



NASA/JSC

# TO WHICH PRECISION CAN WE CORRECT TELLURICS IN THE NIR?

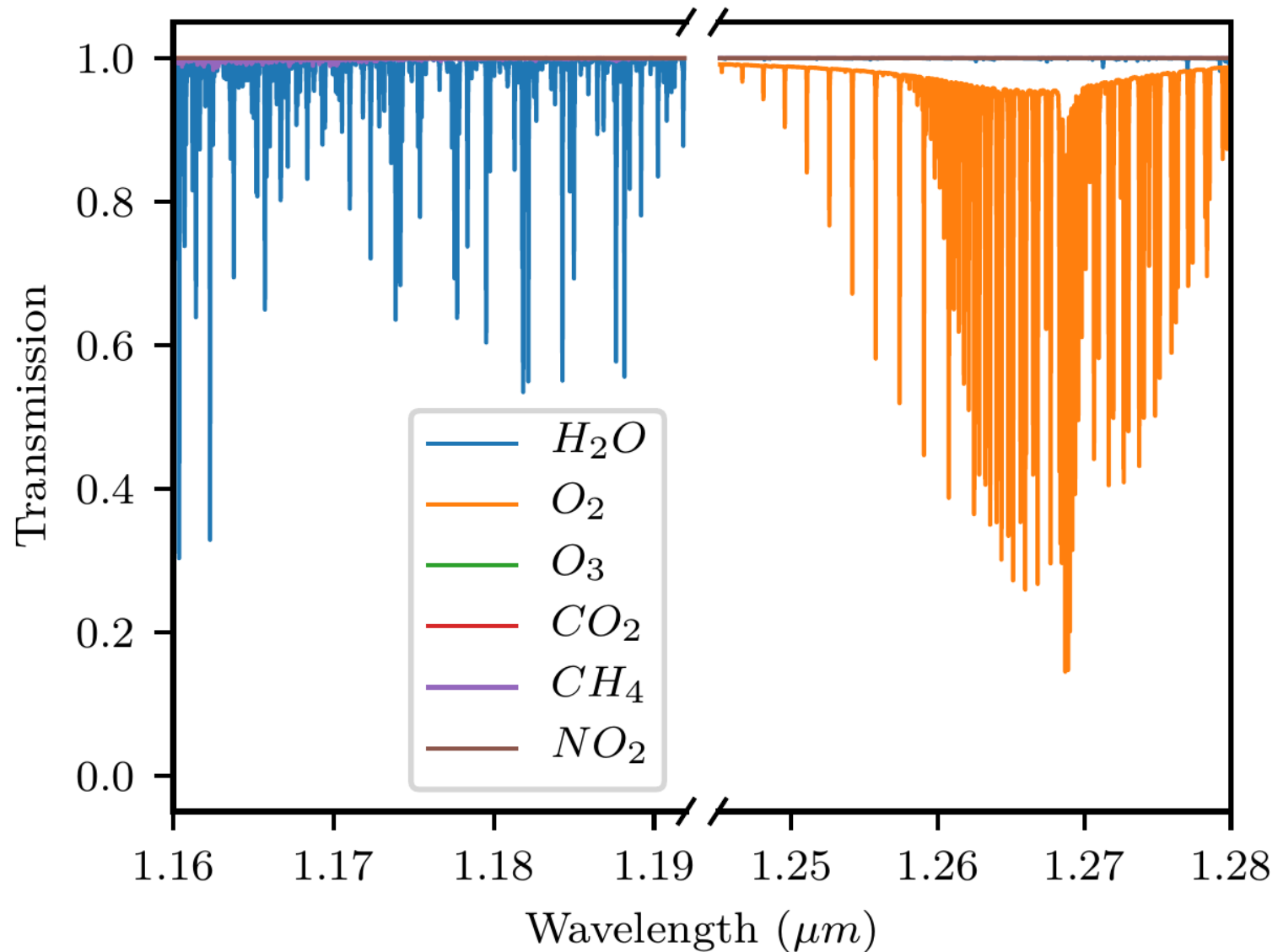
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# TELLURIC ABSORPTION

Synthetic transmission spectrum of our atmosphere (LBLRTM/TAPAS)

