

SEKF issues in the Alps

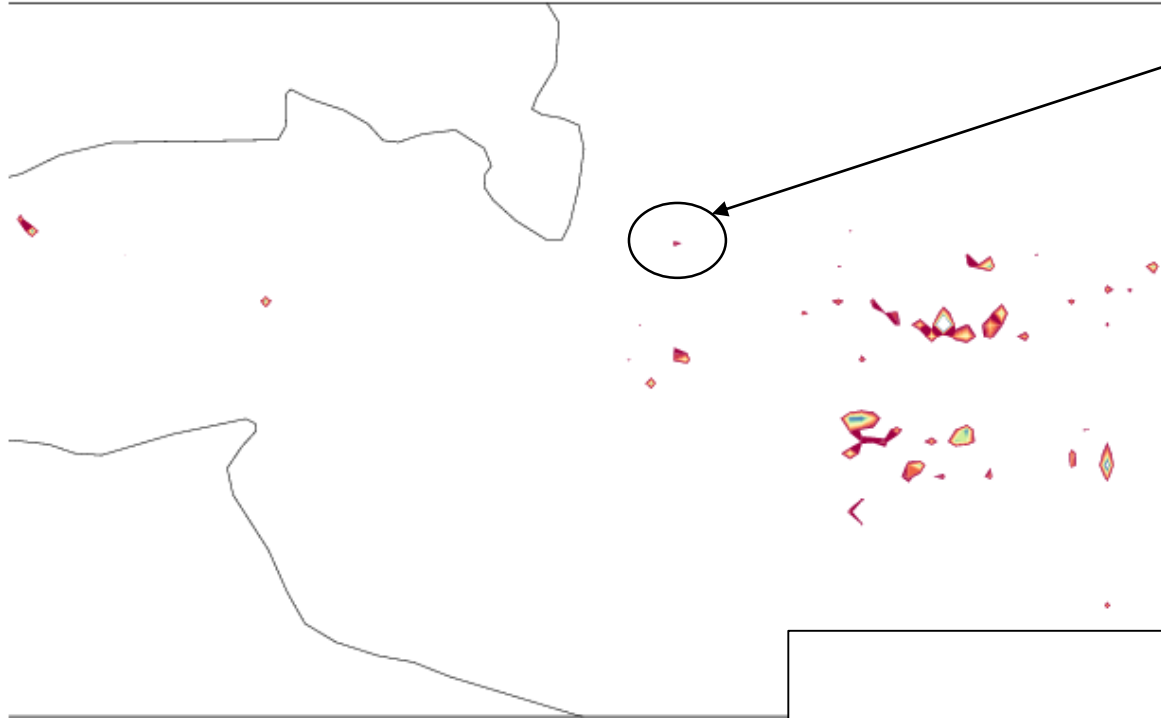
Helga Tóth

Hungarian Meteorological Service

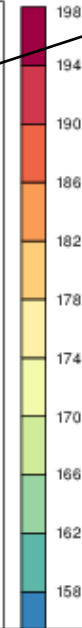
toth.h@met.hu



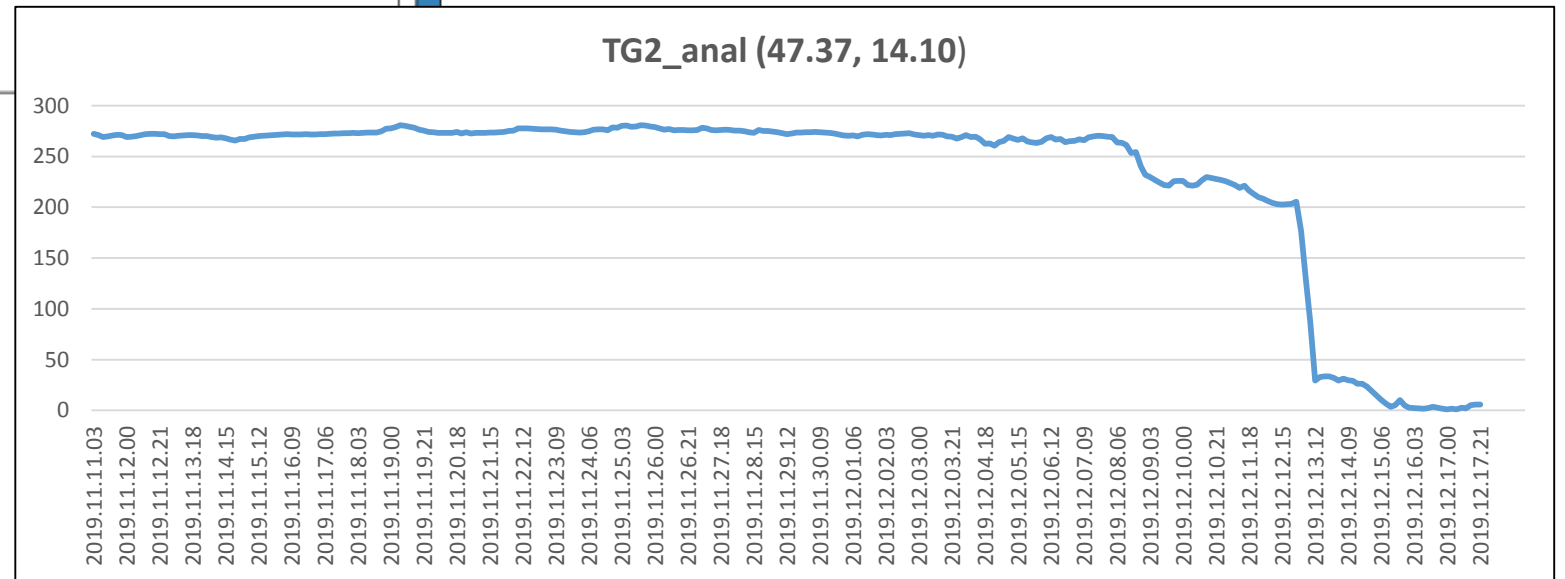
