A fixed order of scattering (?) scheme for ARTS?

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Are we ready?

- We can do scattering forward simulations with ARTS and many other models

- But what about doing retrievals?

Demands of OEM

- Not a too high non-linearity
  - OK
- Gaussian statistics
  - Not valid for all/many cloud variables

- Weighting functions must be provided
  - Not avaliable with DOIT and MC
- Forward model must be sufficently fast

Alternatives to OEM

- Go back to Bayes theorem

  - Gives an expression for a posterior PDF

- Several general methods can be applied

  - E.g. Markov Chains

  - But needs a very fast forward model

- Approximative methods

  - Bayesian Monte Carlo integration, neural nets

  - Both based on a retrieval database

 - Main task is to create a realistic database

Discussion

- NN/BMCI limited to cases where observation has degree of freedom (DOF) < ~10
- Could be OK for down-looking sensors
- Not OK for limb sounding
  - DOF for 2D STEAM retrievals!?
- What to do? Use OEM anyhow?
  - Clouds not a target for limb sounding
  - Basic task is cloud detection
  - Or better, handling of weak scattering
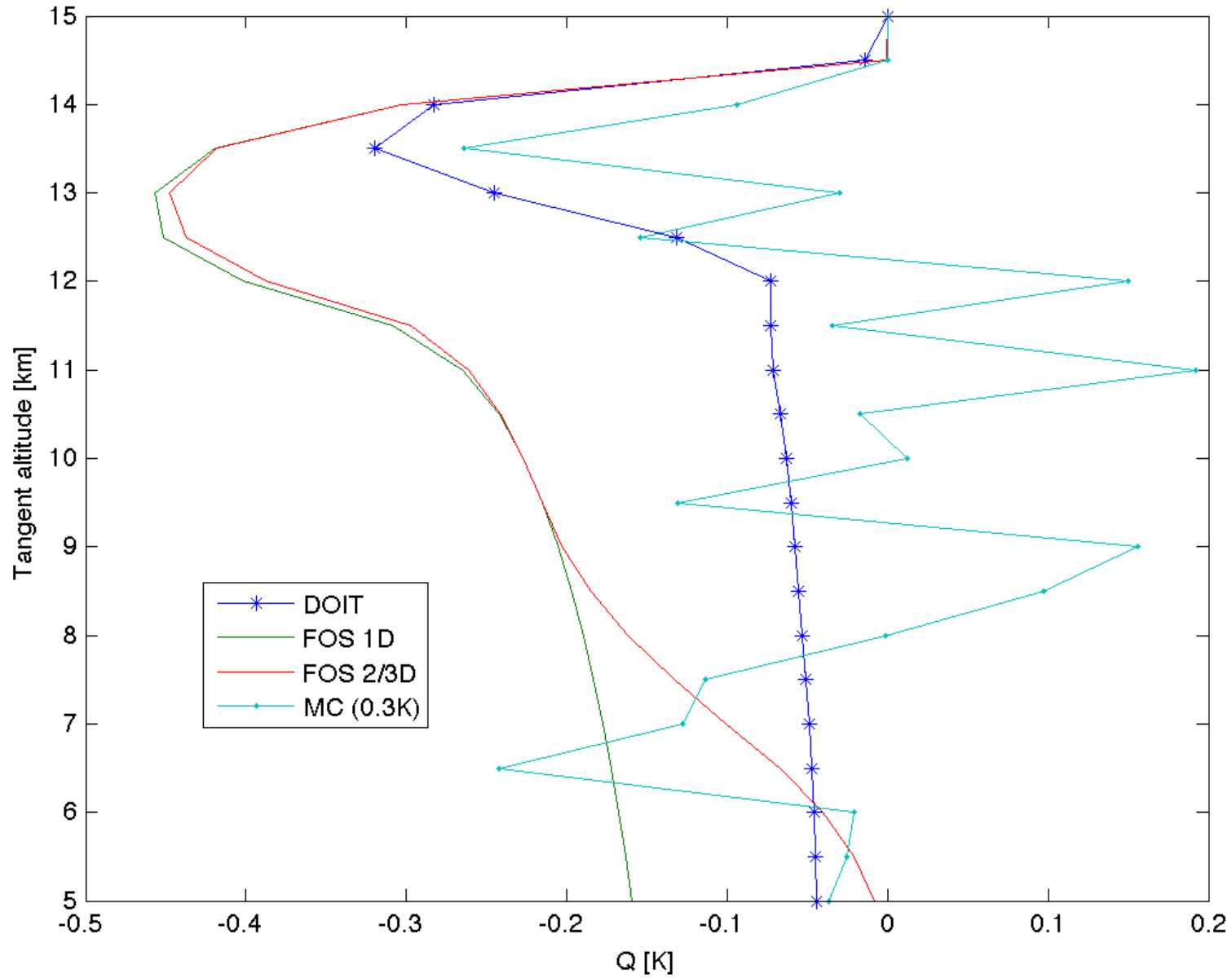
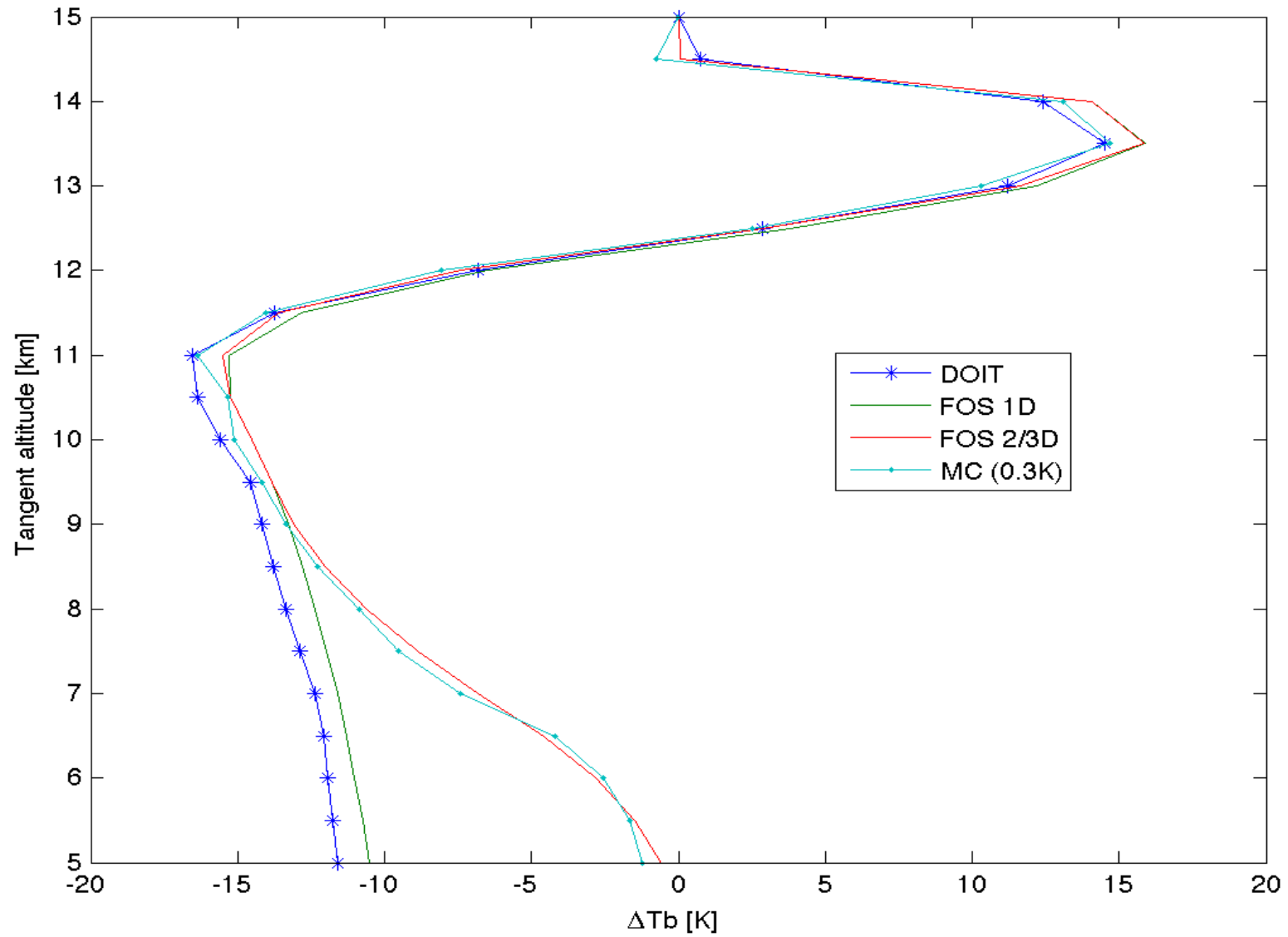# Incoming line-of-sights (LOS)
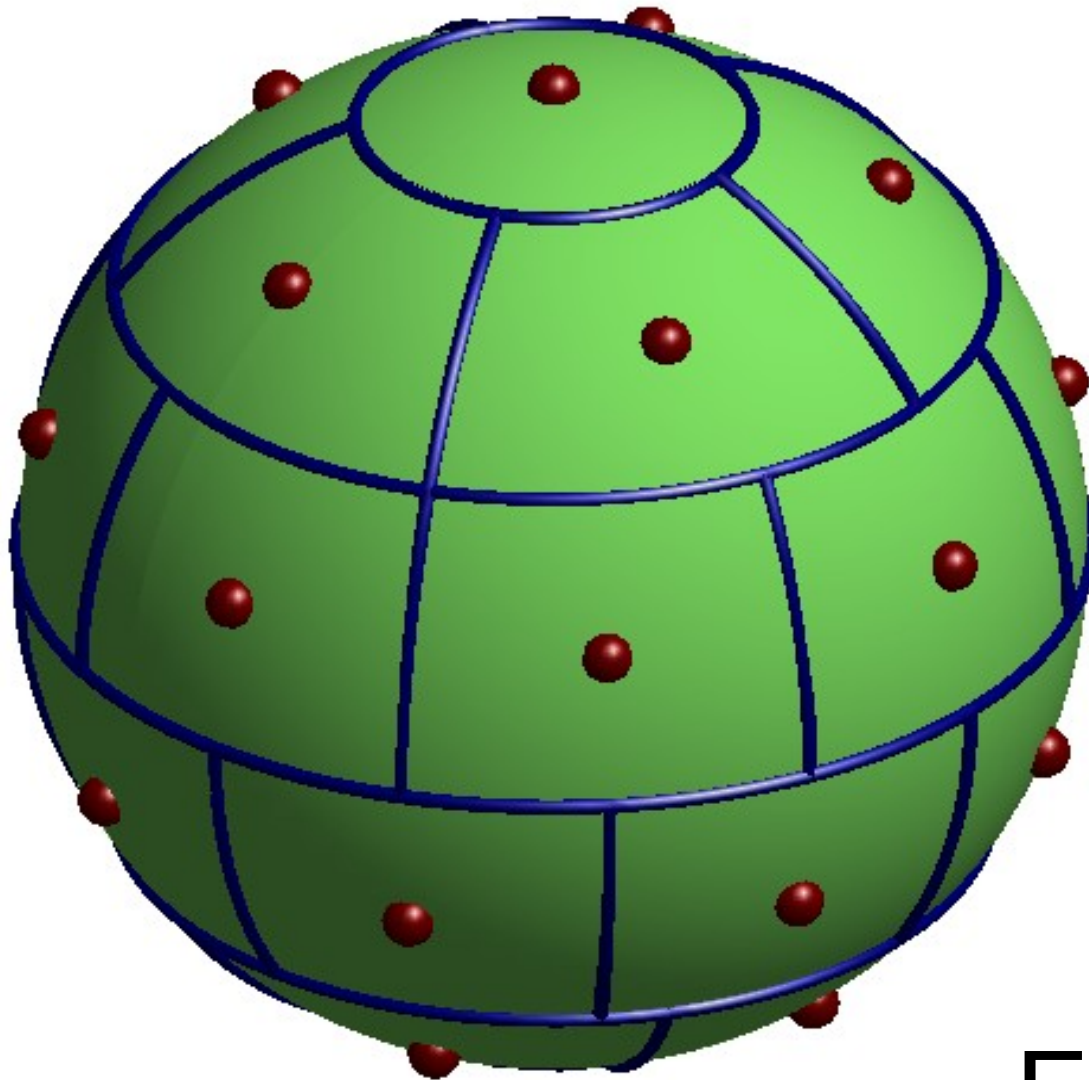
FOS-nX