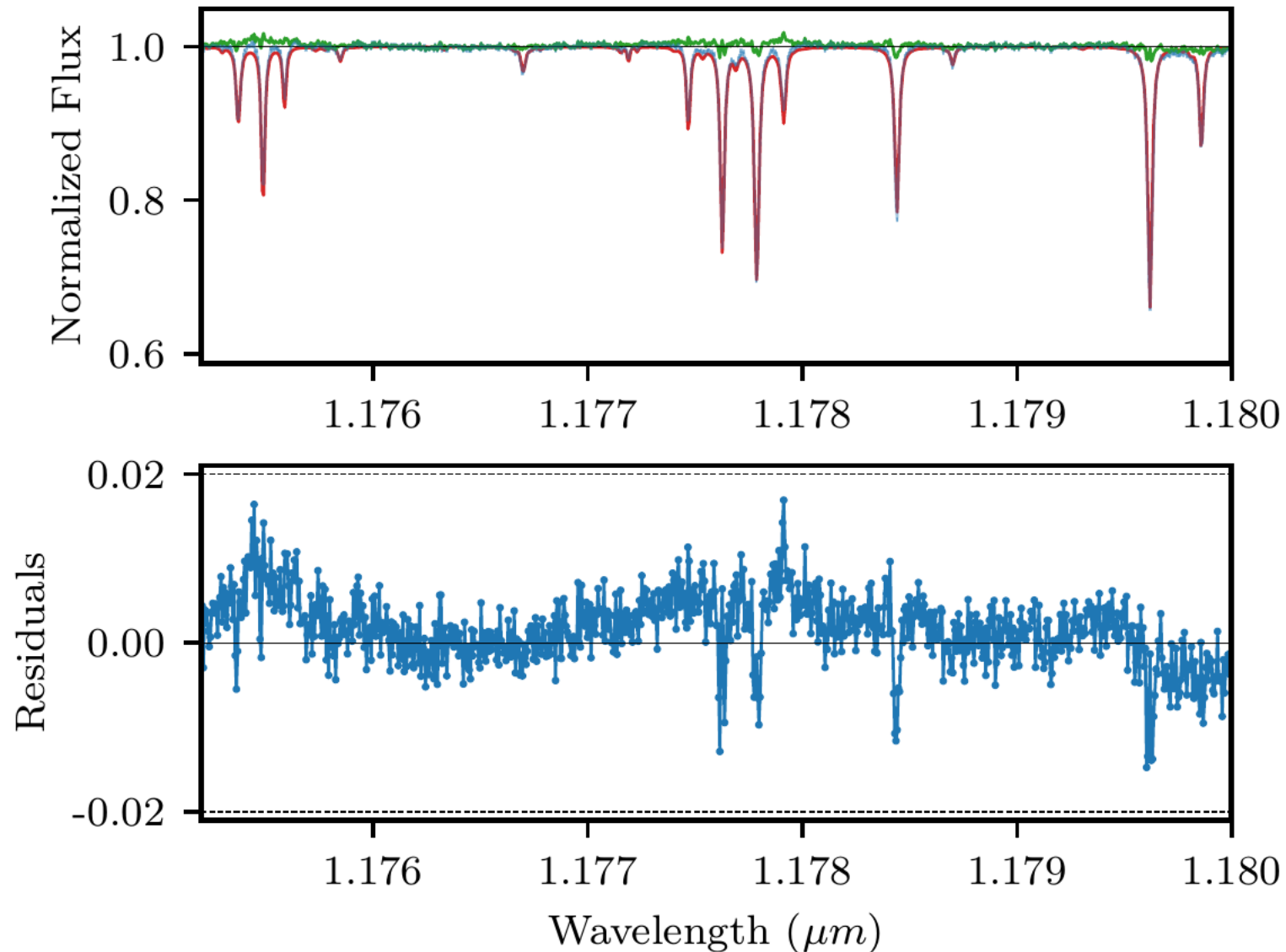
Wavelength coverage of our CRILES data set



# MOLECFIT TELLURIC CORRECTION

CRIRES spectrum of a hot standard star in the J band.