X001TG2
2019/12/15 z09:00 +3h



target point: 47.37, 14.10, 1503 m



SEKF winter run (11. 25-12.17, 2019 from
11.11 spin up)



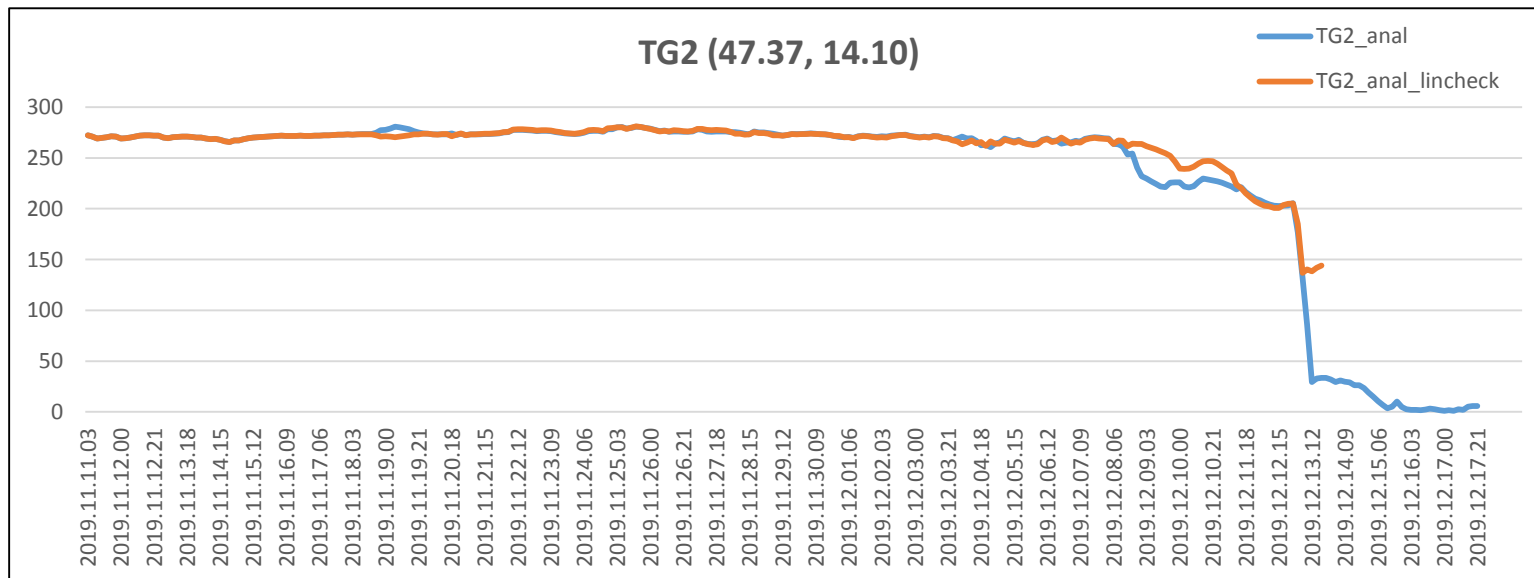
Experiments:

