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Water Vapor Correction: Application and Validation

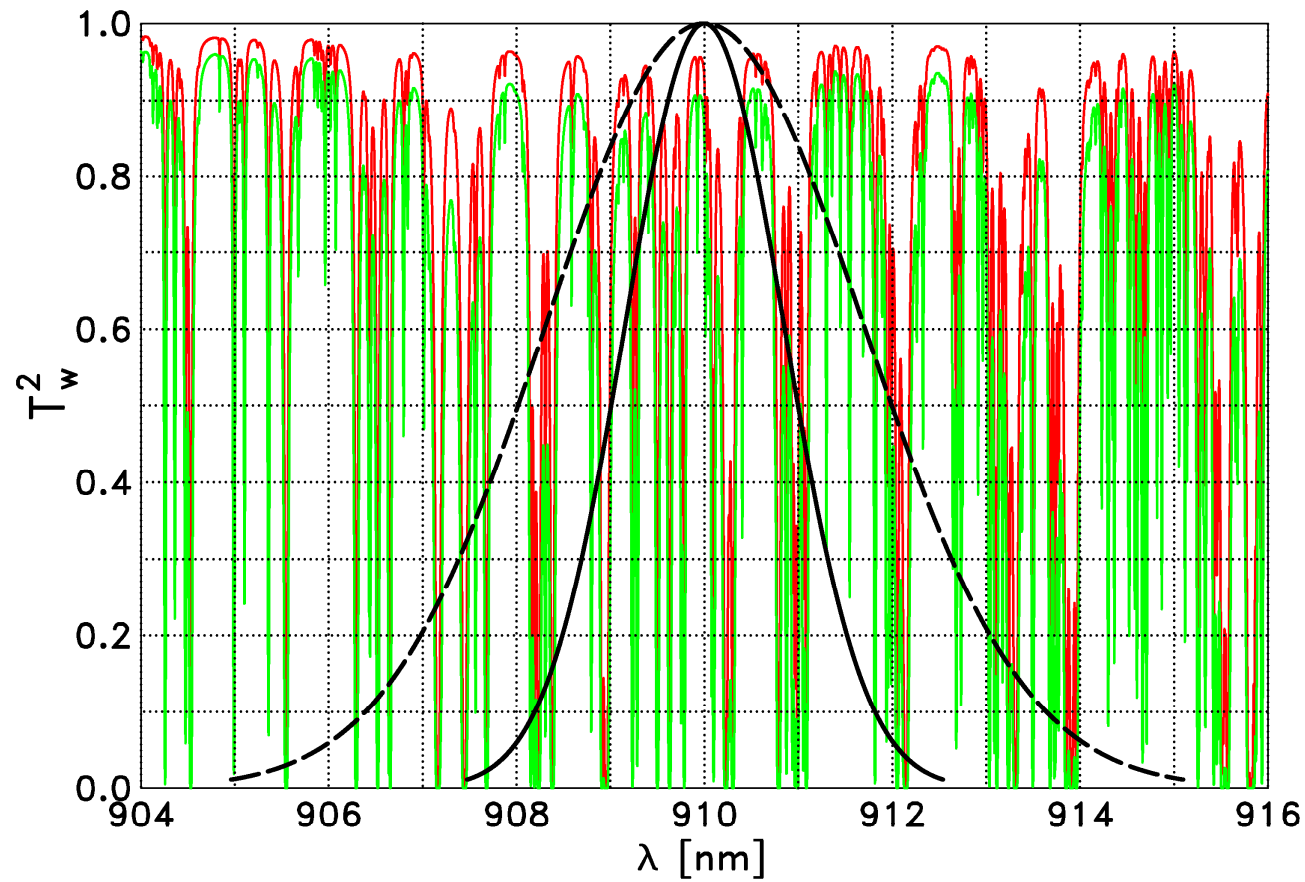
Contribution to CeiLinEx 2015

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The Underlying Problem



Outline of the Concept

Calculate effective water vapor transmission
(i.e. one profile $T_{w,eff}(z)$ representative for „broad“ emission spectrum)

Correct ceilometer signal for water vapor absorption

Invert this signal as a „normal“ signal for aerosol backscatter coefficient

For details see:

