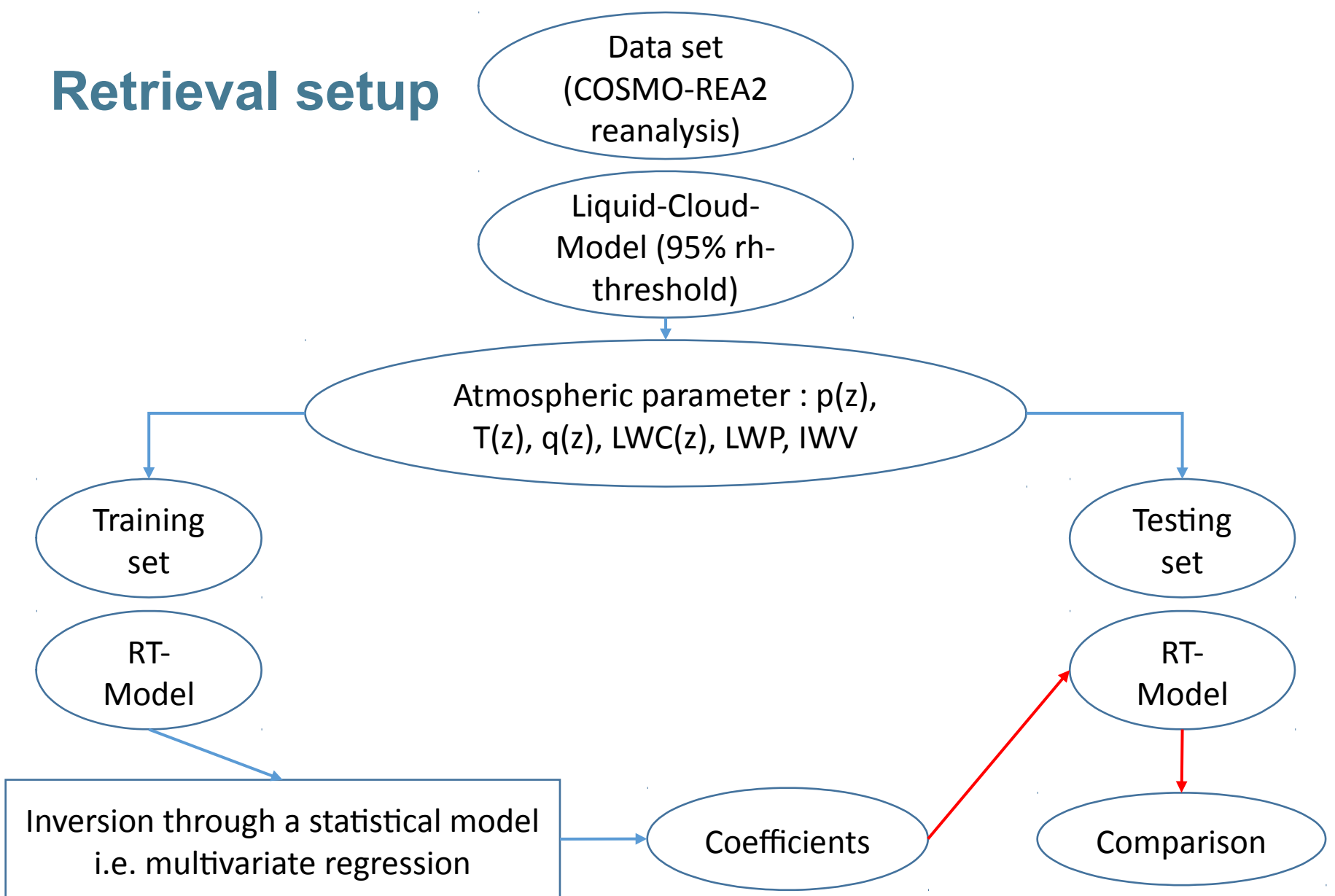




# Temperature profiling with ground-based microwave radiometers during the SoFog3D campaign

# Retrieval setup



# Additional retrievals

## HATPRO:

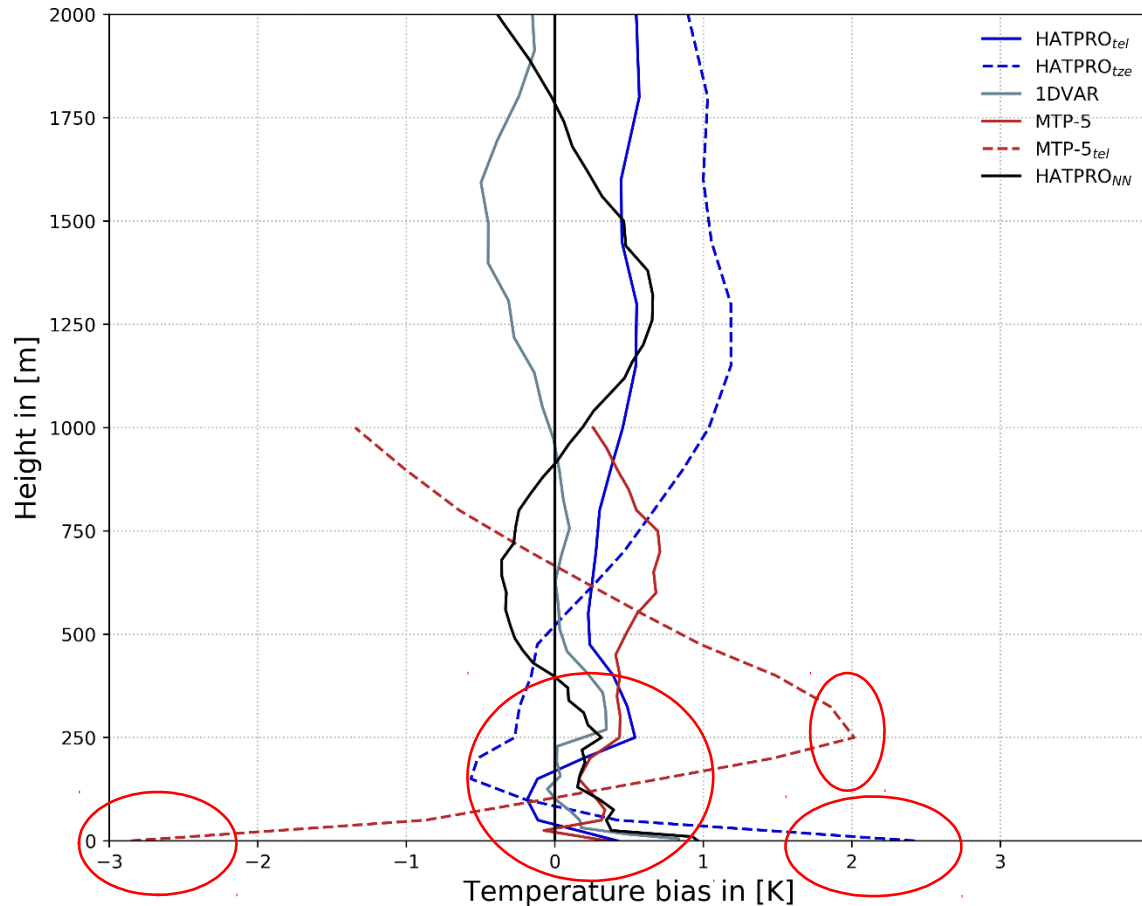
- Neural Network (NN) approach (RPG)
  - NN has been trained with AROME reanalysis data with 1.3 Km spatial resolution
- 1D-variational (1DVAR) (Dr. Pauline Martinet)
  - MWR observations are combined with an a-priori profile originating from the AROME model

## MTP5:

- Regularization (ATTEX)
  - Based on solving the equation for the tropospheric delay of a radio signal in the microwave regime