1. SEKF + Linearity check

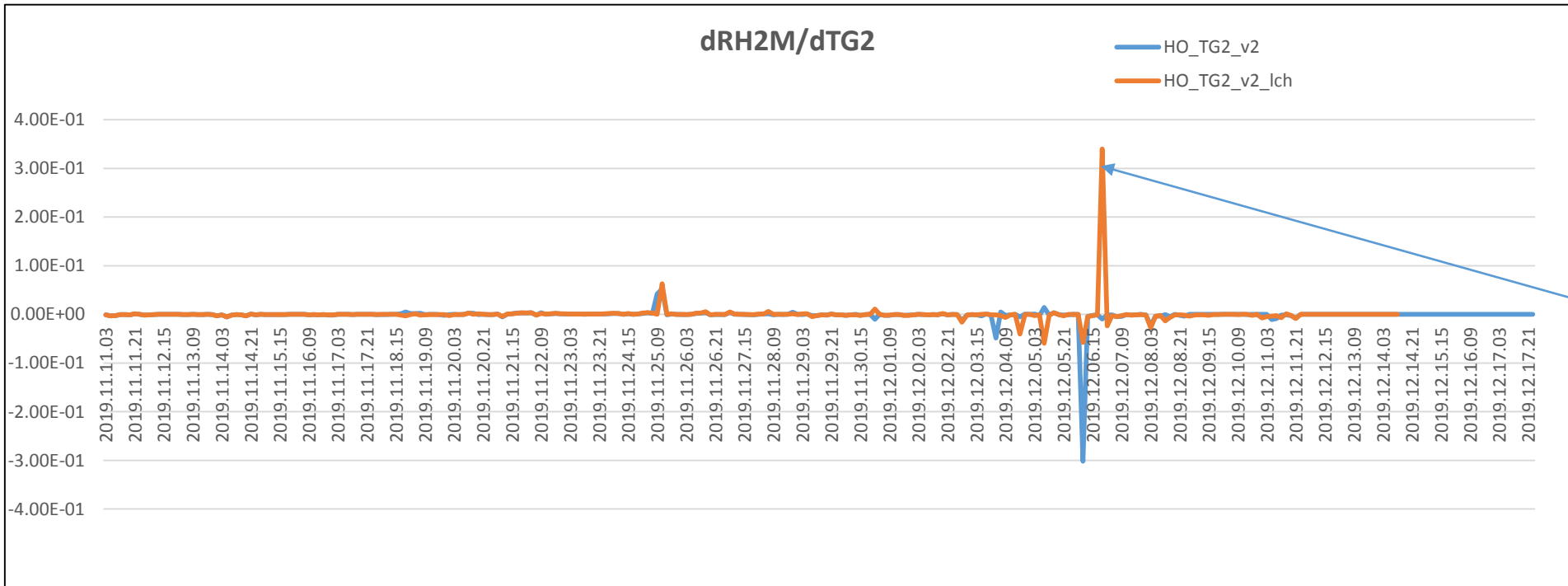
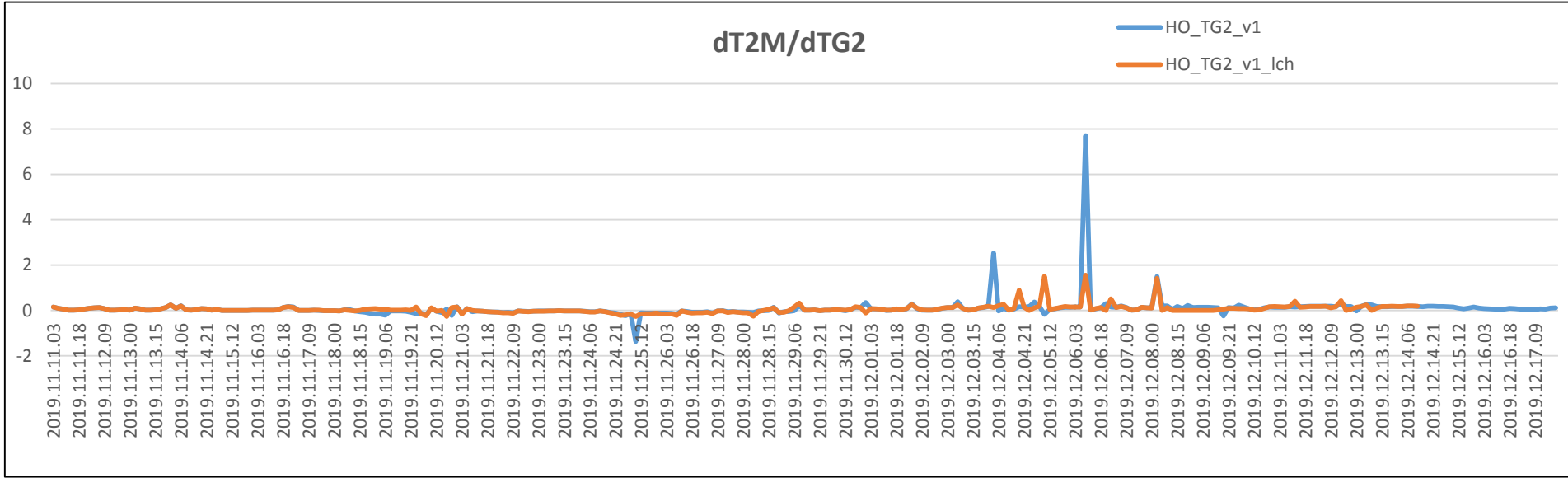
Target: keep the large but valid Jacobians

