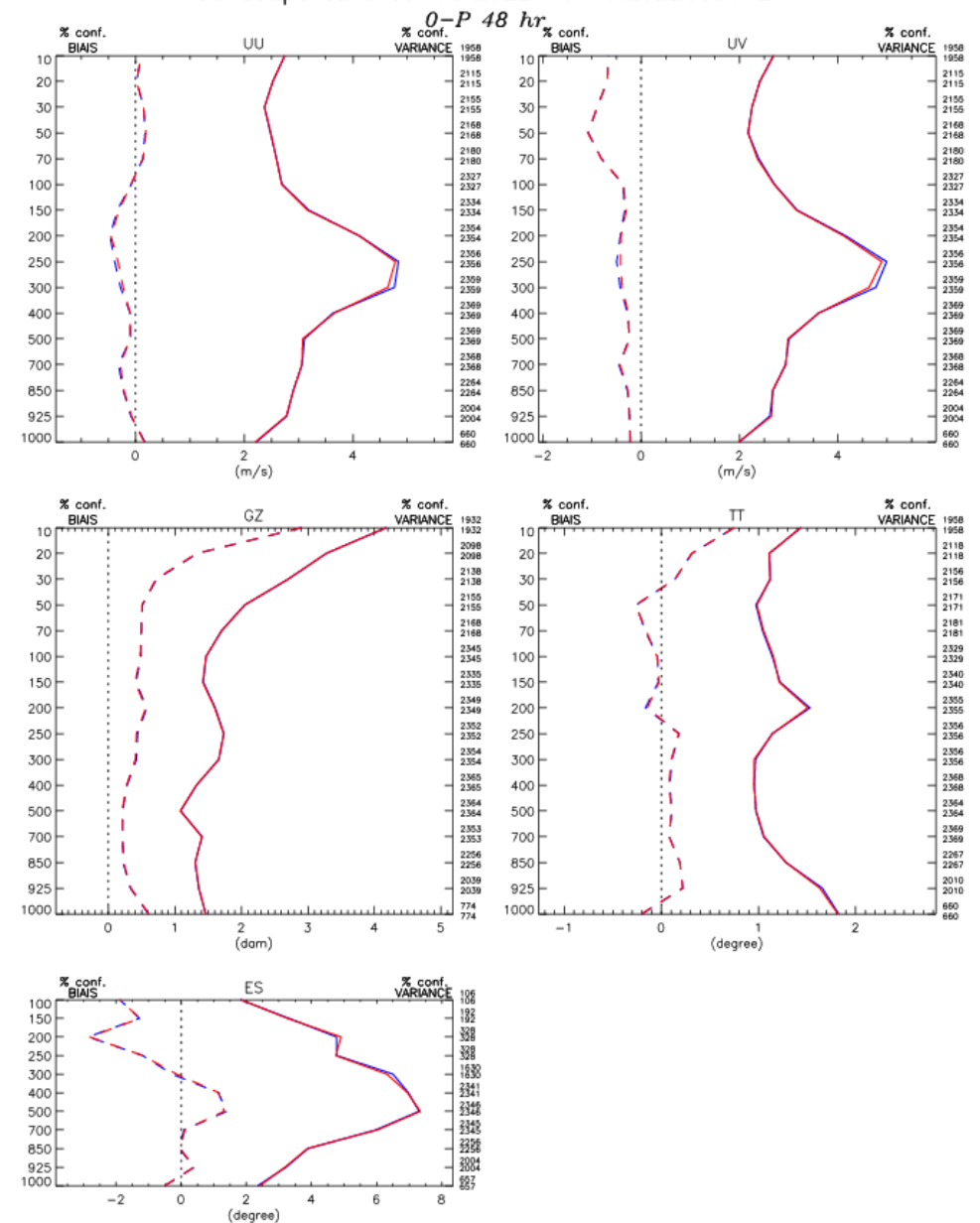


PR 6h



Summer 2022 (5.3.0-a5)