# Bias between MWR and RS

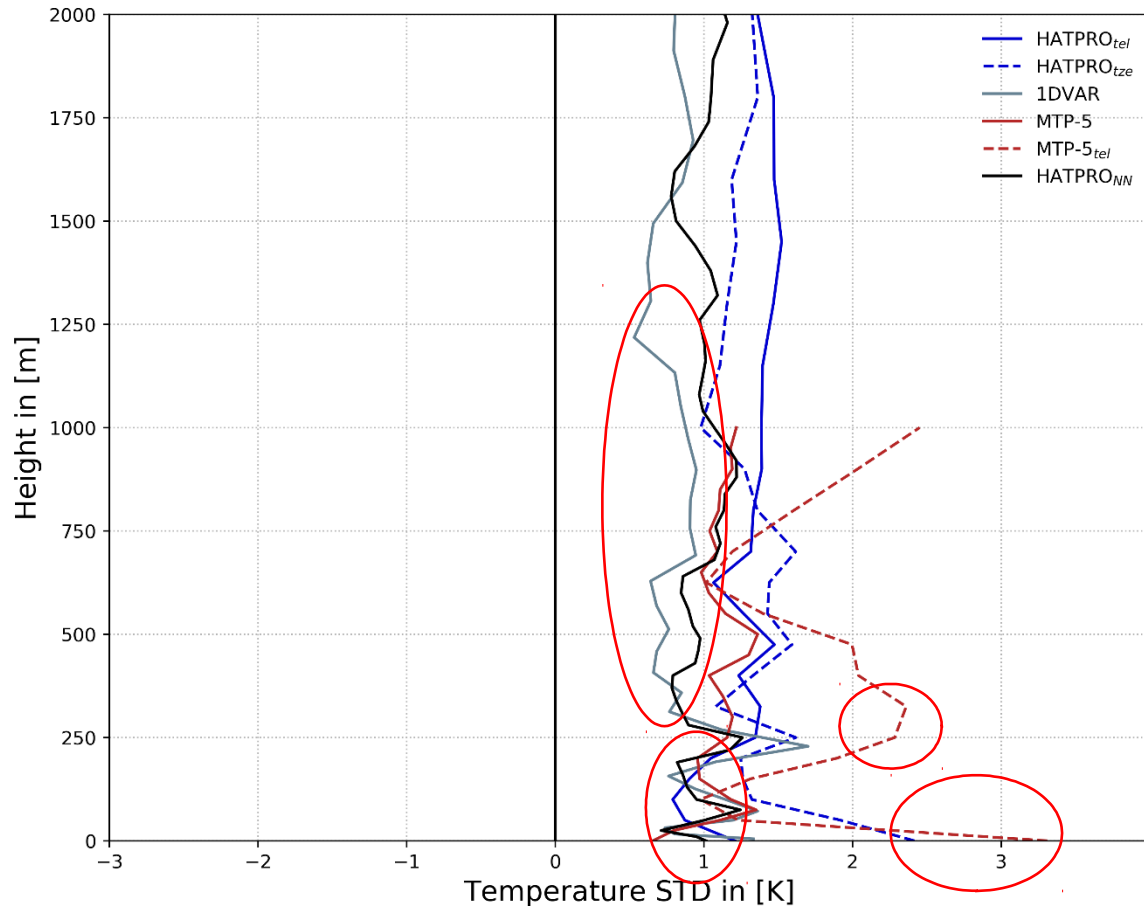
N = 33



- MTP-5 regression  
->high under-estimation at the surface and overestimation at ~250m
- Zenith only retrieval misses information at the surface level  
->high bias
- Other retrievals stay at ~0.5K bias under 1000m

