



Dual Laser Beam Attenuation Processing: A Method for Line-averaging of Air Temperature

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In local scale there is a demand to measure horizontal air temperature averaged over farming and horticulture plots for frost point monitoring and evapotranspiration calculations. Using several dry bulb thermometers is problematic. This work then attends to laser instrumentation of air thermometry. The attenuation of laser beams from Rayleigh scattering has been applied for this purpose. The ratio of attenuation quantity for two isosceles parallel laser beams (850nm and 1064nm with 5W output) led to independent line-averaging of air temperature from transmission path-lengths. Typical measurements have been executed over 400x200 m² garden. Digital resolution is 0.1°C but spatial resolution is quite fine. One of the advantages of dual signal processing is the filtration of ambiguities caused by beam scintillations. Usage of this instrument is recommended over plane area or in green-houses and limited by topography. Applicability may be extended to other studies such as micrometeorology and propagation experiments.