- Arcad is neutral



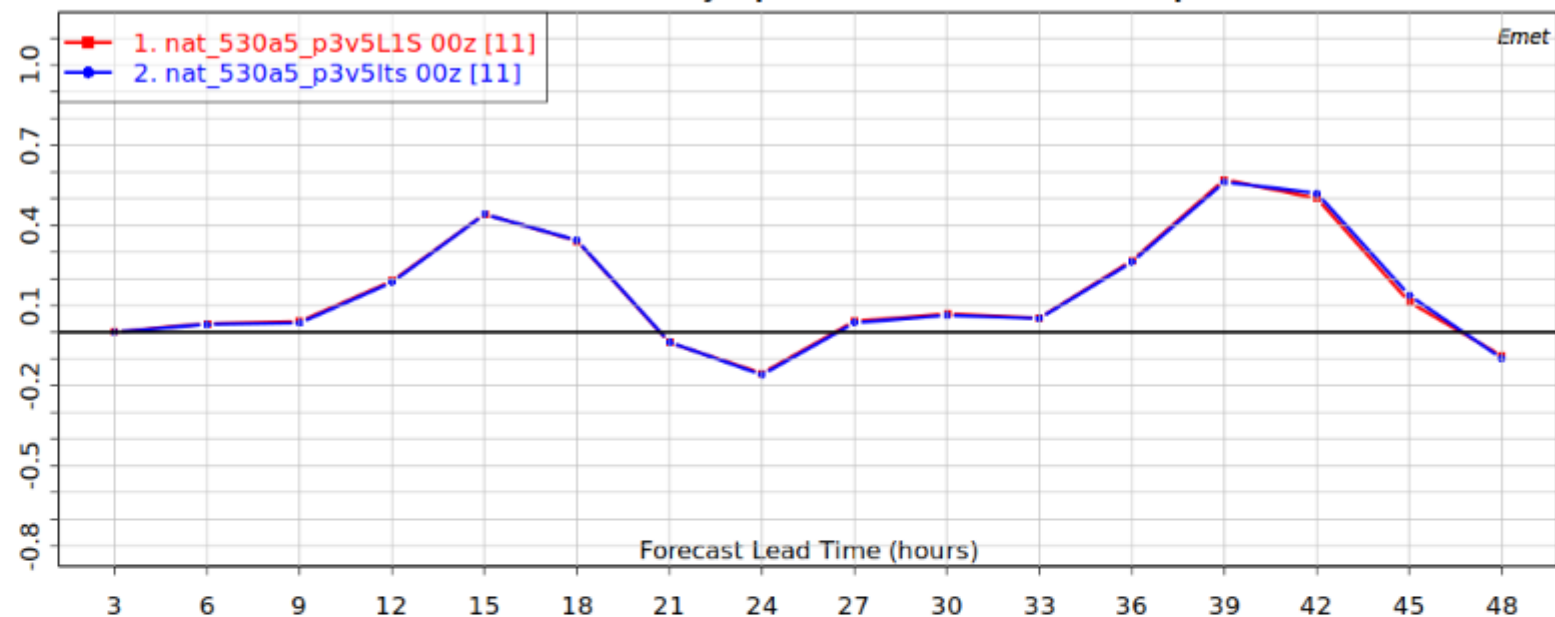
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 Stat. inversees

TT

bias			TD	TT
nat_530a5_p3v5L1S 00z / nat_530a5_p3v5Its 00z				
Appalachia CLIM	20220701 / 20220831	All	-0.27%	-0.07%
Arctic All CLIM	20220701 / 20220831	All	-0.68%	0.14%
Arctic Land CLIM	20220701 / 20220831	All	-0.78%	0.93%
Boreal CLIM	20220701 / 20220831	All	-3.61%	0.49%
Canada	20220701 / 20220831	All	-0.92%	-0.60%
Central CLIM	20220701 / 20220831	All	0.09%	0.62%
Central Plains CLIM	20220701 / 20220831	All	0.49%	-1.77%
Great Lakes CLIM	20220701 / 20220831	All	0.00%	0.44%
MidAtlantic CLIM	20220701 / 20220831	All	-0.58%	1.27%
Mt West CLIM	20220701 / 20220831	All	0.00%	0.21%
North America plus	20220701 / 20220831	All	-0.14%	1.07%
North Atlantic CLIM	20220701 / 20220831	All	-0.09%	-1.12%
North Plains CLIM	20220701 / 20220831	All	0.10%	0.27%
Pacific North West CLIM	20220701 / 20220831	All	-0.19%	-0.16%
Prairie CLIM	20220701 / 20220831	All	-0.05%	0.99%