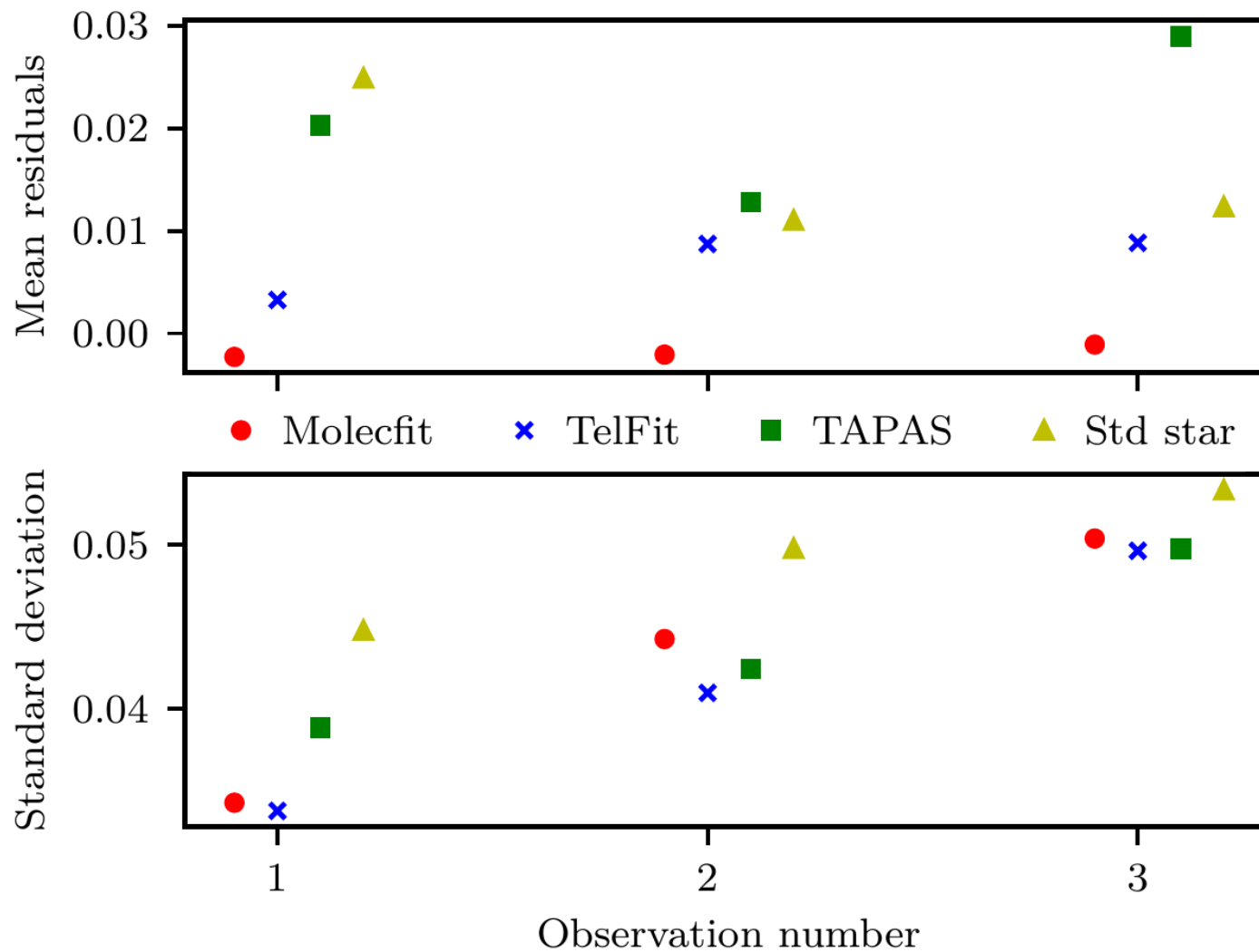
Residuals below 2%. Residual patterns could be removed with PCA.



