# CV tool / T2m assimilation update

Krishna

Impact of T2m assimilation: Recap

- Validating the T2m observations over the Po valley specifically 950-1050hPa is validated against the Sonde in Milano

- The negative impact is still significant

- To gain more confidence in the diagnosed impact, ideal assimilation tests which mimics the single observation diagnostic were carried out.

- Also looked at the timeseries of various quantities during this period.

T2m vs Radiosonde T
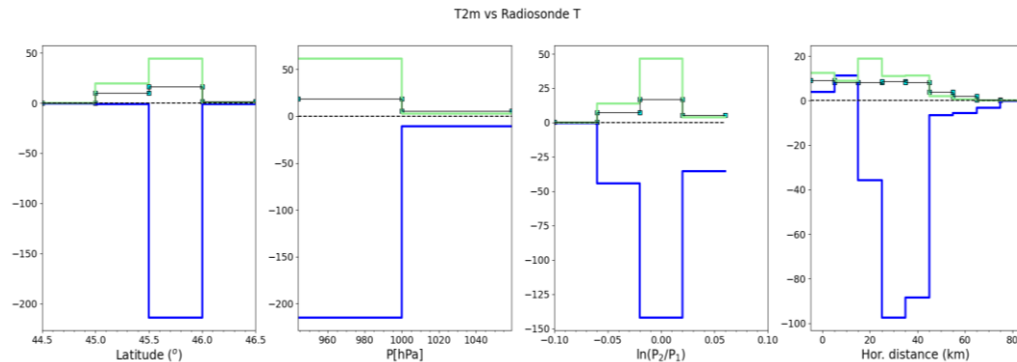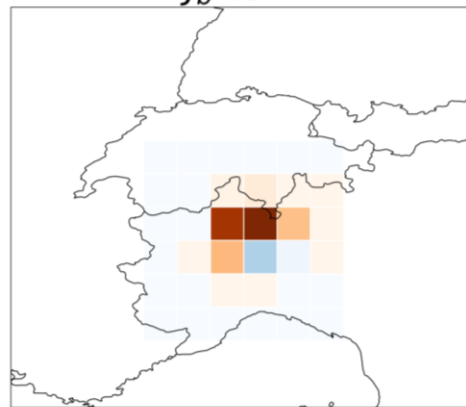
J_b term

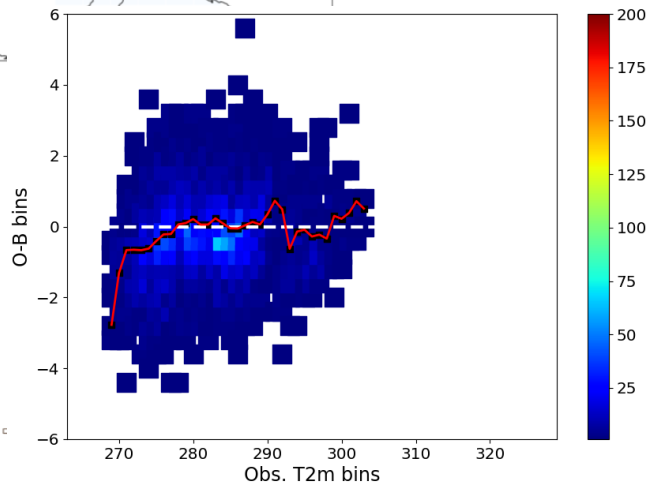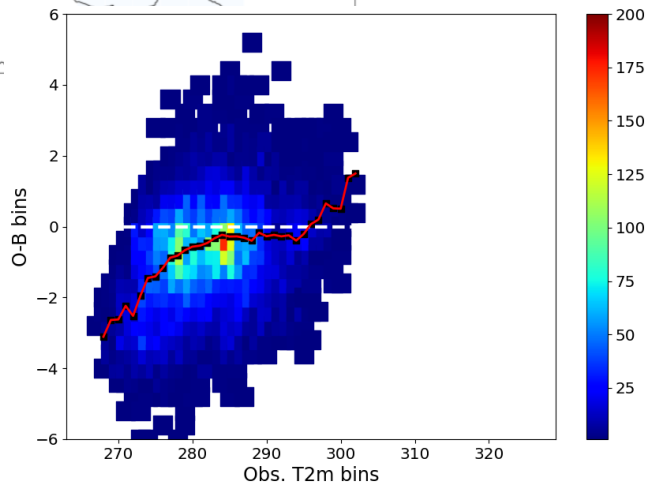Estimated noise in J_b term