Positive and negative perturbations for all control variables (TG1,TG2,WG1,WG2) => 9 OFFLINE runs, and check the linearity of the Jacobians with this conditions:

IF $|H^+ + H^-| > 0.2 * (|H^+| + |H^-|) / 2.0$ => unlinear, H=0.0



Jacobians:

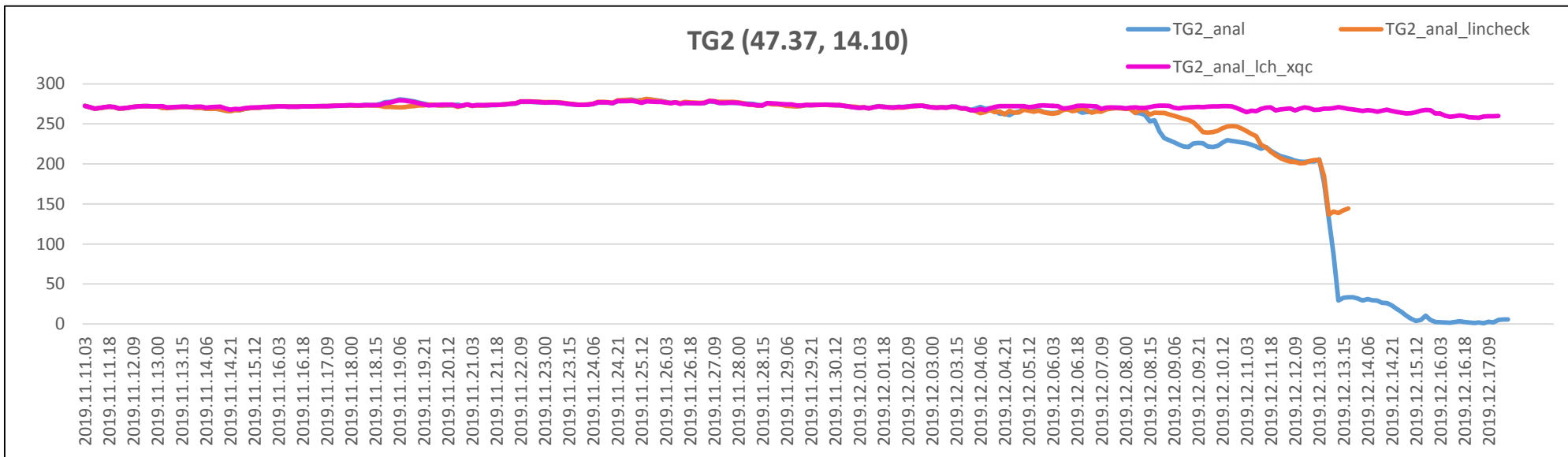


⇒ Jacobians seems ok