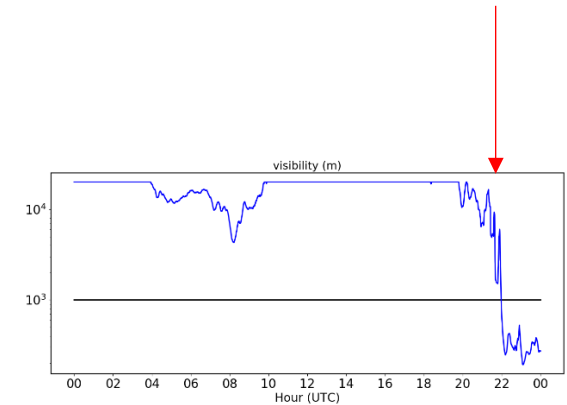
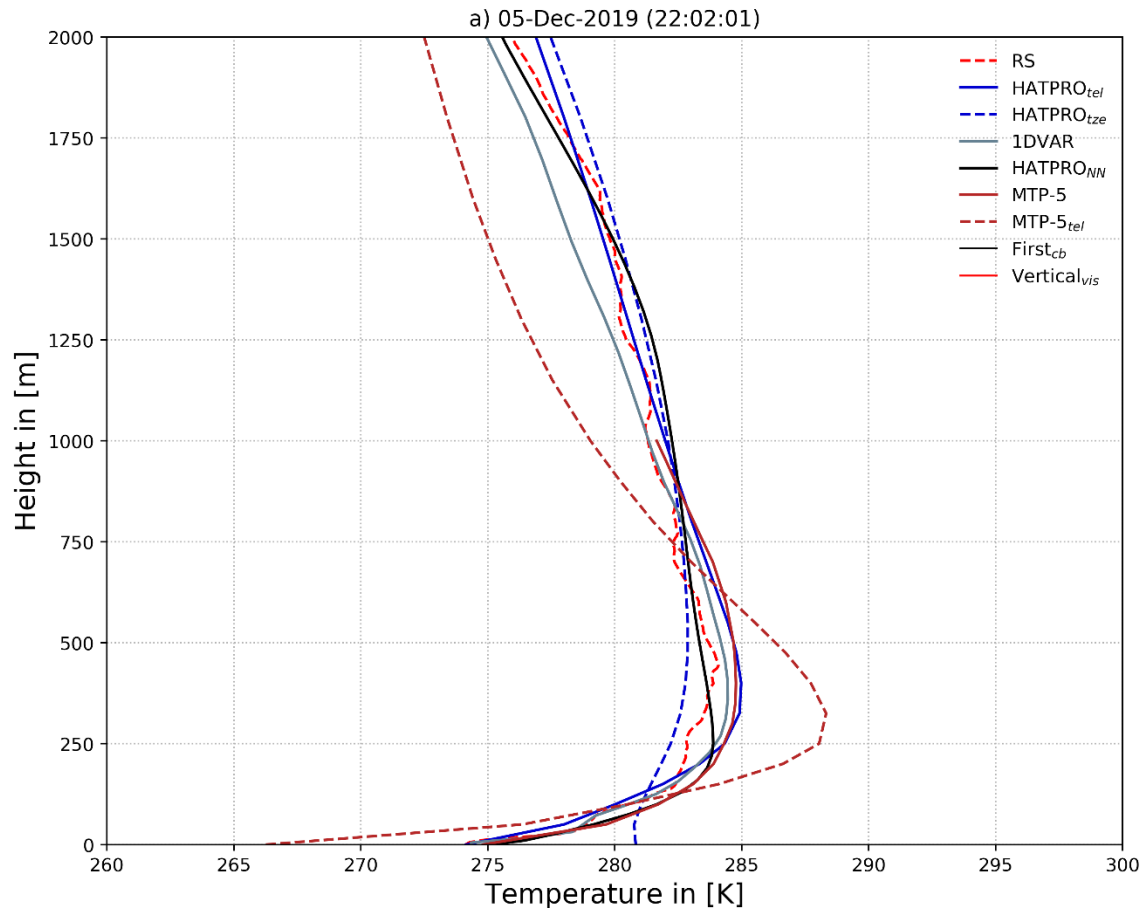
# STD between MWR and RS