MeteoSchweiz
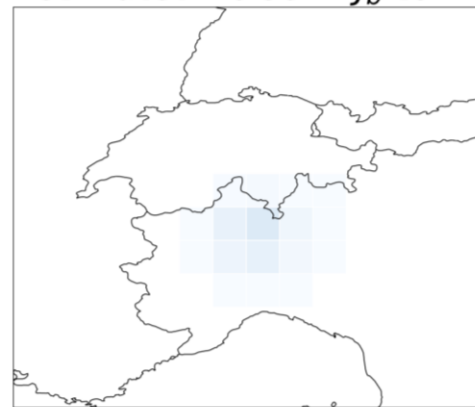
Observation space diagnostics
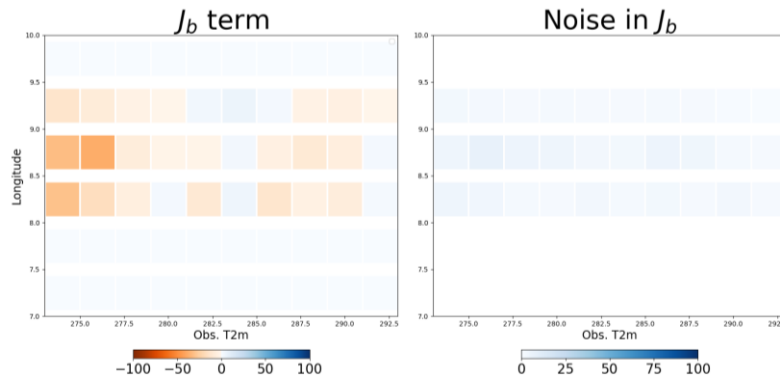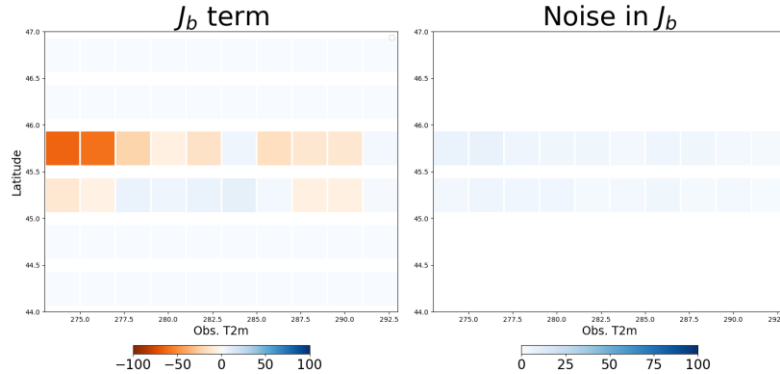
Region 1

Region 2

Statistics from OND2023

- Systematic bias at colder surface temperatures.

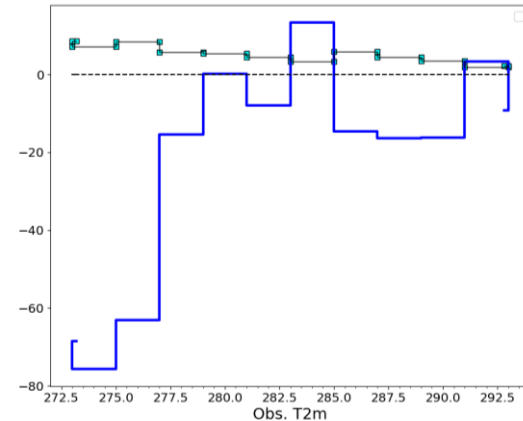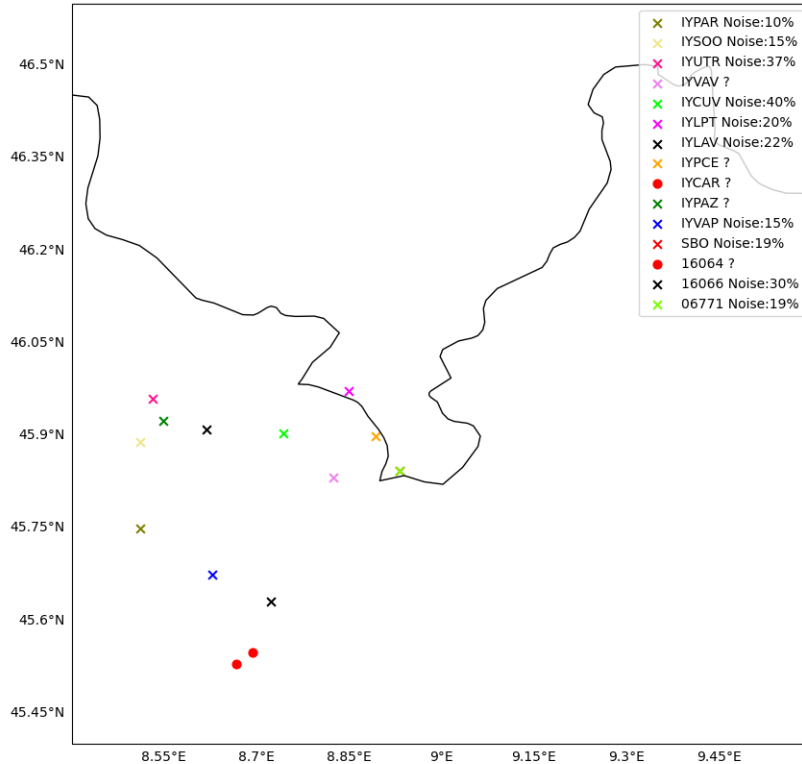- More biased pixels over the Region1 compared to Region2