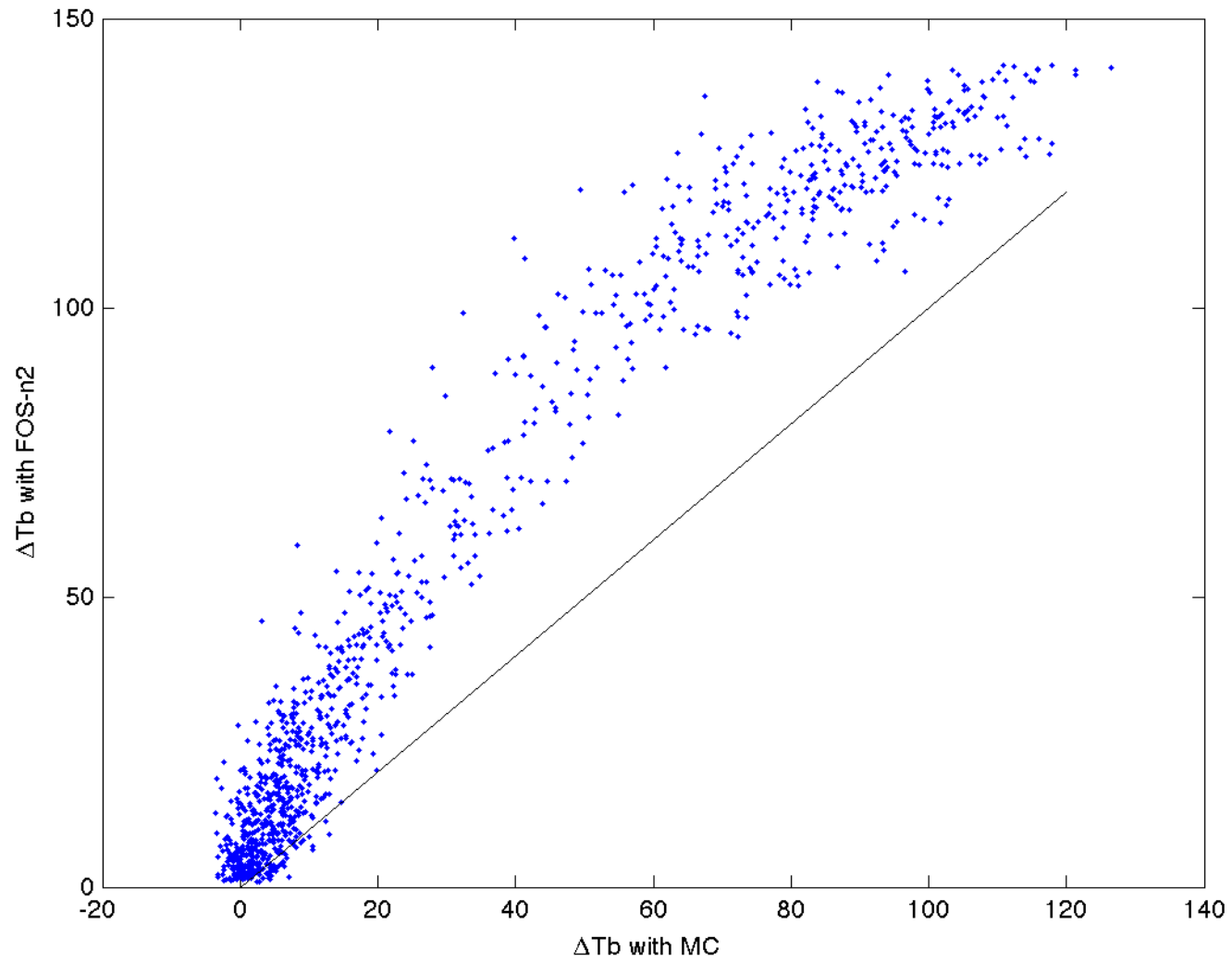# First results, I
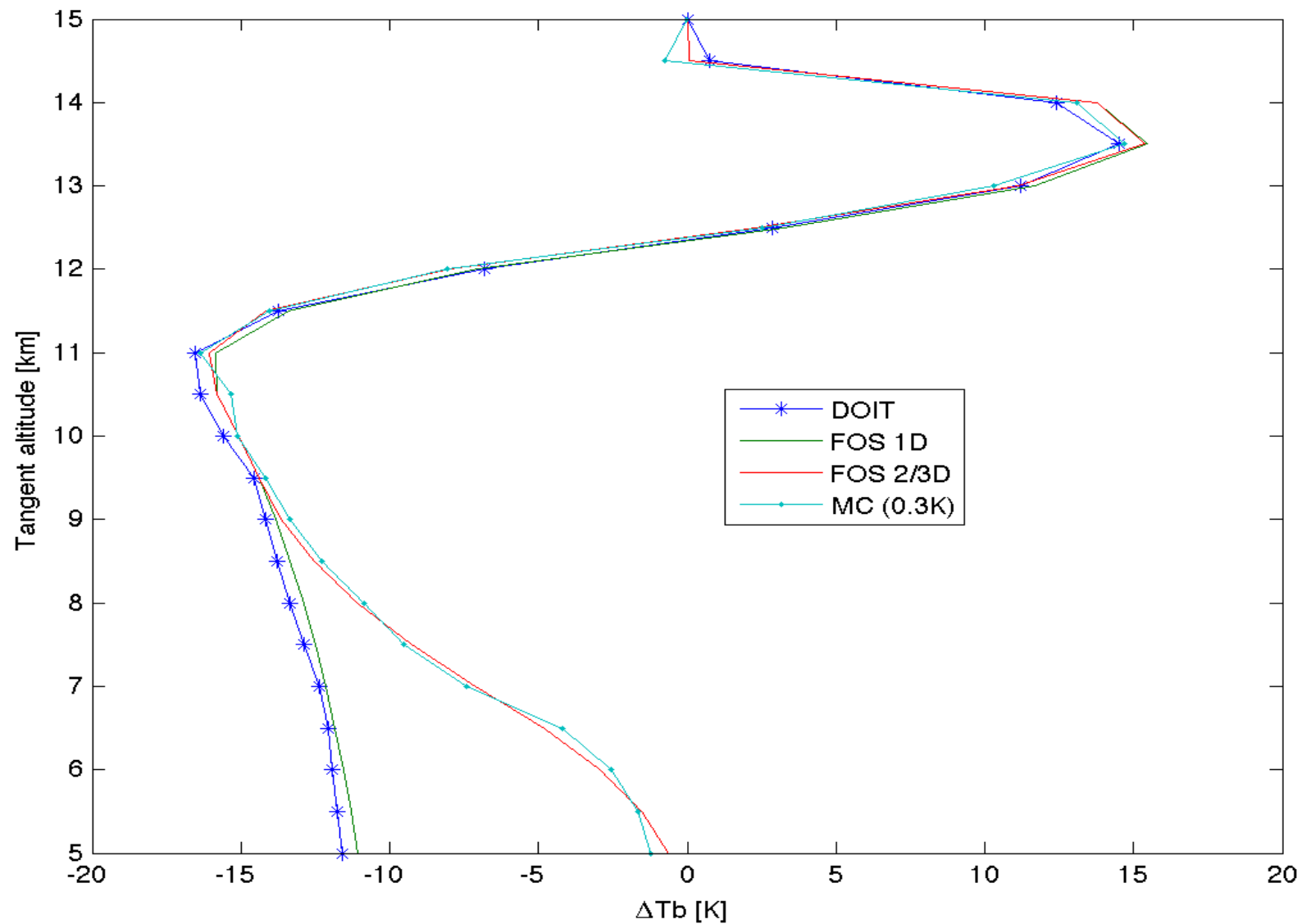
First results, Q

Just 2 FOS LOS

Calculation times

- DOIT: 25
- MC 0.3K: 17263
- MC 2K: 444
- FOS-n28: 29/88/122 for 1/2/3D
- FOS-n2: 10/11/12

Next test

Conclusions

- An useful approach?

- MLS team is working on a very similar approach

- If OK, weighting functions easily added

- "Fixed order of scattering", correct name?