# OFFSET AND SCATTER

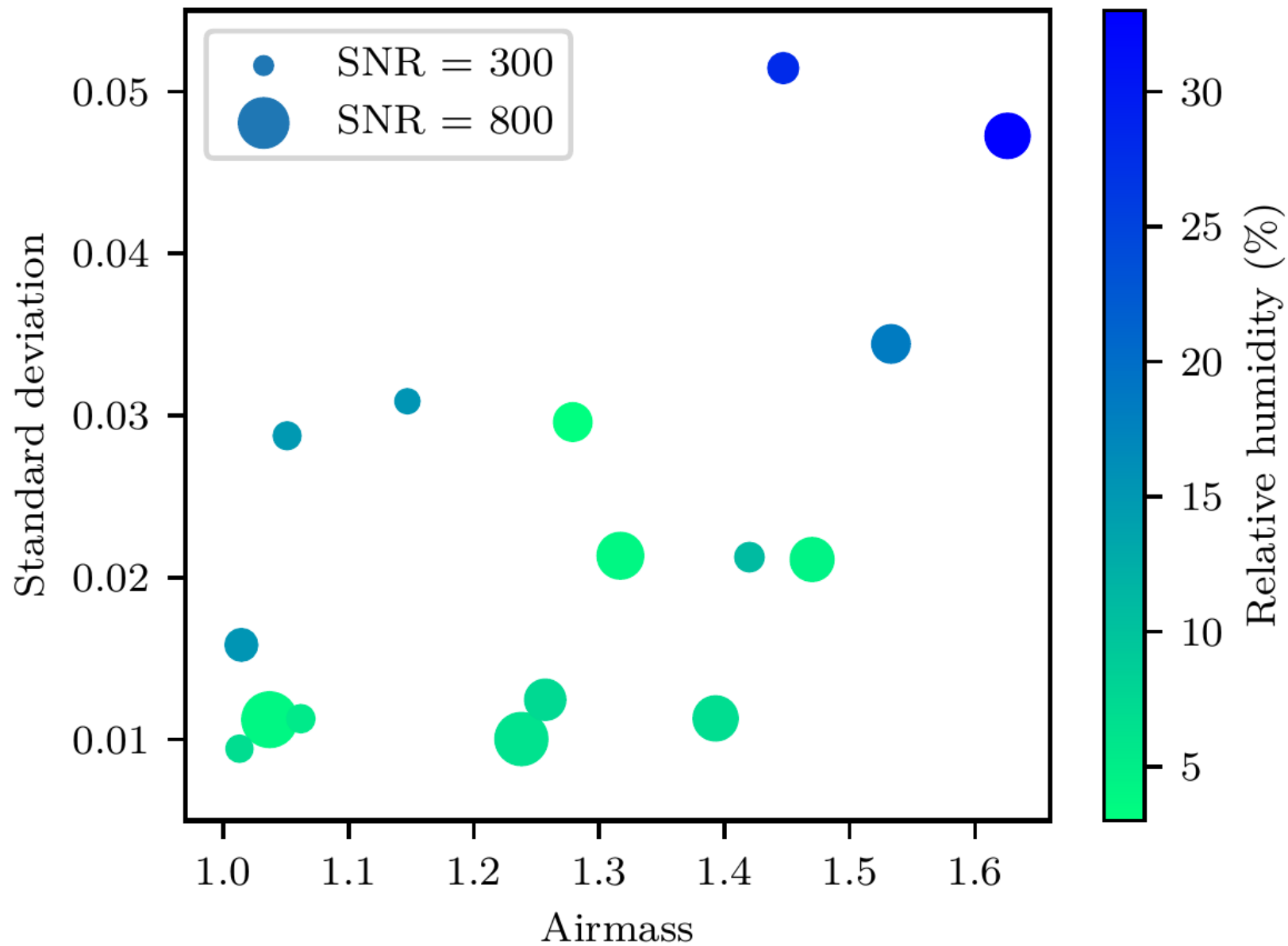
## TELLURIC CORRECTION METHODS

Residuals inside the **water telluric lines** for Molecfit, TelFit, TAPAS, and the standard star method around 1.18 microns.