CV diagnostics

- Consistent with the obs. space diagnostics, CV also suggests larger degradation from cold surface observations

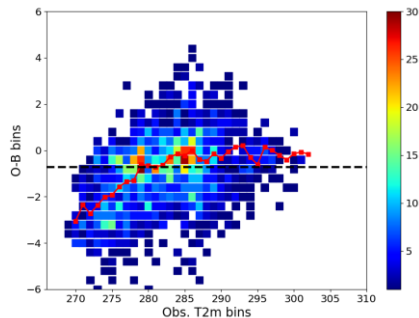- Able to map the major degradation to Region 1
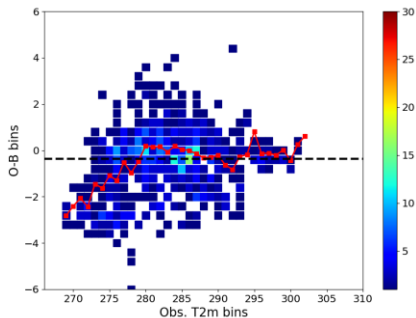
CV diagnostics: stationwise

- Attempted to perform stationwise CV diagnostics over Region1

- Certain stations give statistically significant negative impacts

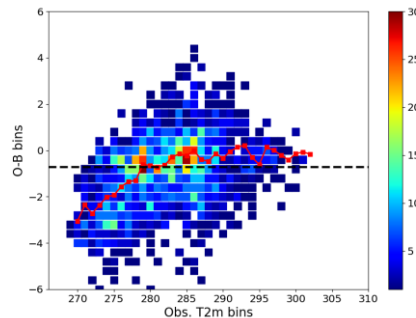- Stationwise obs. space statistics => to check if the negative impacts correlate with the systematic bias over cold surfaces.
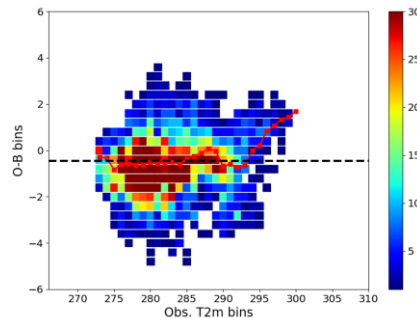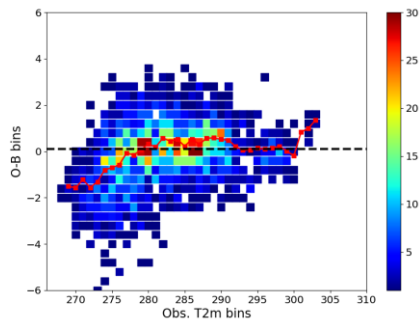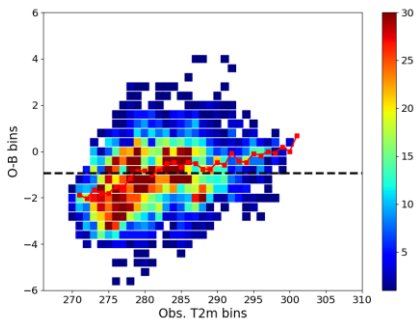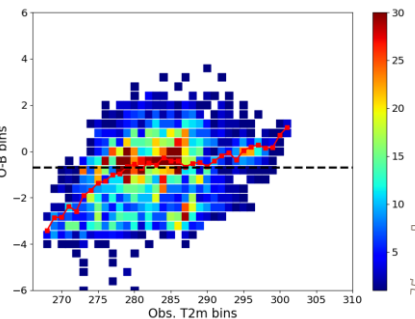
CV diagnostics: stationwise
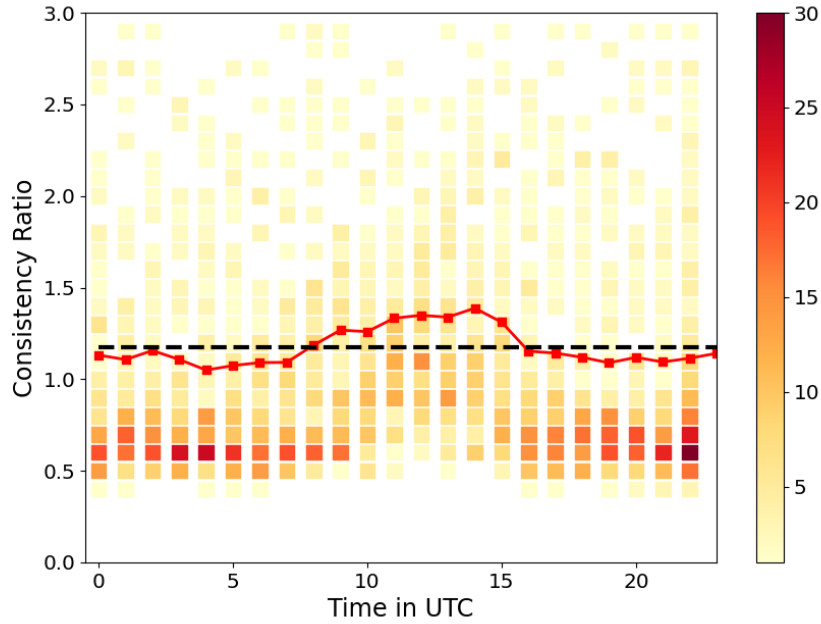