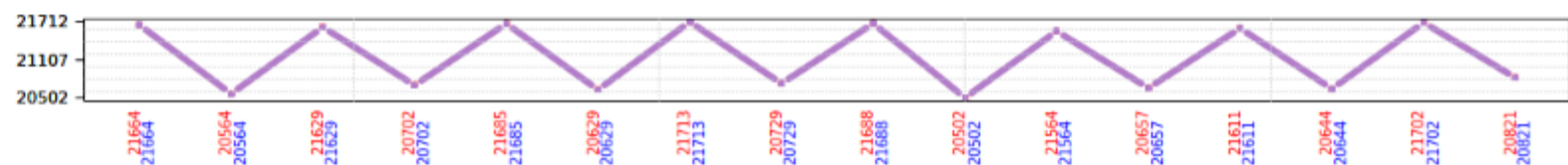


MEAN ERROR (P-O) OF SCREEN-LEVEL AIR TEMPERATURE (C) 2022-07-04 @ 2022-08-03
alt diff max 100 ade synop swob metar North America plus


 $|S_2| - |S_1|$

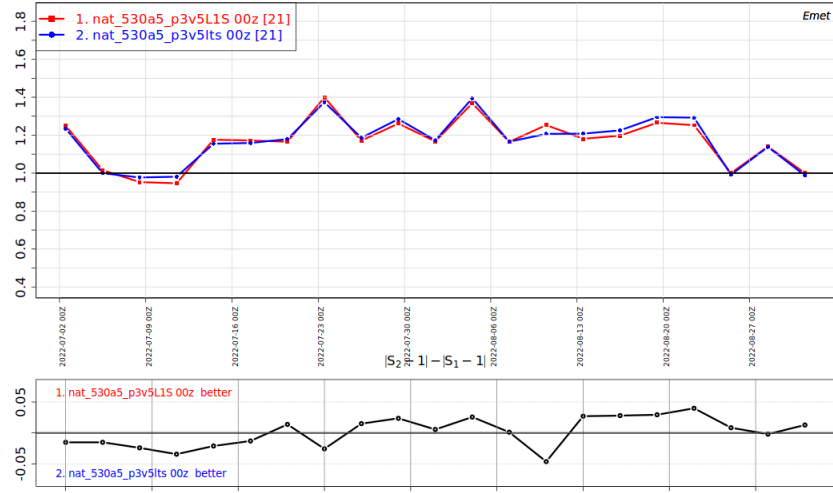

confidence 90 %

number of observations

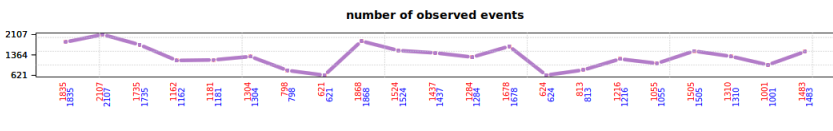


PR_24h

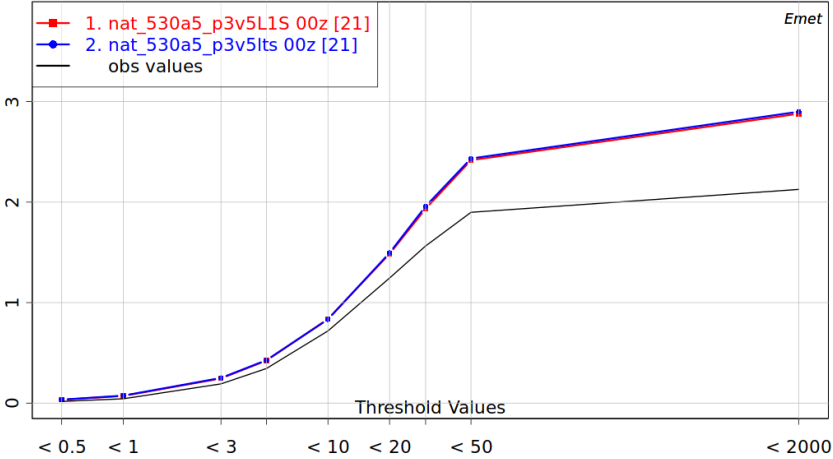
FREQUENCY BIAS INDEX OF 24-HOUR ACC. PRECIPITATION (mm) thresh=1.0mm 2022-07-01 @ 2022-08-30 accum 12h @ 36h run 0z valid 12z day 2 capa North America plus



