Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2016-266-RC2, 2017

Atmospheric Measurement Techniques Discussions

Interactive comment on "Quantitative analysis of the radiation error for aerial coiled fiber–optic Distributed Temperature Sensing deployments using reinforcing fabric as support structure" *by* Armin Sigmund et al.

Anonymous Referee #3

Received and published: 12 March 2017

The paper describes analysis of radiation error of a specific implementation of fiber-optic Raman scatter DTS aimed at profiling temperature in the atmospheric surface layer. The DTS system with coiled glass fiber is supported with meshed fabric to keep the shape and mounted on a small masts of ∼3m and ∼5m heights to profile air temperature in two locations over ground and water. Radiative heating and cooling of such structure is non-negligible, thus, in order to measure temperature of the air corrections for these effects are necessary. Detailed analysis of these corrections is the core of the paper. The authors developed and tested a simple energy balance model of the measurement system. This model allowed to estimate temperature corrections. The

temperatures retrieved after correction (using two slightly different models accounting or not accounting for heat conduction) were compared to air temperatures measured by reference thermometers at 2m height indicating a reasonable agreement. The prosed approach is a step forward in temperature profiling the atmospheric surface layer and the paper is suitable for AMT, but requires enhanced discussion before final acceptance.

Remarks.

1) Discuss, please, briefly, time response to variations in solar radiation and wind velocity – might be important for variable solar fluxes due to cloudiness and fluctuating wind speeds. Is it possible that some of the noise in Ta-Tf results from effectively different filtering (averaging) of Ta and Tf?

2) Fig. 5 documents a systematic offset between DTS and reference temperatures over a meadow and underestimate of an amplitude of correction over a lake. Behavior of the proposed corrections seems to be dependent on the localization of the measurement site. Discuss more, please, taking into account different reference thermometers in both localizations. Do you have a crude idea which terms in the energy balance model contribute mostly to these differences?

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2016-266, 2016.