Issue: Innovation ($T2M_{obs} - T2M_{mod}$) became large (larger, than 3K) => TG2 anal is also large

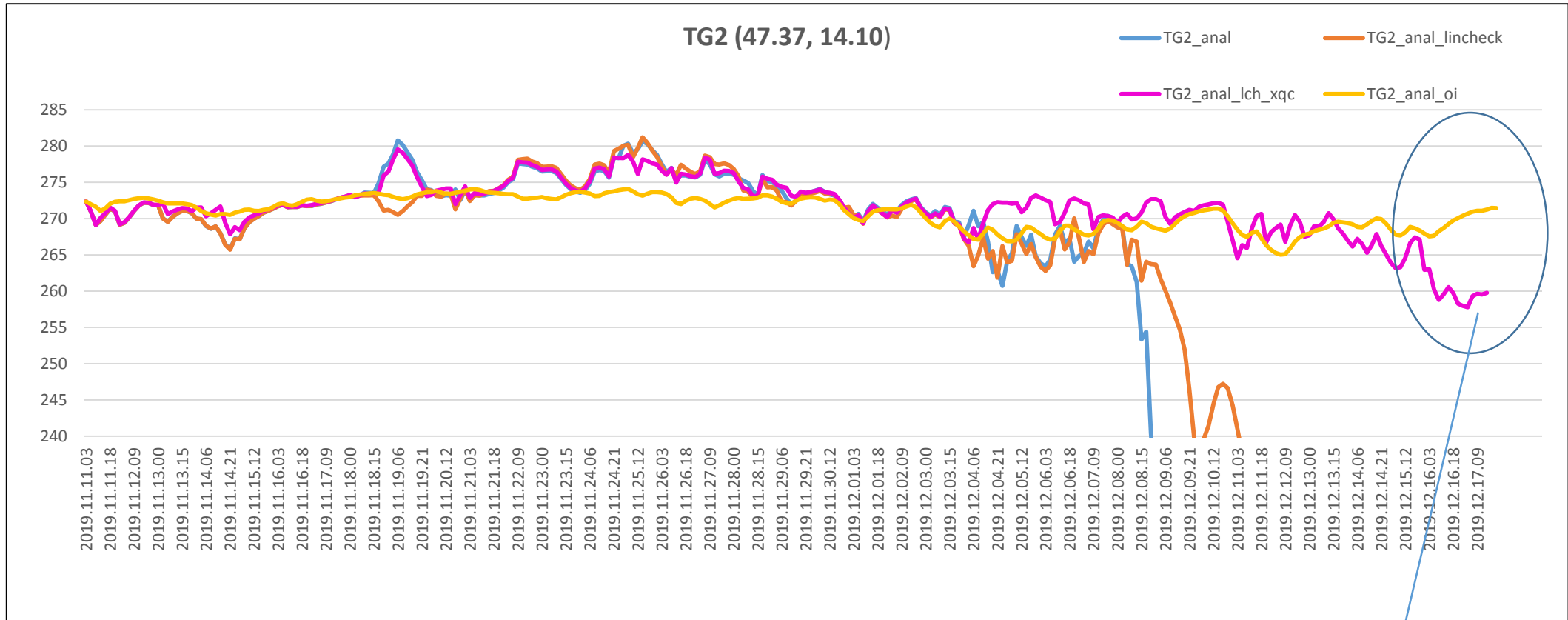
$$x_a = x_b + K (y - \mathcal{H}x_b)$$

New run: **SEKF + linearity check + limitation on Innovation (if XQCOBS>3, then $T2M_{obs}$ blacklisted)**