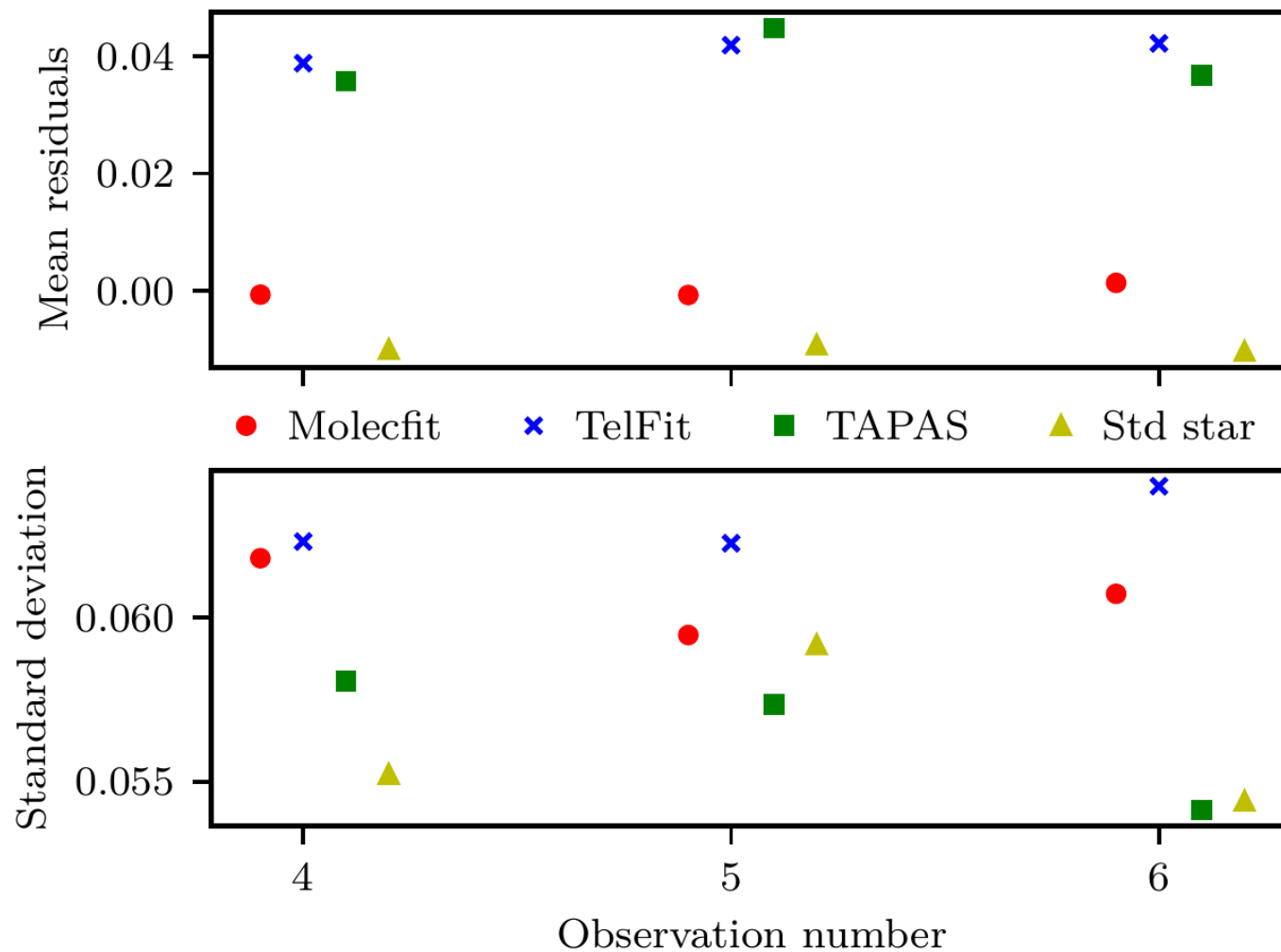
# SCATTER EVOLUTION

with **AIRMASS** and **RELATIVE HUMIDITY**



# COMPARISON TELLURIC CORRECTIONS

Residuals inside the telluric lines in the wavelength range dominated by **oxygen absorption**.