N = 33



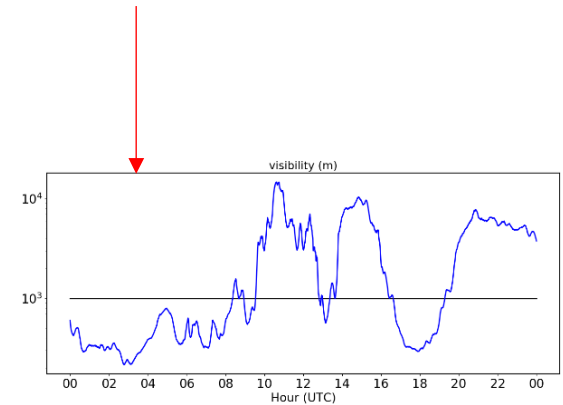
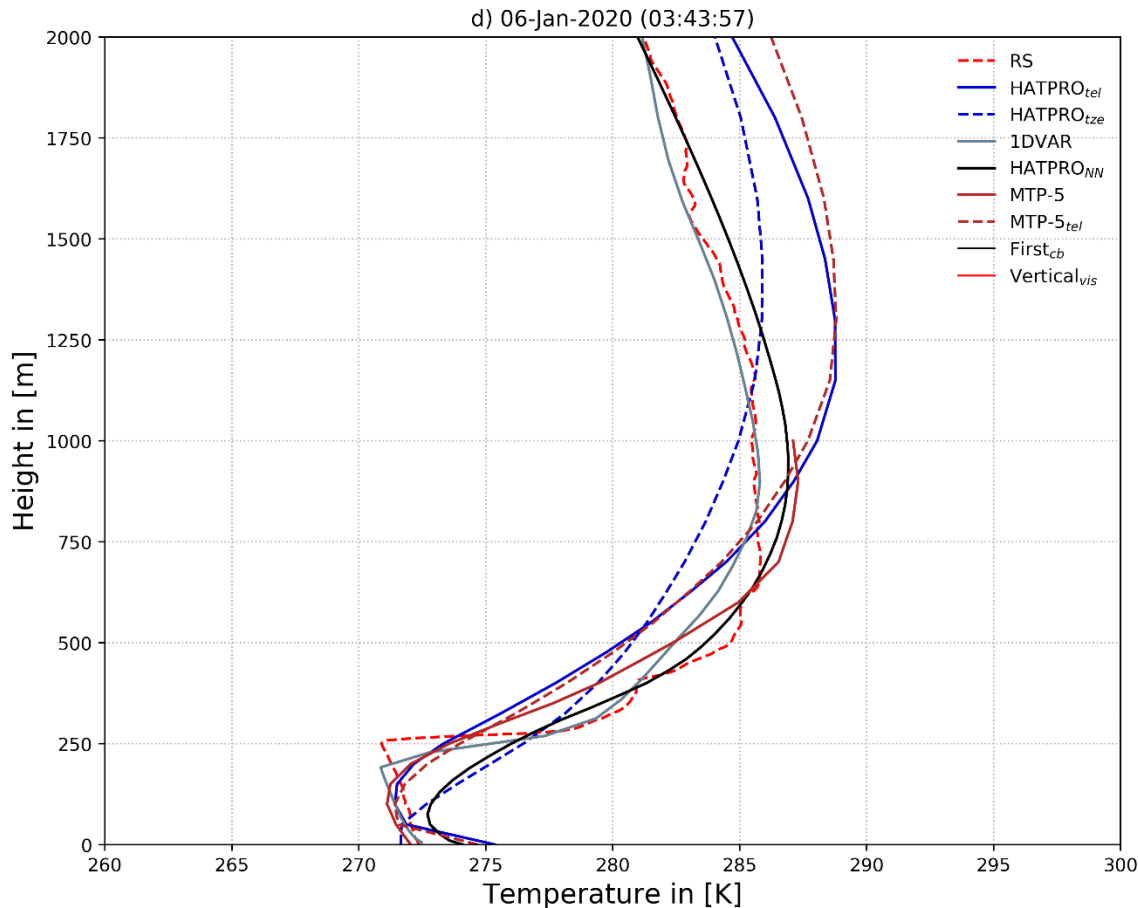
- Lowest variance for regression (HATPRO) at ~150m
- 1DVAR lowest variance from ~250m
- Zenith retrieval higher variance near surface
- Variance of MTP-5 regression near surface and in 200-500m significantly higher

# Case studies



- Thick inversion near the surface
- MTP-5 overestimated
- HATPRO zenith retrieval overestimated near the surface
- All retrievals overestimated in 150-650m w.r.t. radiosonde
- Inversion is well detected by both MWR

# Case studies



- Sharp inversion at 250m
- > 1DVAR able to resolve, other retrievals a smoother profile
- Better performance of the MTP-5 regression in contrast to expected bias/std