⇒ Seems ok

ZOOM:



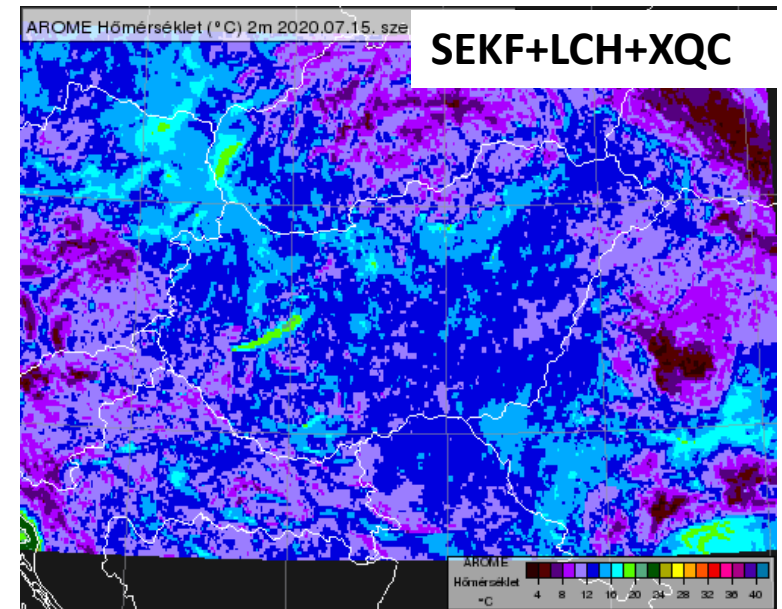
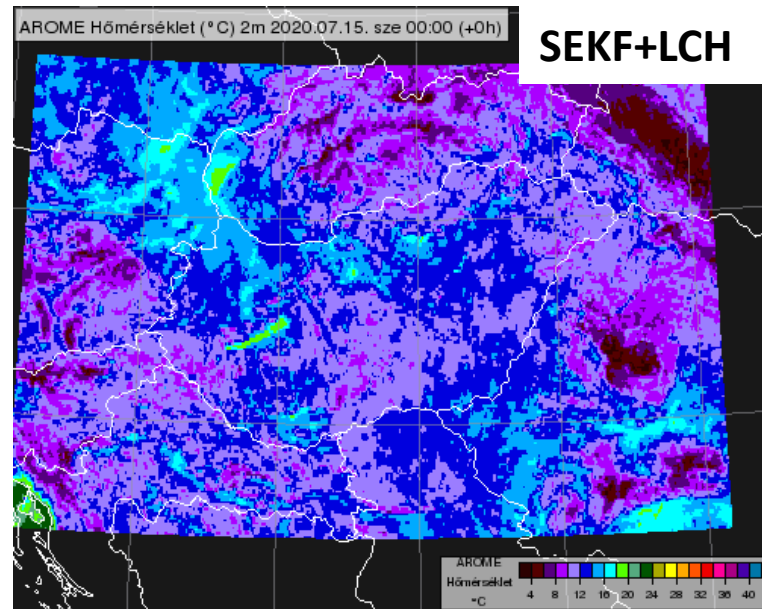
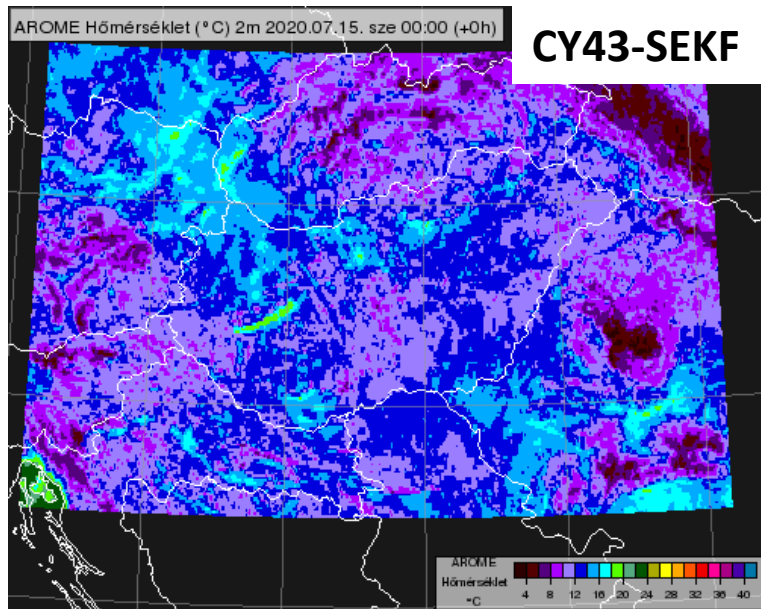