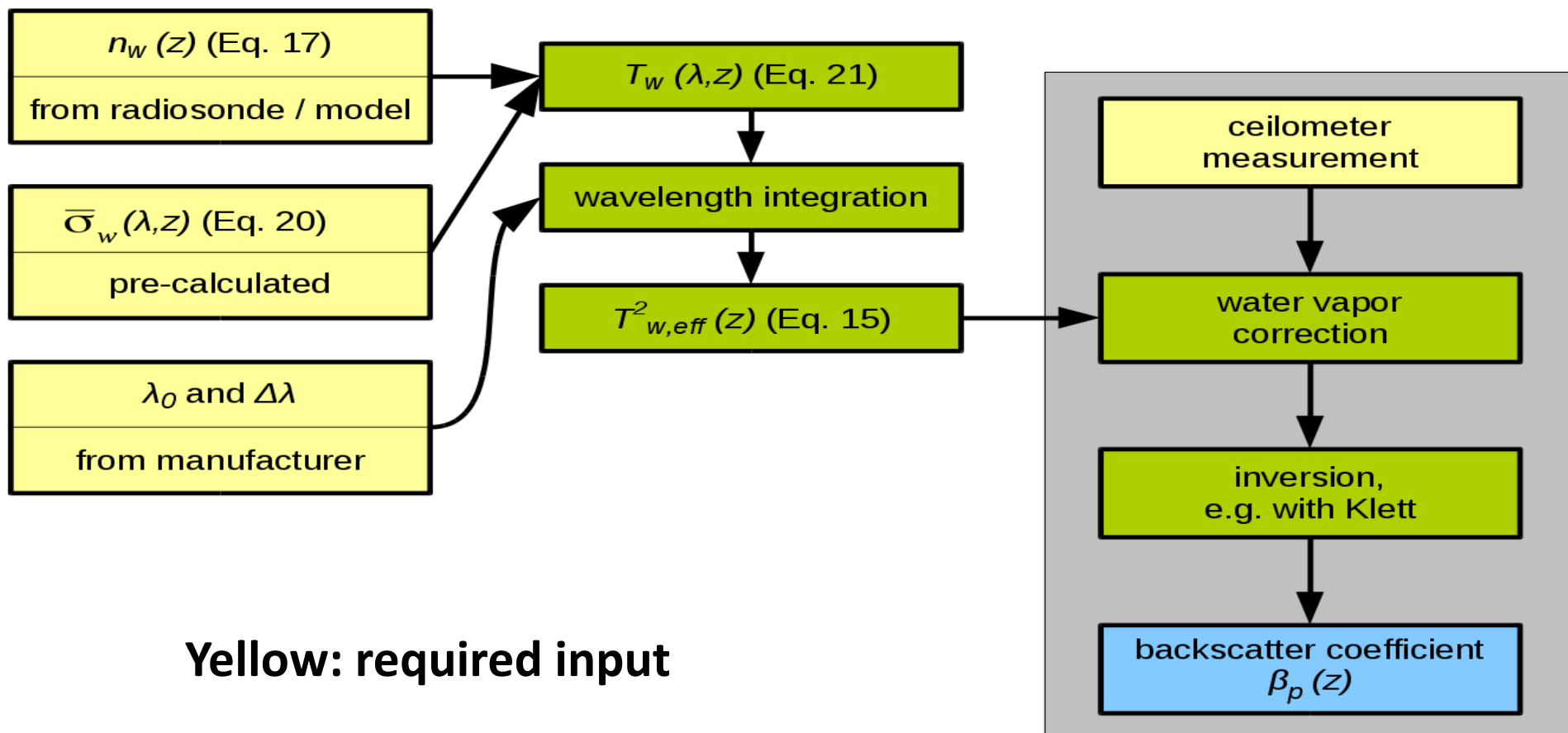
Wiegner, M. and Gasteiger, J.:

Correction of water vapor absorption for aerosol remote sensing with ceilometers

Atmos. Meas. Tech., 8, 3971-3984, doi:10.5194/amt-8-3971-2015, 2015.



Outline of the Concept



What to do within CeiLinEx 2015?

Input

Water vapor number density (from radiosondes, should be available)

Mean spectral absorption cross sections (are available)

Central wavelength and spectral width (from manufacturer or estimated) *

Ceilometer signals from CL51 and CL31 (should be available)

* Further input from partners desirable, ** further Input required





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What to do within CeiLinEx 2015?

Aerosol retrieval

Determination of effective water vapor transmission

Correction for water vapor

Inversion for $\beta_p(z)$ @ 910 nm, calibration required *



What to do within CeiLinEx 2015?

Validation

Select golden cases **

Determine coincident profiles of $\beta_p(z)$ @ 1064 nm (or @ 532 nm)
(from CHM15k, CHM15kx or lidar or ...) **

Extrapolate to $\beta_p(z)$ @ 910 nm using independent information **
(wavelength dependence of aerosol backscatter, sun photometer)

„Validation“ or „comparison“ or „plausibility check“ or ...





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Time Schedule

Input: straight forward, i.e. hopefully fast

Aerosol retrieval: selection of cases and calibration can be time consuming

Validation: unknown (in particular if the profiles do not agree well)





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Conclusion

A lot of work