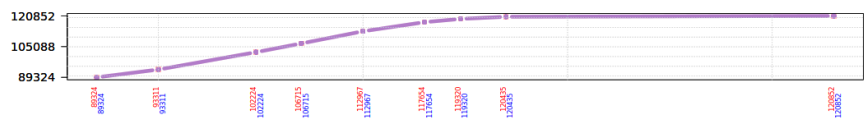
time series (observation time)



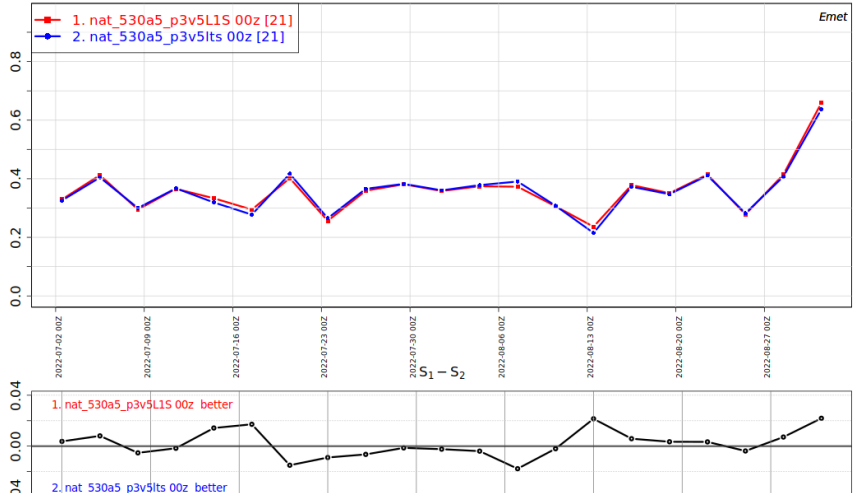
PARTIAL MEAN FORECAST OF 24-HOUR ACC. PRECIPITATION (mm) 2022-07-01 @ 2022-08-30 capa North America plus



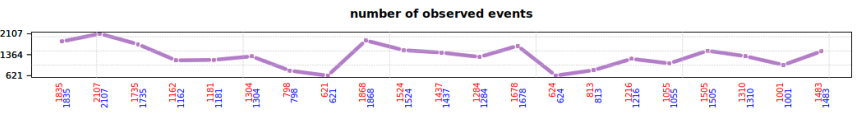
number of observed events



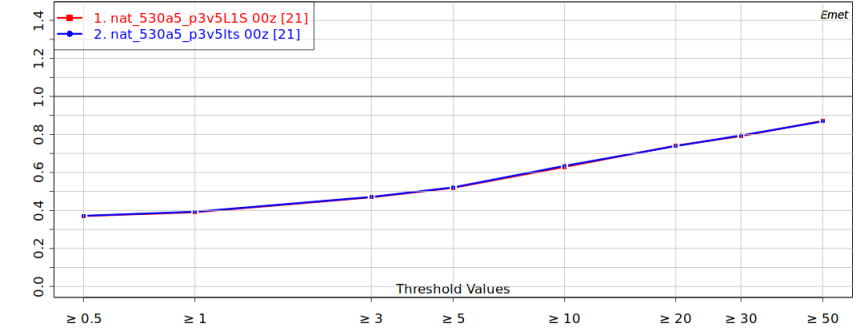
EQUITABLE THREAT SCORE OF 24-HOUR ACC. PRECIPITATION (mm) thresh=1.0mm 2022-07-01 @ 2022-08-30 accum 12h @ 36h run 0z valid 12z day 2 capa North America plus



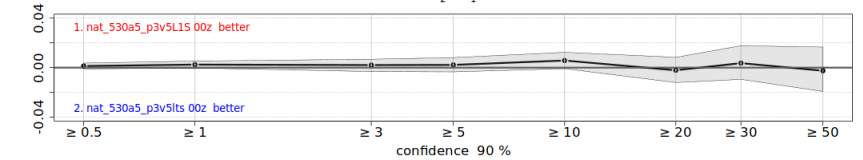
time series (observation time)



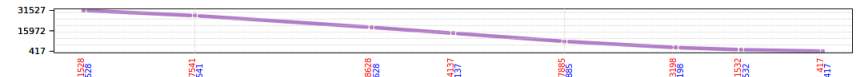
FALSE ALARM RATIO OF 24-HOUR ACC. PRECIPITATION (mm) 2022-07-01 @ 2022-08-30 capa North America plus



$S_2 - S_1$



number of observed events



The new LT
reduces
overall
precip.