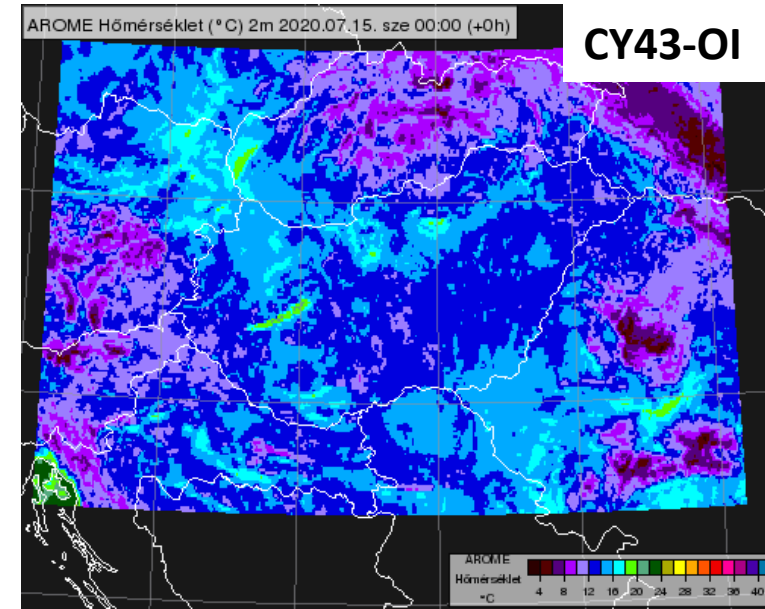
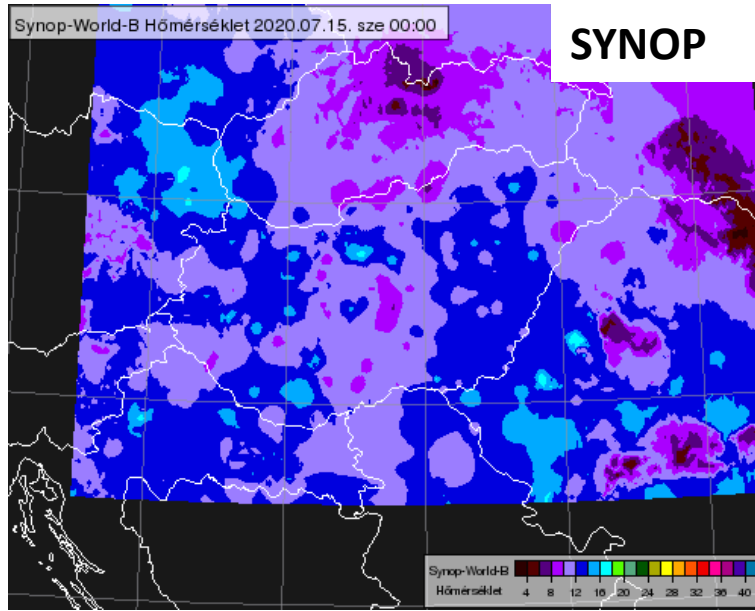
Big differences (~10K between
OI (270K) and SEKF+lch+xqc (260K)!!!
- Which one is correct????