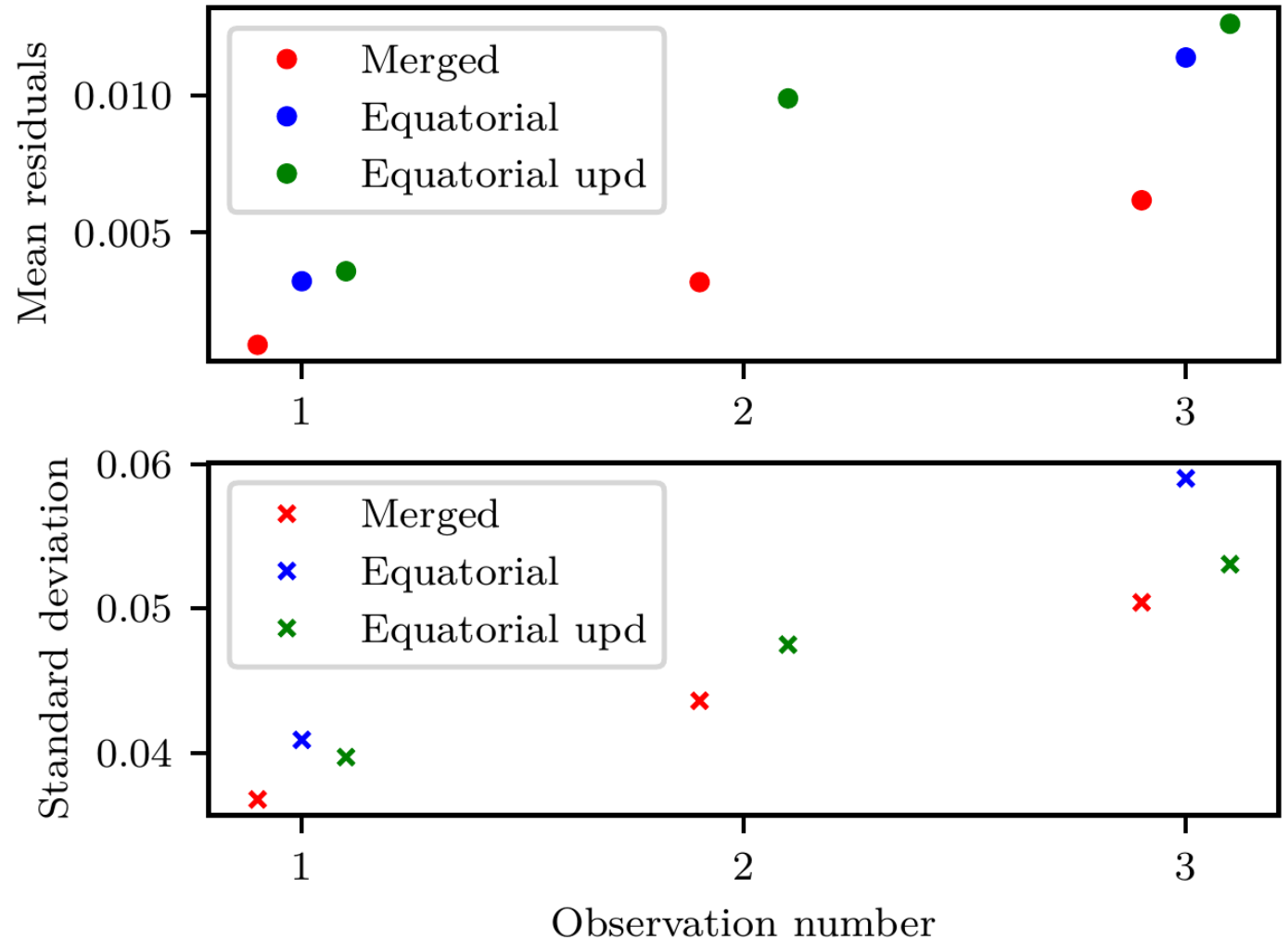


# IMPORTANCE ATMOSPHERIC PROFILE

Merged profile:  
EMM + GDAS +  
averaged profile

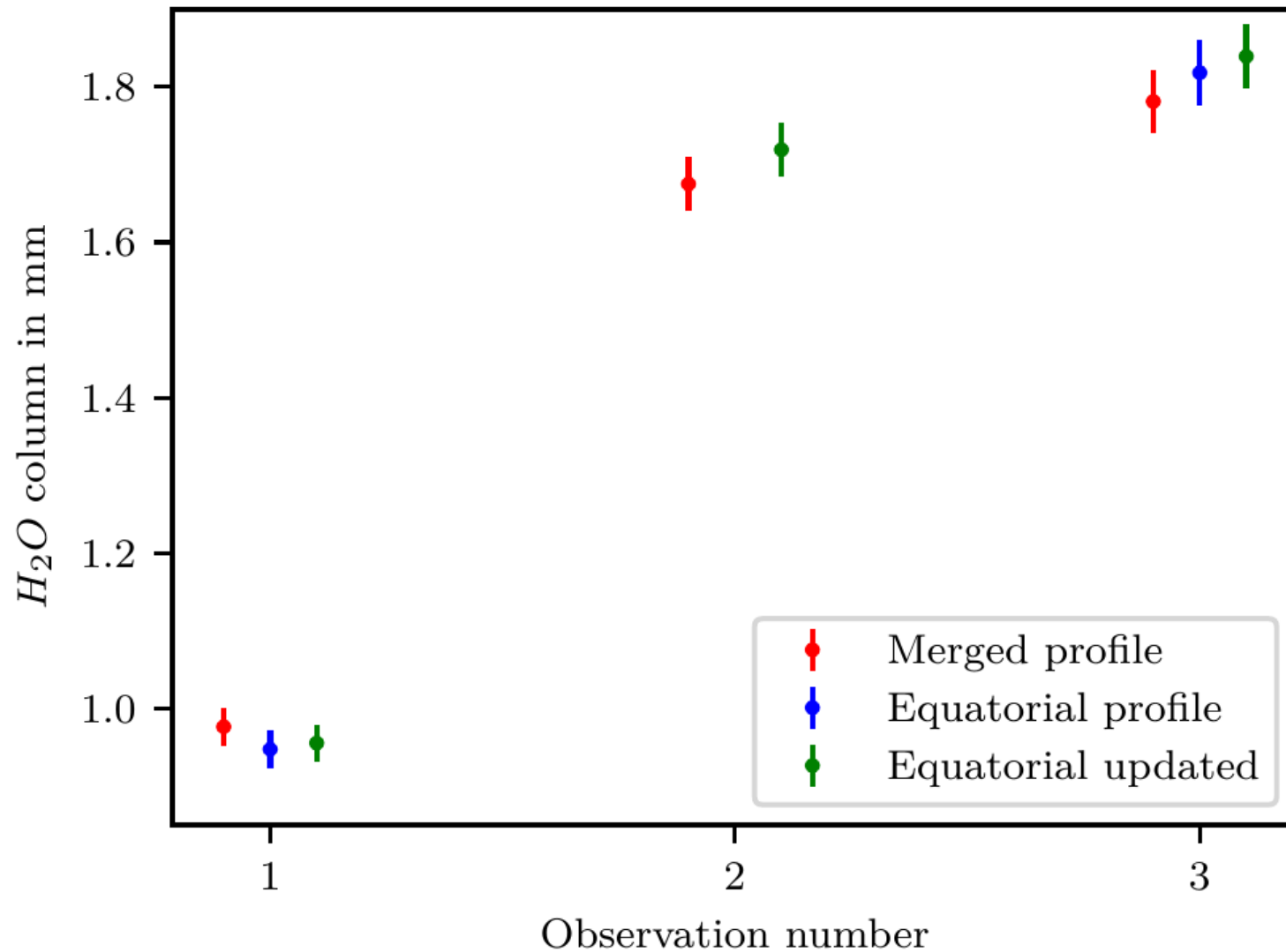
Equatorial profile:  
yearly averaged  
atmospheric profile

Equatorial profile  
updated:  
profile updated with  
humidity values from a  
first telluric correction



# WATER COLUMN RESULTS

All atmospheric profiles lead to water column values which are **in agreement** within the error bars.





# CONCLUSIONS

- Water lines: synthetic transmission methods correct best  
scatter is 1.3 times higher with the standard star
- Oxygen lines: standard star method corrects best  
scatter is 1.2 times smaller with the standard star  
Molecfit has a comparable level of correction
- Use of tailored atmospheric profile improves the correction level  
scatter 2 times smaller