06771

16066

SBO

IYSOO

IYCAR

IYPAR

IYVAP

Bonus 1: SBO/06771 are duplicates but still actively assimilated. Needs further investigation.

Bonus 2: Certain station report same obs. Value at 30min and 1hr time.

More diagnostics

Dowel and Wicker (2009)

$$\text{consistency ratio} = \frac{\sigma_{\text{vr}}^2 + \left\langle \frac{1}{N-1} \sum_{n=1}^{N} [H(\mathbf{x}_n^f) - \overline{H(\mathbf{x}^f)}]^2 \right\rangle}{\langle (d - \langle d \rangle)^2 \rangle},$$

$$(3.4)$$

- Using OND2023 statistics over Region 1

- Most often the CR <1 during the night time which means the ensembles have too little spread

- During the daytime, the CR >=1. means that the spread/RMSE/Obs. Errors are consistent.

- Region 2 does not show this behavior

MeteoSchweiz

Summary

- There seems to be a systematic bias at cold temperatures and based on CV tool we also see that the these observations are degrading the analysis.

- Further based on the observation space diagnostics, we can see a weaker spread in ensemble over the region of interest during the night time.
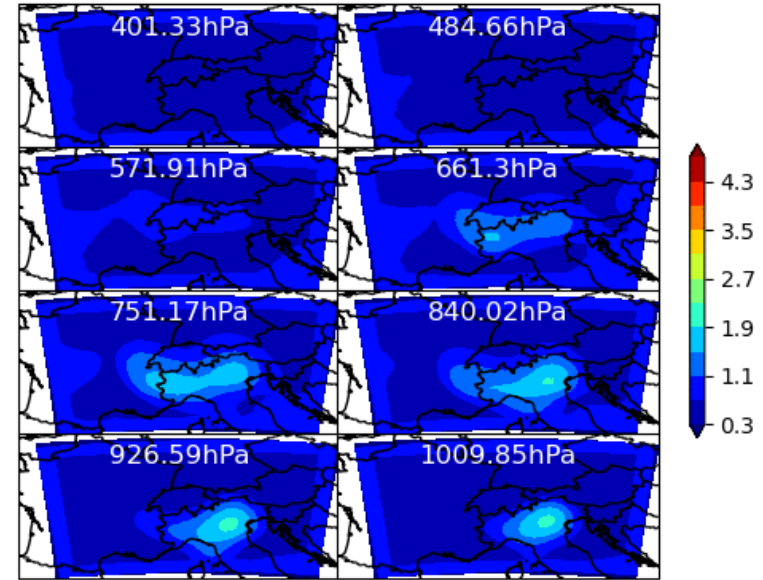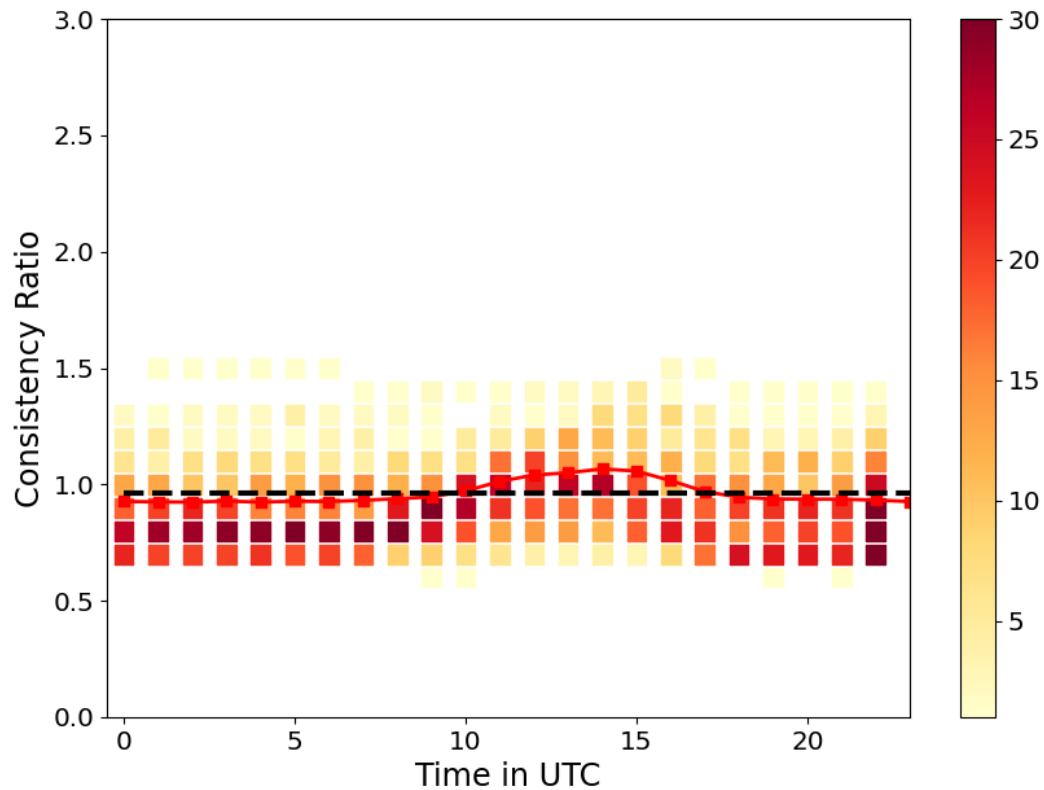
- How to handle these issues?

Slides++

Region 2: CR

Adaptively cycled rho
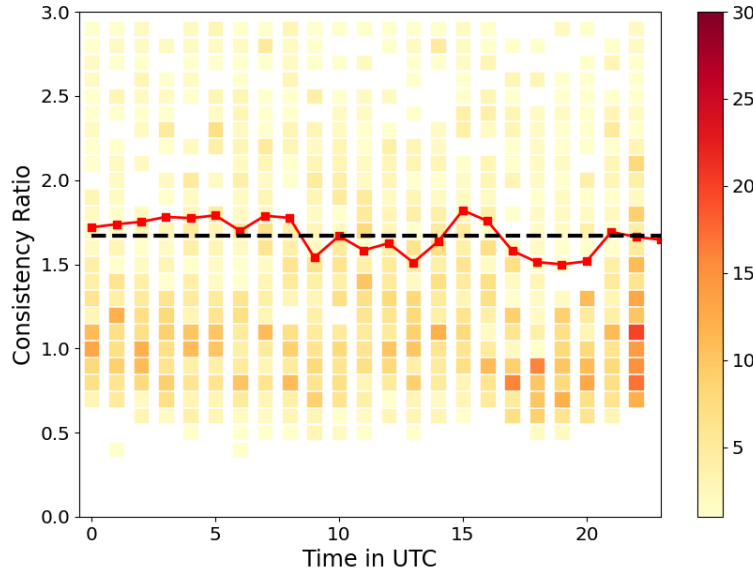
rho_2023-10-01_00Z

Slides++

Full domain