Innovation is close to 3K (but less), SEKF is working

What happens in **summer run**?

T2M: 2020.07.15 00 UTC + 00h

Summer run: 06. 25 – 07. 31, 2020 (06. 25 – 07. 09 spin up)

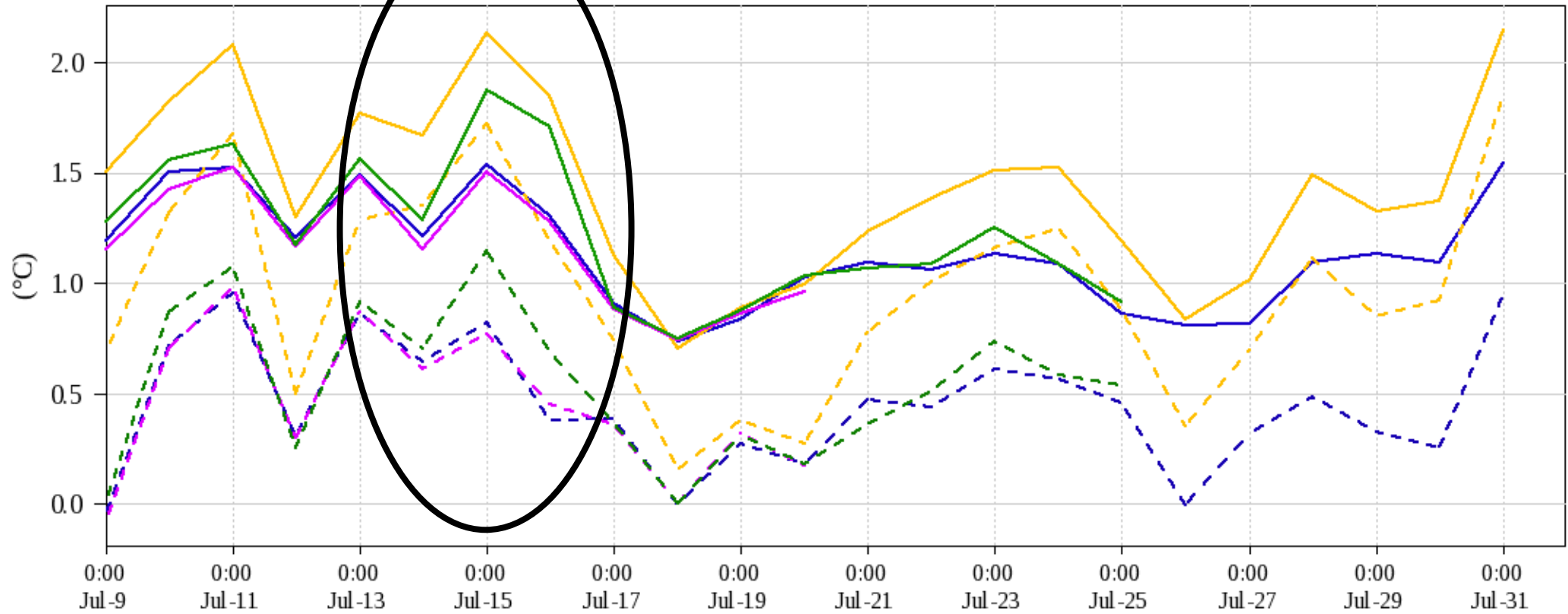


Period: 07/09/2020 - 08/01/2020
Area: AROME_max_400m
Variable: Temperature (2m)
Timestep: 000
Runhour: 00

CY43-OI-MAIN (Operational)
CY43-SEKF
CY43-SEKF-LINCHECK
CY43-SEKF-LINCHECK-XQCOBS

Legend (Model/Score)

- AROME_CY43-SEKF_mod/RMSE
- AROME_CY43-SEKF_mod/BIAS
- AROME_cy43_summer/RMSE
- AROME_cy43_summer/BIAS
- AROME_CY43-SEKF_in/RMSE
- AROME_CY43-SEKF_in/BIAS
- AROME_CY43-SEKF_lch_xqc_summer/RMSE
- AROME_CY43-SEKF_lch_xqc_summer/BIAS



What's next???